IIPM—SCHOOL OF ENGINEERING & TECHNOLOGY
MANDATORY DISCLOSURES

Sl. No	Mandatory Disclosure sub titles	Details / contents
1	**Name of the Institution** • Address including Telephone, mobile,e-mail	**IIPM SCHOOL OF ENGINEERING & TECHNOLOGY** At/PO: Kansbahal-770 034, Near Rourkela Dist. Sundargarh, Odisha Tel: 066624-280576, e-mail : principaldiploma@iipm.ac.in
2	**Name & Address of the Society** Address including Telephone, mobile,e-mail	**Indian Institute for Production Management** At/PO: Kansbahal-770 034, Near Rourkela Dist. Sundargarh, Odisha Tel: 066624-280576, e-mail : info@iipm.ac.in
3	**Name & Address of the Principal** Address including Telephone, mobile, e-mail	**Er. Prashanta Kumar Dehury** At/PO: Kansbahal-770 034, Near Rourkela Dist. Sundargarh, Odisha Tel: 066624-280323, Mob. 8599004706,7008353610 e-mail : principaldiploma@iipm.ac.in
4	**Name of the Affiliating University**	**State Council of Technical Education & Vocational Training , Odisha**
5	**Governance** • Members of the Board and their brief background	**Attached**
	• Members of the Academic Advisory Body	**Annexure-5 (i)**
	• Frequency of the Board Meeting and Academic Advisory Body	**Half-yearly**
	• Organisational Chart and processes	**Annexure-5 (ii)**
	• Nature and extent of involvement of faculty and students in academic affairs / improvements	• Faculty used to prepare lecture notes, lesson plan and give presentation to the before advising committee before going to the class. • Students are given extra hours to clear their doubts. Students are given soft skill training for overall development
	• Mechanism/ norms and procedures for democratic / good governance	• Board of Governors prepares policies. • Principal execute the policies. • A student committee has been formed and student related activities are discussed anddecided by students in presence of teachers.
	• Student feedback on institutional governance / faculty performance	• Feedback system is very exhaustive and it is done in every three months. • Institutional Governance is also evaluated by students and staff in a ten points scale every year. • Board of Governance also asks for summaryof feedback frequently.

	• Grievance redressal mechanism for faculty , staff and student.	• A Redressal committee comprising of faculties and student has been formed. • Any complain or grievances are taken before committee for amicable solution. • Grievances of serious nature are forwarded to the Principal.
	• Establishment of Anti-ragging Committee	**Annexure-5 (iv)**
	• Establishment of online grievance redressal mechanism .	
	• Establishment of Grievance redressal committee in the institution and appointment of ombudsmen by the University,	**Under process**
	• Establishment of Internal complaint Committee (ICC)	**Annexure-5 (vi)**
	• Establishment of Committee for SC/ST	**Annexure-5 (vii)**
	• Internal Quality Assurance Cell	**Annexure-5 (viii)**
6	Programmes • Name of Programmes approved by AICTE	**DIPLOMA IN MECHANICAL ENGINEERING** **&** **DIPLOMA IN MINING ENGINEERING**

	• Name of Programmes Accredited by AICTE • Status of Accreditation of the Courses • Total number of Courses • No. of Courses for which applied for Accreditation • Status of Accreditation – Preliminary/ Applied for SAR and results awaited/ Applied for SAR and visits completed/ Results of the visits awaited/ Rejected/ Approved for ….. Courses • For each Programme the following details are to be given: • Placement Facilities • Campus placement in last three years with minimum salary, maximum salary and average salary • Name and duration of programme(s) having Twinning and Collaboration with Foreign University(s) and being run in the same Campus along with status of their AICTE approval. If there is Foreign Collaboration, give the following details: • Details of the Foreign University • Name of the University • Address • Website • Accreditation status of the University in its Home Country • Ranking of the University in the Home Country • Whether the degree offered is equivalent to an Indian Degree? If yes, the name of the agency which has approved equivalence. If no, implications for students in terms of pursuit of higher studies in India and abroad and job both within and outside the country • Nature of Collaboration • Conditions of Collaboration • Complete details of payment a student has to make to get the full benefit of Collaboration	**Nil** **To be applied** **One** **Nil** **-** **Yes** **Annexure-6** **N.A.** **N.A.**

	• For each Programme Collaborated provide the following: • Programme Focus • Number of seats • Admission Procedure • Fee • Placement Facility • Placement Records for last three years with minimum salary, maximum salary and average salary • Whether the Collaboration Programme is approved by AICTE? If not whether the Domestic/Foreign • University has applied to AICTE for approval	**N.A.**

SL.NO.	Name of the programme	No. of Seats	Duration	Cut-off mark for admission	Fees
1	Diploma in Mechanical Engineering	60	3years	35%	25,800/year
2	Diploma in Mining Engineering	60	3years	35%	25,800/year

7	**Faculty** • Permanent Faculty • Adjunct Faculty • Permanent Faculty: Student Ratio • Number of Faculty employed and left during the last three years	 **17** **Nil** **17 : 360** **Employed :4** **Left : 1**

8	**Profile of Director/ Faculty** **For each Faculty give a page covering with Passport size photograph** i. Name ii. Date of Birth iii. Unique id iv. Education Qualifications v. Work Experience • Teaching • Research • Industry • others vi. Area of Specialization vii. Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level viii. Research guidance • No. of papers published in National/ International Journals/ Conferences • Master • Ph.D. ix. Projects Carried out x. Patents xi. Technology Transfer xii. Research Publications xiii. No. of Books published with detail	**Annexure- 8**
9	**Fee** • Details of fee, as approved by State Fee Committee, for the Institution • Time schedule for payment of fee for the entire programme • No. of Fee waivers granted with amount and name of students • Number of scholarship offered by the Institution, duration and amount • Criteria for fee waivers/scholarship • Estimated cost of Boarding and Lodging in Hostels	• The fee of the institute is charged as per the guidelines published by DTET, Odisha from time to time • The Time Schedule for payment of fee for the entire programme is before the commencement of the academic session • No. of fee waivers granted is 5% of total intake capacity. As per the govt. guidelines the fee waivers are treated as TFW category students. • The institute helps the students to apply and avail various Government Scholarships from the State as well as Central Government. • As per the guidelines of Government. • The Boarding and Lodging cost of both Boys and Girls Hostel is ₹ 48000/- per Year.
10	**Admission(For Last 3 years)**	

Sl. No.	Course Offered	Academic year	No. of Admitted Students
1	Diploma in Mechanical Engg.	2023-24	69
2	Diploma in Mining Engg.	2023-24	66
3	Diploma in Mechanical Engg.	2024-25	73
4	Diploma in Mining Engg.	2024-25	69
5	Diploma in Mechanical Engg.	2025-26	63
6	Diploma in Mining Engg.	2025-26	64

11	**Admission Procedure**	As per the guidelines of Directorate of Technical Education & Training, Odisha.

	• Mention the admission test being followed, name and address of the Test Agency and its URL(website) • Number of seats allotted to different Test Qualified candidate separately (AIEEE/ CET (State conducted test/ University tests/ CMAT/ GPAT)/ Association conducted test) • Calendar for admission against Management/vacant seats: • Last date of request for applications • Last date of submission of applications • Dates for announcing final results • Release of admission list (main list and waiting list shall be announced on the same day) • Date for acceptance by the candidate (time given shall in no case be less than 15 days) • Last date for closing of admission • Starting of the Academic session • The waiting list shall be activated only on the expiry of date of main list • The policy of refund of the fee, in case of withdrawal, shall be clearly notified	https://skill.samsodisha.gov.in/diploma.aspx Directorate of Technical Education & Training, Odisha. 1. Diploma in Mechanical Engg.-60nos. 2. Diploma in Mining Engg.-60nos. • As per the guidelines of Directorate of Technical Education & Training, Odisha. • **As per** SCTE&VT, Odisha. • **N.A.** • **Yes.**
12	**Criteria and Weightages for Admission** • Describe each criterion with its respective weightages i.e. Admission Test, marks in qualifying examination etc. • Mention the minimum level of acceptance, if any • Mention the cut-off levels of percentage and percentile score of the candidates in the admission test for the last three years • Display marks scored in Test etc. and in aggregate for all candidates who were admitted	**Not applicable**
13	**List of Applicants** • List of candidate whose applications have been received along with percentile/percentage score for each of the qualifying examination in separate categories for open seats. List of candidate who have applied along with percentage and percentile score for Management quota seats	**Not applicable**

14	• Results of Admission Under Management seats/Vacant seats • Composition of selection team for admission under Management Quota with the brief profile of members (This information be made available in the public domain after the admission process is over) • Score of the individual candidate admitted arranged in order or merit • List of candidate who have been offered admission • Waiting list of the candidate in order of merit to be operative from the last date of joining of the first list candidate • List of the candidate who joined within the date, vacancy position in each category before operation of waiting list	**Not applicable**
15	• Information of Infrastructure and Other Resources Available • Number of Class Rooms and size of each • Number of Tutorial rooms and size of each • Number of Laboratories and size of each • Number of Drawing Halls with capacity of each • Number of Computer Centers with capacity of each • Central Examination Facility, Number of rooms and capacity of each • Barrier Free Built Environment for disabled and elderly persons • Occupancy Certificate • Fire and Safety Certificate • Hostel Facilities **Library** • Number of Library books/ Titles/ Journals available (program-wise) • List of online National/ International Journals subscribed • E- Library facilities • Laboratory and Workshop	**Annexure-15** **yes** **yes** **Yes** **Yes** **Programme : Diploma in Mechanical & Mining Engg.** **Volume : 4254 , Title : 504** **Journals – Annexure – 15 (i)** **NA** The Institute has a well-equipped all Laboratory to cater the needs of the Diploma Mechanical & mining Students.

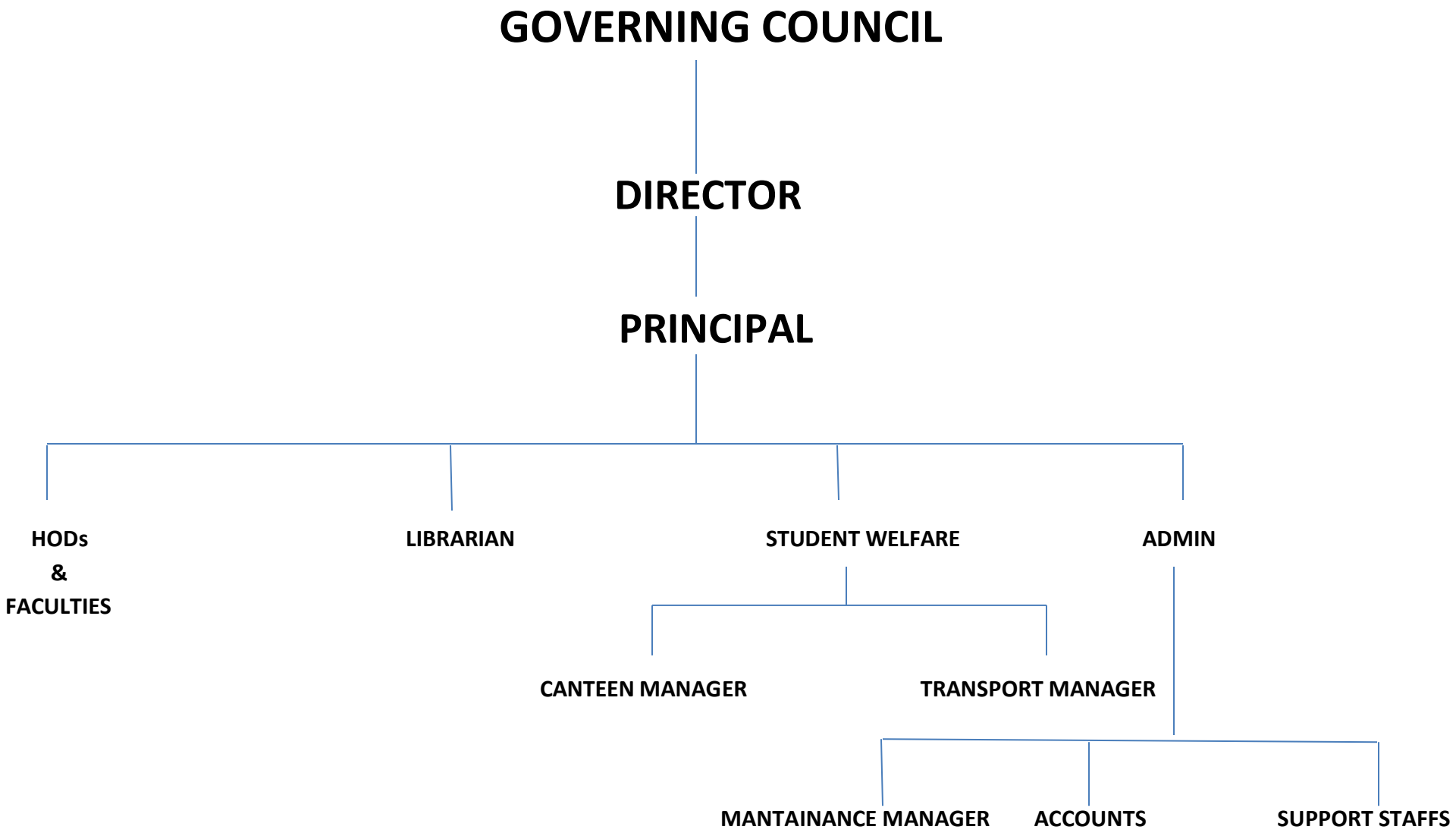
	• List of Experimental Setup in each Laboratory/ Workshop **Computing Facilities** • Internet Bandwidth • Number and configuration of System • Total number of system connected by LAN • Total number of system connected by WAN • Major software packages available • Special purpose facilities available • Innovation Cell • Social Media Cell • Compliance of the National Academic Depository (NAD), applicable to PGCM/ PGDM Institutions and University Departments **List of facilities available** • Games and Sports Facilities • Extra-Curricular Activities • Soft Skill Development Facilities **Teaching Learning Process** • Curricula and syllabus for each of the programmes as approved by the University • Academic Calendar of the University • Academic Time Table with the name of the Faculty members handling the Course • Teaching Load of each Faculty • Internal Continuous Evaluation System and place • Student's assessment of Faculty, System in place **For each Post Graduate Courses give the following:** • Title of the Course • Curricula and Syllabi • Laboratory facilities exclusive to the Post Graduate Course **Special Purpose** • Software, all design tools in case • Academic Calendar and frame work	. . **N.A.** **32 Mbps** **All** **All** **Yes** **Yes** **Yes** **N.A.** **Yes** **Yes** **Yes** **As per SCTE&VT, Odisha,** **Annexure- 15(ii)Annexure-15(iii)** **Annexure – 15 (iv)** **NA** **Windows,CAD/CAM** **YES**
16	**Enrolment of students in the last 3 years(Including Lateral entry students)**	**Academic Year 2023- 135** **Academic Year 2024- 142** **Academic Year 2025 - 127**
17	**List of Research Projects/ Consultancy Works** • Number of Projects carried out,	**N.A.**

	funding agency, Grant received • • Publications (if any) out of research in last three years out of masters projects • Industry Linkage • MoUs with Industries (minimum 3)	
18	**LoA and subsequent EoA till the current Academic Year**	**Annexure-18**
19	**Accounted audited statement for the last three years**	**Annexure-19**
20	**Best Practices adopted, if any**	**Green Campus and Clean Campus Initiative**: **Indian Institute for Production Management (popularly known as IIPM)** has significant greenery covering all parts of the campus which enhances its beauty and also attracted the attention of the visitors. The beautiful green garden and the flowers are not only the reason of appreciation but also we pay special attention to the cleanliness of the campus. More green campus initiative is being taken to hand as we are planning for waste water treatment and rain water harvesting. **Discipline and Timeliness:** Discipline and timeliness are our core values. All the staffs and students value time and care for discipline. We have a goal to imbibe these values within our students to be a successful professional in life.

STRUCTURE OF GOVERNING BODY
IIPM-SCHOOL OF ENGINEERING & TECHNOLOGY, KANSBAHAL

SL.NO.	Name	Designation	Nominated by
1.	Shri. Anup Sahay	Chairman	Society
2.	Shri. Arun Kumar Mishra	Member Secretary	Society
4.	Shri Prashanta Kumar Dehury	Member	Society
5.	Shri Asish Kumar Dash	Member	Institute
6.	Ms. Sritprava Sahoo	Member	Institute
7.	Nominee from SCTE&VT	Member	Affiliating Council/Board
8.	Nominee from AICTE	Member	AICTE
9.	Nominee from Industry	Member	Industry
10.	Nominee from Industry	Member	Industry
11.	Educationist	Member	Institute
12.	Educationist	Member	Institute
13.	Industrialist	Member	Industry
14.	Nominee from State Government	Member	State Government

ORGANISATION CHART (ANNEXURE-5 (ii))



Anti-ragging Committee at IIPM – School of Engineering & Technology

Ragging is a practice in educational institutions that involves existing students baiting or bullying new students. In the name of introduction or initiation, millions of students are brutally abused in many educational institutions. Historically originated, probably, to generate fellow-feeling or camaraderie and the ability to work in a team, it has metamorphosed into something else. It often takes a malignant form wherein the newcomers may be subjected to psychological or physical torture.

Under the pretext of 'welcoming' new students to the college, ragging is a notorious practice that gives senior students an excuse to harass their junior counterparts and make them easy targets to satiate their own perverse sadistic pleasures.

What Is Ragging

(As defined by the Hon'ble Supreme Court of India)

Any disorderly conduct whether by words spoken or written, or by an act which has the effect of teasing, treating or handling with rudeness any other student, indulging in rowdy or undisciplined activities which causes or is likely to cause annoyance, hardship or psychological or physical harm or to raise fear or apprehension thereof in a fresher or a junior student and which has the effect of causing or generating a sense of shame or embarrassment so as to adversely affect the physique or psyche of a fresher or a junior student.

Punishment for Ragging:

Ragging within or outside the educational institution is prohibited. Whoever directly or indirectly commits, participates in, abets or instigates ragging inside or outside the educational institution shall be suspended, expelled or rusticated from the institution and shall also be liable to fine. The punishment includes rigorous imprisonment, cancellation of admission, suspension from attending classes, withholding/ withdrawing fellowships/ scholarships and other financial benefits, withholding or cancelling the results.

Depending upon the nature and gravity of the offence as established by the Anti-Ragging Committee of the Institution, the possible punishments for those found guilty of ragging shall be any one or any combination of the following:

Suspension from attending classes and academic privileges

withholding / withdrawing scholarship / fellowship and other benefits

Forfeiting Campus Placement opportunities / recommendations

Debarring from appearing in any test/examination or other evaluation process

withholding of results

Debarring from representing the institution in any regional, national or international meet, tournament, youth festival etc.

Suspension/ expulsion from the hostel

Cancellation of Admission

Rustication from the institution for a period, ranging from 1 to 3 years

Expulsion from the institution and consequent debarring from admission to any other institution for a specific period

Fine of Rupees 25,000/-

Collective punishment: When the persons committing or abetting the crime of ragging are not identified, the institution shall resort to collective punishment as a deterrent to ensure community pressure on the potential raggers.

In addition, in case of every single incident of ragging, a First Information Report (FIR) will be filed with the local police authorities. The possible punishment includes rigorous imprisonment (in compliance with the order of Supreme Court of India).

In the case of any ragging incident, the students may immediately call and bring it to the notice of the members of the Anti-Ragging committee for necessary help, guidance and actions.

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY

(A Unit of Indian Institute for Production Management)

Kansbahal, Near L&T Campus, Sundargarh, Odisha-770034

E Mail: **principaldiploma@iipm.ac.in** , Website: **www.iipmset.ac.in**, Toll Free: **1800 – 120 - 5444**

Approved by AICTE – New Delhi and Affiliated to SCTE & VT – Odisha

IIPM-SET/278
31st July 2025

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY IIPM-SET KANSBAHAL, ODISHA 770034

Internal Complaints Committee (ICC)

Order No.: SDTE-OE-I-ESTT-0016-2018/4697 SDTE

Reference: In compliance with the Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013.

Purpose:

To constitute an Internal Complaints Committee (ICC) at **IIPM School of Engineering & Technology** to prevent, prohibit, and redress sexual harassment of women at the workplace.

Composition of ICC

S. No	Name of the Member	Designation	Position in ICC	Contact Details
1.	Dr.Saritprava Sahoo	Presiding Officer (Senior female faculty)	Chairperson	7750085070
2.	Mrs.Jharana Pujahari	Faculty Member	Member	8763526835
3.	Er.Mousumibala Panda	Faculty Member	Member	8763800535
4.	Mrs. Rashmita Maharana	Non-Teaching Staff	Member	6371167564
5.	Mrs.Hema Ekka	External Member (NGO)	External Member	9437434668
6.	BK Damayanti Satapathy	External Member (NGO)	External Member	8249034782
7.	Ms Shrutimayee Mahanta	Student Representative	Member(Student)	7848046272
8.	Ms Akankshya Mishra	Student Representative	Member(Student)	8260878001
9.	Ms Sneha Mahanta	Student Representative	Member(Student)	9040023553
10	Ms Divya Jena	Student Representative	Member(Student)	7008537773
11	Er.Prasanna Mohanty	Faculty Member	Member	8249878586

Functions of the ICC:

1. To receive complaints of sexual harassment.
2. To conduct inquiries and recommend actions.
3. To organize awareness and sensitization programs.
4. To ensure a safe and secure environment for all.

Copy to:

1. All Members.
2. Director's Office
3. Admin Office

Shrutimayee Mahanta
Akankshya Mishra.
Divya Jena
Sneha Mahanta
Prasanna Mohanty.
Saritprava Sahoo
Mousumibala Panda
Jharana Pujahari
Rashmita Maharana

31-7-25
PRINCIPAL
IIPM-SET
Principal
IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
KANSBAHAL ROURKELA

November 19, 2024

ESTABLISHMENT OF SC&ST COMMITTEE

The SC&ST cell for IIPM SCHOOL OF ENGINEERING & TECHNOLOGY is hereby formed for the betterment of students & the cell work as per the UGC guidelines to curb any discrimination against the students in the college premises.

The cell comprise of following members.

1. *Mr. Akshaya Kumar Sethi* — *Librarian*
2. *Mr. Biswajit Mohanta* — *Lecturer*
3. *Mrs. Rosmala Bilung* — *Technician*
4. *Mr. Sanjay Kumar Majhi* — *Lecturer*
5. *Mr. Jiten Barla* — *Technician*

PRINCIPAL
IIPM-SET

Principal
IIPM-SCHOOL OF ENGINEERING & TECHNOLOGY
Kansbahal, Odisha - 77 0034

ANNEXURE-6

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY

CAMPUS PLACEMENTDURING LAST THREE YEARS

YEAR	STUDENTS ELIGIBLE FOR PLACEMENT	STUDENTS PLACED	MINIMUM SALARYRS. IN LAKHS(ANNUM)	MAXIMUM SALARY RS. IN LAKHS(ANNUM)
2023-24	124	64	2.0	3.6
2024-25	130	57	2.4	3.4
2025-26	118	59	2.4	3.6

ANNEXURE-8

PROFILE OFTHE PRINCIPAL

i	Name	PRASHANTA KUMAR DEHURY
ii	Date of Birth	25/06/1987
iii	Unique id	1-3642163602
iv	Education Qualifications	B. Tech, M. Tech, Ph.D (cont..)
v	Work Experience	
	• Teaching	16
	• Research	0
	• Industry	0
	• others	0
vi	Area of Specialization	VLSI
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	DIPLOMA
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	06
	• Master	-
	• Ph.D.	Cont..
ix	Projects Carried out	-
x	Patents	01
xi	Technology Transfer	-
xii	Research Publications	-

FACULTY PROFILE

i	Name	Asish Kumar Dash
ii	Date of Birth	01-05-1988
iii	Unique id	1-3641559686
iv	Education Qualifications	M Tech (CSE), B Tech (CS&E)
v	Work Experience	
	• Teaching	15 Years
	• Research	NIL
	• Industry	NILL
	• others	NIL
vi	Area of Specialization	Computer Science & Engineering
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	DIPLOMA
viii	Research guidance	NIL
	• No. of papers published in National/ International Journals/ Conferences	NIL
	• Master	NIL
	• Ph.D.	NO
ix	Projects Carried out	NA
x	Patents	NA
xi	Technology Transfer	NA
xii	Research Publications	NA

i	Name	PRASHANTA KUMAR DEHURY
ii	Date of Birth	25/06/1987
iii	Unique id	1-3642163602
iv	Education Qualifications	B. Tech, M. Tech, Ph.D (cont..)
v	Work Experience	
	• Teaching	16
	• Research	0
	• Industry	0
	• others	0
vi	Area of Specialization	VLSI
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	DIPLOMA
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	06
	• Master	-
	• Ph.D.	Cont..
ix	Projects Carried out	-
x	Patents	01
xi	Technology Transfer	-
xii	Research Publications	-

i	Name	SOUMYA RANJAN DASH
ii	Date of Birth	14/05/1993
iii	Unique id	1-4712321954
iv	Education Qualifications	B.Sc.,M.Sc.
v	Work Experience	9
	• Teaching	9
	• Research	NIL
	• Industry	NIL
	• others	NIL
vi	Area of Specialization	GEOLOGY
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	DIPLOMA
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	NIL
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

i	Name	Mausumi Bala Panda
ii	Date of Birth	12/12/1985
iii	Unique id	1-3641875723
iv	Education Qualifications	B.Tech(EE),M.Tech
v	Work Experience	
	• Teaching	1 8Years
	• Research	
	• Industry	NIL
	• others	
vi	Area of Specialization	ELECTRICAL ENGINEERING
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post GraduateDiploma Level	DIPLOMA
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	NIL
	• Master	NIL
	• Ph.D.	NO
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

i	Name	JHARANA PUJAHARI
ii	Date of Birth	23/07/1989
iii	Unique id	1-4432999751
iv	Education Qualifications	M.A ,M.Phil, PhD (Continuing)
v	Work Experience	9 Years
	• Teaching	8
	• Research	NIL
	• Industry	1
	• others	
vi	Area of Specialization	COMMUNICATIVE ENGLISH
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post GraduateDiploma Level	DIPLOMA
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	3
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NA
x	Patents	NA
xi	Technology Transfer	NA
xii	Research Publications	3

i	Name	BINODINI RATH
ii	Date of Birth	06/07/1989
iii	Unique id	1-9479602436
iv	Education Qualifications	B.Sc.,M.Sc.
v	Work Experience	4
	• Teaching	4
	• Research	NIL
	• Industry	NIL
	• others	NIL
vi	Area of Specialization	CHEMISTRY
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	DIPLOMA
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	NIL
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

i	Name	DEEPTIKANT SHARMA
ii	Date of Birth	08/05/1982
iii	Unique id	1-4712801304
iv	Education Qualifications	B.TECH
v	Work Experience	6
	• Teaching	6
	• Research	00
	• Industry	0
	• others	NIL
vi	Area of Specialization	SURVEY
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	DIPLOMA
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	NIL
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

i	Name	SACHIDANAND SWAR
ii	Date of Birth	04/09/1986
iii	Unique id	1-4864753776
iv	Education Qualifications	B.TECH
v	Work Experience	13
	• Teaching	4
	• Research	-
	• Industry	9
	• others	-
vi	Area of Specialization	ELECTRICAL MACHINARIES IN MINES
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	DIPLOMA
viii	Research guidance	-
	• No. of papers published in National/ International Journals/ Conferences	-
	• Master	-
	• Ph.D.	-
ix	Projects Carried out	-
x	Patents	-
xi	Technology Transfer	-
xii	Research Publications	-

i	Name	RAHUL SARAF
ii	Date of Birth	06/06/1991
iii	Unique id	1-4864787913
iv	Education Qualifications	B.Tech
v	Work Experience	
	• Teaching	2
	• Research	NIL
	• Industry	NIL
	• others	NIL
vi	Area of Specialization	MECHANICAL ENGINEERING
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	DIPLOMA
viii	Research guidance	NIL
	• No. of papers published in National/ International Journals/ Conferences	NIL
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

i	Name	BISWAJEET MOHANTA
ii	Date of Birth	15/12/1983
iii	Unique id	1-4864787920
iv	Education Qualifications	B.Tech
v	Work Experience	09
	• Teaching	4
	• Research	NIL
	• Industry	05 YEARS
	• others	NIL
vi	Area of Specialization	Mechanical engineering
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	diploma
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	NIL
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

i	Name	DR.SARITPRAVA SAHOO
ii	Date of Birth	01/07/1983
iii	Unique id	1-7392630628
iv	Education Qualifications	B.Tech, M.Tech , Ph.D
v	Work Experience	18
	• Teaching	15
	• Research	3
	• Industry	0
	• others	0
vi	Area of Specialization	THERMAL ENGINEERING & PRODUCTON ENGINEERING
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	DIPLOMA
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	0
	• Master	0
	• Ph.D.	0
ix	Projects Carried out	0
x	Patents	0
xi	Technology Transfer	0
xii	Research Publications	10

i	Name	SANJAY KUMAR MAJHI
ii	Date of Birth	05/01/1994
iii	Unique id	1-7437800836
iv	Education Qualifications	B.Tech
v	Work Experience	08
	• Teaching	06
	• Research	NIL
	• Industry	02 YEARS
	• others	NIL
vi	Area of Specialization	Mining Engineering
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	diploma
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	NIL
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

i	Name	PRASANNA MOHANTY
ii	Date of Birth	01/04/1992
iii	Unique id	1-9323098681
iv	Education Qualifications	B.Tech, M. Tech
v	Work Experience	
	• Teaching	12 Years
	• Research	NIL
	• Industry	NIL
	• others	NIL
vi	Area of Specialization	Production Engineering
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	diploma
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	01
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

i	Name	MOHAN KUMAR SAHOO
ii	Date of Birth	17/02/1970
iii	Unique id	1-9471409959
iv	Education Qualifications	MBA
v	Work Experience	
	• Teaching	1
	• Research	NIL
	• Industry	10
	• others	NIL
vi	Area of Specialization	MBA
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	diploma
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	00
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

i	Name	SUBODH KUMAR PATEL
ii	Date of Birth	16/07/1983
iii	Unique id	1-9470735228
iv	Education Qualifications	B.Tech, M. Tech
v	Work Experience	
	• Teaching	1
	• Research	NIL
	• Industry	NIL
	• others	NIL
vi	Area of Specialization	Thermography Engineering
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	diploma
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	00
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

i	Name	ARABINDA MOHANTY
ii	Date of Birth	04/07/1977
iii	Unique id	1-9481030015
iv	Education Qualifications	B. Tech
v	Work Experience	12
	• Teaching	2
	• Research	NIL
	• Industry	10
	• others	NIL
vi	Area of Specialization	POWER PLANT
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	DIPLOMA
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	NIL
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

i	Name	BHABANIKANTA PARIDA
ii	Date of Birth	28/10/1992
iii	Unique id	1-4864216311
iv	Education Qualifications	B. Tech
v	Work Experience	2
	• Teaching	2
	• Research	NIL
	• Industry	2
	• others	NIL
vi	Area of Specialization	MACHINE DESIGN
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	DIPLOMA
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	NIL
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

i	Name	ABHAY KUMAR MAHANTA
ii	DOB	13/03/1994
iii	Unique id	1-46574213903
iv	Education Qualifications	B. Tech
v	Work Experience	3
	• Teaching	1
	• Research	NIL
	• Industry	2
	• others	NIL
vi	Area of Specialization	MACHINE DESIGN
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	DIPLOMA
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	NIL
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

i	Name	ANURAG BEHRA
ii	DOB	10/11/1994
iii	Unique id	1-46574213642
iv	Education Qualifications	B. Tech
v	Work Experience	4
	• Teaching	2
	• Research	NIL
	• Industry	2
	• others	NIL
vi	Area of Specialization	THERMAL ENGINEERNG
vii	Courses taught at Diploma/ Post Diploma/ Under Graduate/ Post Graduate/ Post Graduate Diploma Level	DIPLOMA
viii	Research guidance	
	• No. of papers published in National/ International Journals/ Conferences	NIL
	• Master	NIL
	• Ph.D.	NIL
ix	Projects Carried out	NIL
x	Patents	NIL
xi	Technology Transfer	NIL
xii	Research Publications	NIL

ANNEXURE-15

INFRASTRUCTURE & OTHER RESOURCES

Room No	Room type (mention Class room / Lab / Toilet, etc.)	Carpet area (in m2)	Completion of Flooring	Completion of Walls and painting	Completion of Electrification and lighting
19	Class room	69	Yes	Yes	Yes
03	Class room	67	Yes	Yes	Yes
49	Class room	66	Yes	Yes	Yes
50	Class room	66	Yes	Yes	Yes
51	Class room	66	Yes	Yes	Yes
62	Class room	66	Yes	Yes	Yes
04	Tutorial room	34	Yes	Yes	Yes
18	Tutorial room	35	Yes	Yes	Yes
01	Laboratory	67	Yes	Yes	Yes
21	Laboratory	66	Yes	Yes	Yes
22	Laboratory	66	Yes	Yes	Yes
41	Laboratory	80	Yes	Yes	Yes
42	Laboratory	80	Yes	Yes	Yes
37	Laboratory	64	Yes	Yes	Yes
46	Laboratory	66	Yes	Yes	Yes
54	Laboratory	76	Yes	Yes	Yes
57	Laboratory	68	Yes	Yes	Yes
58	Laboratory	68	Yes	Yes	Yes
60	Laboratory	66	Yes	Yes	Yes
61	Language Laboratory	66	Yes	Yes	Yes
20	Indoor Gym	40	Yes	Yes	Yes
02	First Aid	10	Yes	Yes	Yes
05	Seminar Room	133	Yes	Yes	Yes
08	Board Room	21	Yes	Yes	Yes
07	Central Store	15	Yes	Yes	Yes
12	Stationary Store	10	Yes	Yes	Yes
10	Accounts	13	Yes	Yes	Yes
09	Training & Placement	50	Yes	Yes	Yes
13	Principal	21	Yes	Yes	Yes
14	House Keeping	16	Yes	Yes	Yes
15	Director Room	16	Yes	Yes	Yes
17	Server Room	6	Yes	Yes	Yes
6,23,24	Toilet (3 nos.)	33	Yes	Yes	Yes
26	Exam Office	40	Yes	Yes	Yes
27	Faculty Cabin	50	Yes	Yes	Yes
29	HOD Cabin	40	Yes	Yes	Yes
28	Department Office	40	Yes	Yes	Yes
25	Pantry	13	Yes	Yes	Yes
33	Drawing Hall	140	Yes	Yes	Yes
32,43,44	Library	300	Yes	Yes	Yes
30	DG & Maintenance	10	Yes	Yes	Yes
31	Meter Room	5	Yes	Yes	Yes
11	Central Store	15	Yes	Yes	Yes
34	Electrical Panel Room	13	Yes	Yes	Yes
36	Workshop	200	Yes	Yes	Yes
39	Additional Workshop	400	Yes	Yes	Yes
38	Kitchen/Cafeteria	200	Yes	Yes	Yes
64	Boys Common Room	38	Yes	Yes	Yes
55	Girls Common Room	35	Yes	Yes	Yes
40	General Office	150	Yes	Yes	Yes
45	Computer Centre	150	Yes	Yes	Yes
56,67	Ladies Toilet	62	Yes	Yes	Yes
52,63	Gents Toilet	76	Yes	Yes	Yes
65	Tutorial	38	Yes	Yes	Yes
47	Tutorial	38	Yes	Yes	Yes
48	Office	38	Yes	Yes	Yes

Annexure-15(i)

LIST OF JOURNALS

1. Journal of Recent Trends in Mechanics
2. Journal of Mechanical and Mechanics Engineering
3. IUP Journal of Mechanical Engineering
4. Mining Engineers Journal
5. Mining Machinery
6. Mining Geology

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA

TEACHING AND EVALUATION SCHEME FOR 1ST SEMESTER (Common to All ENGINEERING Programme) (W.e.f 2024-25)

Sl. No	Code No.	Course Title	Hours per week		Total contact hrs/ week	Credits	Evaluation Scheme			
			L	P			Internal Assessment/ Sessional	End Sem Exams	Exams (Hours)	Total
1	TH 1(a) TH 1(b)	Communication Skills in English Or Introduction to IT Systems	3	-	3	3	30	70	3	100
2	TH 2	Applied Physics-I	4	-	4	4	30	70	3	100
3	TH 3	Mathematics-I	4	-	4	4	30	70	3	100
4	TH 4(a) TH 4(b)	Fundamentals of Electrical & Electronics Engineering Or Engineering Mechanics	4	-	4	4	30	70	3	100
5	TH 5	Environmental Science	4	-	4	4	30	70	3	100
		TOTAL	**19**	**-**	**19**	**19**	**150**	**350**	**---**	**500**
6	PR 1(a) PR 1(b)	Communication Skills in English Lab OR Introduction to IT Systems Lab	-	4	4	2	25	---	---	25
7	PR 2	Applied Physics-I Lab	-	2	2	1	25	25	3	50
8	PR 3(a) PR 3(b)	Engineering Graphics OR Engineering Workshop Practice	-	4	4	2	25	75	4	100
9	PR 4(a) PR 4(b)	Fundamentals of Electrical & Electronics Engineering Lab Or Engineering Mechanics Lab	-	2	2	1	25	---	----	25
10	PR 5	Sports and Yoga	-	2	2	1	50	--	--	50
			-	14	14	7	150	100		
		TOTAL	**19**	**14**	**33**	**26**	**300**	**450**	**---**	**750**

Abbreviations: L-Lecturer, P-Practical. Each class is of 1 Hour duration

Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%

There shall be Induction Program before beginning of 1st Semester and Internships at the end of 2nd Semester Classes as per AICTE norm. The best of 2 IA conducted in a subject out of 20 marks to be considered. Assignment/ quiz etc. of 10 marks to be treated as part of IA. Besides this ,Monthly Test to be conducted for each subject. Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester. Club/Innovation/ Idea Tinkering Activities etc. shall be encouraged to be performed by students beyond the above stipulated hours.

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA

TEACHING AND EVALUATION SCHEME FOR 2nd SEMESTER (Common to All ENGINEERING Programme) (W.e.f 2024-25)

Sl. No	Code No.	Course Title	Hours per week		Total contact hrs/ week	Credits	Evaluation Scheme			
			L	P			Internal Assessment/ Sessional	End Sem Exams	Exams (Hours)	Total
1	TH 1(a) TH 1(b)	Communication Skills in English Or Introduction to IT Systems	3	-	3	3	30	70	3	100
2	TH 2	Applied Physics-II	4	-	4	4	30	70	3	100
3	TH 3	Mathematics-II	4	-	4	4	30	70	3	100
4	TH 4(a) TH 4(b)	Fundamentals of Electrical & Electronics Engineering Or Engineering Mechanics	4	-	4	4	30	70	3	100
5	TH 5	Applied Chemistry	4	-	4	4	30	70	3	100
		TOTAL	**19**	**-**	**19**	**19**	**150**	**350**	**---**	**500**
6	PR 1(a) PR 1(b)	Communication Skills in English Lab OR Introduction to IT Systems Lab	-	4	4	2	25	---	---	25
7	PR 2	Applied Physics-II Lab	-	2	2	1	25	25	3	50
8	PR 3(a) PR 3(b)	Engineering Graphics OR Engineering Workshop Practice	-	4	4	2	25	75	4	100
9	PR 4(a) PR 4(b)	Fundamentals of Electrical & Electronics Engineering Lab Or Engineering Mechanics Lab	-	2	2	1	25	---	----	25
10	PR 5	Applied Chemistry Lab	-	2	2	1	25	25	3	50
			-	14	14	7	125	125		
		TOTAL	**19**	**14**	**33**	**26**	**275**	**475**	**---**	**750**

Abbreviations: L-Lecturer, P-Practical. Each class is of 1 Hour duration

Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%

There shall be Induction Program before beginning of 1st Semester and Internships at the end of 2nd Semester Classes as per AICTE norm. The best of 2 IA conducted in a subject out of 20 marks to be considered. Assignment/ quiz etc. of 10 marks to be treated as part of IA. Besides this ,Monthly Test to be conducted for each subject. Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester. Club/Innovation/ Idea Tinkering Activities etc. shall be encouraged to be performed by students beyond the above stipulated hours.

Communication Skills in English(Revised)

Course Code- TH 1(a) (Common to 1st& 2nd Sem)

Period per week:	03	IA:	30 Marks
Total Period:	45	End Sem:	70 Marks
Timing of End Exam:	03 Hours	No of Credit:	03

Course outcomes:

At the end of this course, the students will be able to:

•Understand the meaning, process of communication, types of communication and barrier in communication and manner to communicate effectively.

•Comprehend soft skill and hard skill and to apply it in day to day life.

•Comprehend the seen passages and develop basic speaking and writing skills including proper usage of language and vocabulary so that they can become highly confident and skilled speakers and writers.

•Write personnel & business letter and drafting of notice and minutes of a meeting.

• Enhancement of vocabulary and apply English grammar rules correctly while framing a sentence, answer and writing letter, application etc and enhancement of vocabulary

Course Content

Unit-1 Communication: Theory and Practice (8 Hours)

- Basics of communication: Introduction, meaning and definition, process of communication
- Types of communication: formal and informal, verbal, non-verbal and barriers to effective communication
- **7** Cs for effective communication (considerate, concrete, concise, clear, complete, correct, courteous)
- Art of Effective communication
  - Choosing words
  - Voice
  - Modulation
  - Clarity
  - Time
  - Simplification of words
- Technical Communication

Unit-2 Soft Skills for Professional Excellence (5 Hours)

- Introduction: Soft Skills and Hard Skills
- Importance of Soft Skills
- Life Skills: Self-awareness and Self-analysis
- Applying Soft Skills across cultures

Unit-3: Reading Comprehension (12 hours)

Comprehension, vocabulary enhancement and grammar exercises based on reading of the following texts:

Section-1

- "An Astrologer's Day", "The Missing Mail", " Doctor's Word" by R.K. Narayan (*Malgudi Days*)
- "The Gift of the Magi" by O.Henry

Section-2

- "Stopping by Woods on a Snowy Evening" by Robert Frost,
- "Where the Mind is Without Fear" by Rabindranath Tagore

Unit-4: Professional Writing (10 hours)

- Summary writing and Report writing
- Letters: Business and Personal
- Drafting e-mail, notices, Minutes of a Meeting
- Filling-up different forms such as banks and on-line forms for placement

Unit-5: Vocabulary and Grammar (10 hours)

- Vocabulary of commonly used words
- Commonly used administrative terms (English only), One-word substitution, Parts of Speech, Active and Passive voice, Tenses , Punctuation

References:

1. M. Ashraf Rizvi. *Effective Technical Communication*. Mc-Graw Hill, 2002.
2. John Nielson. *Effective Communication Skills*. Xlibris, 2008.
3. *Roget's Thesaurus of English Words and Phrases*
6. Wren & Martin. *High School English Grammar and Composition*. S Chand,2024
7. A. J. Thomson & A. V. Martinet. *Practical English grammar*.Oxford University Press,1997
8. R.K.Narayan.*Malgudi Days*. Indian Thought Publications,2017
9. Sanjay.Kumar&Pushp.Lata. *Communication Skills*. Oxford University Press,2024

Introduction to IT Systems

Course Code- TH 1(b)

(Common to 1st & 2nd sem)

Period per week:	3	IA:	30 Marks
Total Period:	45	End Sem Exam:	70 Marks
Timing of End Exam:	3 Hours	No. Of Credit:	3

Course outcomes:

At the end of the course, students will be able to:

- ✓ Develop the skill to handle & operate computer and access the internet.
- ✓ Assemble the PC, install & configure OS and other software/Hardware.
- ✓ Design & develop the website using mark up language.
- ✓ Create and work with various office tools.
- ✓ Enhance the skill to protect the system and its information from cyber attacks.

Course Content:

UNIT 1:

Basic Internet skills: Understanding browser, efficient use of search engines, awareness about Digital
India portals (state and national portals) and college portals.

General understanding of various computer hardware components – CPU, Memory, Display, Key- board, Mouse, HDD and other Peripheral Devices.

UNIT 2:

OS Installation (Linux and MS Windows), Unix Shell and Commands, vi editor.

UNIT 3:

HTML4, CSS, making basic personal webpage.

UNIT 4:

Office Tools: OpenOffice Writer, OpenOffice Spreadsheet (Calc), OpenOffice Impress.

UNIT 5: Information security best practices.

Class lectures will only introduce the topic or demonstrate the tool, actual learning will take place in the Lab by practicing regularly.

Suggested Lab Work:

This is a skill course. Topics/concepts taught in the class should be practiced in the Lab same week and practiced regularly during the semester till student becomes confident about it. This course is all about some theory and a lot of practice.

References:

1. Introduction to IT Systems (English) by Prof. Prashant Joshi (Download from https://ekumbh.aicte-india.org/dbook.php)
2. R.S. Salaria, Computer Fundamentals, Khanna Publishing House
3. Ramesh Bangia, PC Software Made Easy – The PC Course Kit, Khanna Publishing House
4. Online Resources, Linux man pages, Wikipedia
5. Mastering Linux Shell Scripting: A practical guide to Linux command-line, Bash scripting, and Shell programming, by Mokhtar Ebrahim, Andrew Mallett

Applied Physics –I

Course Code- TH 2

(Common to 1st Sem)

Period per week:	4	IA:	30 Marks
Total Period:	60	End Sem Exam:	70 Marks
Timing of End Exam:	3 Hours	No. Of Credit:	4

Course Outcome:

After completion of the course the students will be able to:

1) Classify different physical quantities and derive their units and dimensions.

2) Differentiate between scalar and vector quantity and use its properties to understand physical laws & different types of motion .

3) Apply the basic concept of force, torque, work, energy, power, friction, Moment of Inertia to solve simple classical Mechanics problems.

4) Apply different laws of elasticity, hydro statics and hydro dynamics to calculate various mechanical properties of solid and fluids.

5) Analyze various modes of heat transfer and behaviour of matter under exposure of heat and select appropriate thermometer to measure various range of temperature in industrial application.

Course Content:

Unit 1: **Physical world, Units and Measurements**

Physical quantities; fundamental and derived, Units and systems of units (FPS, CGS and SI units),

Dimensions and dimensional formulae of physical quantities, Principle of homogeneity of dimensions, Dimensional equations and their applications (conversion from one system of units to other, checking of dimensional equations and derivation of simple equations), Limitations of dimensional analysis.

Measurements: Need, measuring instruments, least count, types of measurement (direct, indirect), Errors in measurements (systematic and random), absolute error, relative error, error propagation, error estimation and significant figures.

Unit 2: Force and Motion

Scalar and Vector quantities – examples, representation of vector, types of vectors. Addition and Subtraction of Vectors, Triangle and Parallelogram law (Statement only), Scalar and Vector Product, Resolution of a Vector and its application to inclined plane and lawn roller.

Force, Momentum, Statement and derivation of conservation of linear momentum, its applications such as recoil of gun, rockets, Impulse and its applications.

Circular motion, definition of angular displacement, angular velocity, angular acceleration, frequency, time period, Relation between linear and angular velocity, linear

acceleration and angular acceleration (related numerical), Centripetal and Centrifugal forces with live examples, Expression and applications such as banking of roads and bending of cyclist.

Unit 3: Work, Power and Energy

Work: Concept and units, examples of zero work, positive work and negative work

Friction: concept, types, laws of limiting friction, coefficient of friction, reducing friction and its engineering applications, Work done in moving an object on horizontal and inclined plane for rough and plane surfaces and related applications.

Energy and its units, kinetic energy, gravitational potential energy with examples and derivations, mechanical energy, conservation of mechanical energy for freely falling bodies, trans- formation of energy (examples).

Power and its units, power and work relationship, calculation of power (numerical problems).

Unit 4: Rotational Motion

Translational and rotational motions with examples, Definition of torque and angular momentum and their examples, Conservation of angular momentum (quantitative) and its applications.

Moment of inertia and its physical significance, radius of gyration for rigid body, Theorems of parallel and perpendicular axes (statements only), Moment of inertia of rod, disc, ring and sphere (hollow and solid); (Formulae only).

Unit 5: Properties of Matter

Elasticity: definition of stress and strain, moduli of elasticity, Hooke's law, significance of stress-strain curve.

Pressure: definition, units, atmospheric pressure, gauge pressure, absolute pressure, Fortin's Barometer and its applications.

Surface tension: concept, units, cohesive and adhesive forces, angle of contact, Ascent Formula (No derivation), applications of surface tension, effect of temperature and impurity on surface tension.

Viscosity and coefficient of viscosity: Terminal velocity, Stoke's law and effect of temperature
on viscosity, application in hydraulic systems.

Hydrodynamics: Fluid motion, stream line and turbulent flow, Reynold's number Equation of continuity, Bernoulli's Theorem (only formula and numericals) and its applications.

Unit 6: Heat and Thermometry

Concept of heat and temperature, modes of heat transfer (conduction, convection and radiation with examples), specific heats, scales of temperature and their relationship, Types of Thermometer (Mercury thermometer, Bimetallic thermometer, Platinum resistance thermometer, Pyrometer) and their uses.

Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansions and relation amongst them, Co-efficient of thermal conductivity, engineering applications.

References:

1. Applied Physics-I (English) by Prof. Vinod Kumar Yadav (down load from https://ekumbh.aicte-india.org/dbook.php)
2. 'Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi
3. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi.
4. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
5. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
6. Engineering Physics by DK Bhhatacharya & PoonamTandan; Oxford University Press, New Delhi.
7. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publications (P) Ltd., New Delhi
8. Practical Physics by C. L. Arora, S. Chand Publication.
9. e-books/e-tools/ learning physics software/websites etc.

Mathematics- I

Course Code- TH 3

(Common to 1st Sem)

Period per week:	4	IA:	30 Marks
Total Period:	60	End Sem Exam:	70 Marks
Timing of End Exam:	3 Hours	No. Of Credit:	4

Course Outcomes:

At end of the course, the students will be able to:

(i) Acquire necessary background in Trigonometry to appreciate the importance of the geometric study as well as for the calculation and the mathematical analysis of engineering problems.

(ii) Find the effects of changing conditions on a system in probability and calculus.

(iii) Apply Complex numbers to physical phenomena.

(iv) Decompose rational function to partial fraction for computing the anti-derivative of a function.

Course Content:

UNIT - I: Trigonometry

Concept of angles, measurement of angles in degrees, grades and radians and their conversions, T-Ratios of Allied angles (without proof), Sum, difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa). T- Ratios of multiple angles, sub-multiple angles (2A, 3A, A/2). Graphs of sin x, cos x, tan x and e^x .

UNIT-II: Differential Calculus

Definition of function; Concept of limits. Four standard limits $\lim_{x \to a} \frac{x^n - a^n}{x-a}$, $\lim_{x \to 0} \frac{\sin x}{x}$, $\lim_{x \to a} \left(\frac{a^x - 1}{x}\right)$ and $\lim_{x \to a} (1+x)^{\frac{1}{x}}$

Differentiation by definition of x^n, $\sin x$ $\cos x$, $\tan x$, e^x and $\log_a x$. Differentiation of sum, product and quotient of functions. Differentiation of function of a function. Differentiation of trigonometric and inverse trigonometric functions, Logarithmic differentiation, Exponential functions.

UNIT - III: Algebra

Complex Numbers: Definition, real and imaginary parts of a Complex number, polar and Cartesian, representation of a complex number and its conversion from one form to other, conjugate of a com- plex number, modulus and amplitude of a complex number Addition, Subtraction, Multiplication and Division of a complex number. De-movier's theorem, its application.

Partial fractions: Definition of polynomial fraction proper & improper fractions and definition of partial fractions. To resolve proper fraction into partial fraction with denominator containing non-repeated linear factors, repeated linear factors and irreducible non-repeated quadratic factors. To resolve improper fraction into partial fraction.

Permutations and Combinations: Value of ${}^{n}P_{r}$ and ${}^{n}C_{r}$.

Binomial theorem: Binomial theorem (without proof) for positive integral index (expansion and general form); binomial theorem for any index (expansion without proof) first and second binomial approximation with applications to engineering problems

References:

- ✓ Mathematics-I by Dr. Deepak Singh (Download from https://ekumbh.aicte-india.org/dbook.php)
- ✓ B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
- ✓ G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995.
- ✓ Reena Garg, Engineering Mathematics, Khanna Publishing House, New Delhi (Revised Ed. 2018)
- ✓ V. Sundaram, R. Balasubramanian, K.A. Lakshminarayanan, Engineering Mathematics, 6/e., Vikas Publishing House.
- ✓ Reena Garg & Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi

Fundamentals of Electrical & Electronics Engineering

Course Code- TH 4(a)

(Common to 1st & 2nd Sem)

Period per week:	4	IA:	30 Marks
Total Period:	60	End Sem Exam:	70 Marks
Timing of End Exam:	3 Hours	No. Of Credit:	4

Course Outcome-

At the end of this course, the students will be able to:

- ✓ Identify & analyze different types of electronics components and signals.
- ✓ Analyze basic op-amp circuits and digital circuits.
- ✓ Develop the concept on Electrical and magnetic circuit parameters.
- ✓ Acquire knowledge of Machines & Transformer.
- ✓ Develop knowledge on AC circuit & solve numericals.

Course Content:

UNIT I Overview of Electronic Components & Signals:

Passive Active Components: Resistances, Capacitors, Inductors, Diodes, Transistors, FET, MOS and CMOS and their Applications. (Concept and simple problems of Resistance, Capacitor & Inductor, Definition, classification and Working of diode(PN juction,LED, Zener), transistor, FET, Concept of MOS and CMOS)

Signals: DC/AC, voltage/current, periodic/non-periodic signals, average, rms, peak values, different types of signal waveforms, Ideal/non-ideal voltage/current sources, independent/dependent voltage current sources. (Definitions)

UNIT II Overview of Analog Circuits:

Operational Amplifiers-Ideal Op-Amp, Practical op amp, Open loop and closed loop configurations, Application of Op-Amp as amplifier, adder, differentiator and integrator.

UNIT III Overview of Digital Electronics: Introduction to Boolean Algebra, Electronic Implementation of Boolean Operations, Gates-Functional Block Approach (Simple problems of Number system)

Storage elements-Flip Flops-A Functional block approach, Counters: Ripple, Up/down and decade, Introduction to digital IC Gates (of TTL Type).

Unit IV Electric and Magnetic Circuits:

EMF, Current, Potential Difference, Power and Energy; M.M.F, magnetic force, permeability, hysteresis loop, reluctance, leakage factor and BH curve; Electromagnetic induction, Faraday's laws of electromagnetic induction, Lenz's law; Dynamically induced emf; Statically induced emf; Equations of self and mutual inductance; Analogy between electric and magnetic circuits.

Unit V A.C. Circuits:

Cycle, Frequency, Periodic time, Amplitude, Angular velocity, RMS value, Average value, Form Factor Peak Factor, impedance, phase angle, and power factor; Mathematical and phasor representation of alternating emf and current; Voltage and Current relationship in Star and Delta connections; A.C in resistors, inductors and capacitors; A.C in R-L series, R-C series, R-L-C series and parallel circuits; Power in A. C. Circuits, power triangle.

Unit VI (Revised) Transformer and Machines: General construction and principle of different type of transformers; Emf equation and transformation ratio of transformers; Auto transformers; Construction and Working principle of DC motors; Basic equations and characteristic of motors.

References:

1. Fundamentals of Electrical and Electronics Engineering by Prof. Susan S. Mathew (Download from https://ekumbh.aicte-india.org/dbook.php)
2. Ritu Sahdev, Basic Electrical Engineering, Khanna Publishing House
3. Mittle and Mittal, Basic Electrical Engineering, McGraw Education, New Delhi, 2015, ISBN : 978-0-07-0088572-5
4. Saxena, S. B. Lal, Fundamentals of Electrical Engineering, Cambridge University Press, latest edition ISBN : 9781107464353
5. Theraja, B. L., Electrical Technology Vol – I, S. Chand Publications, New Delhi, 2015, ISBN: 9788121924405
6. Theraja, B. L., Electrical Technology Vol – II, S. Chand Publications, New Delhi, 2015, ISBN: 9788121924375
7. Jegathesan, V., Basic Electrical and Electronics Engineering, Wiley India, New Delhi, 2015, ISBN : 97881236529513
8. Sedha, R.S., A text book of Applied Electronics, S.Chand, New Delhi, 2008, ISBN-13: 978-8121927833
9. Malvino, Albert Paul, David, Electronics Principles, McGraw Hill Education, New Delhi,2015, ISBN-13: 0070634244-978
10. Mehta, V.K., Mehta, Rohit, Principles of Electronics, S. Chand and Company, New Delhi, 2014, ISBN-13-9788121924504
11. Bell Devid, Fundamental of Electronic Devices and Circuits, Oxford University Press, NewDelhi 2015 ISBN : 9780195425239

Engineering Mechanics

Course Code- TH 4(b)

(Common to 1st & 2nd sem)

Period per week:	4	IA:	30 Marks
Total Period:	60	Term End Exam:	70 Marks
Timing of End Exam:	3 Hours	No. Of Credit:	4

Course outcomes:

After completing this course, student will be able to:

1. Analyze the coplanar force system and find out the resultant force of this system by applying basics of mechanics.
2. Determine unknown forces of different engineering systems by applying laws of equilibrium.
3. Apply the principle of friction in various conditions when the object is in static equilibrium.
4. Find the centroid and centre of gravity of various components in engineering system.
5. Analyze different simple machines to find out different influencing parameters viz. Mechanical Advantage, Velocity Ratio and Efficiency.

Course Contents:

Unit – I Basics of mechanics and force system

Significance and relevance of Mechanics, Applied mechanics, Statics, Dynamics.

Space, time, mass, particle, flexible body and rigid body.

Scalar and vector quantity, Units of measurement (SI units) - Fundamental units and derived units.

Force – unit, representation as a vector and by Bow's notation, characteristics and effects of a force, Principle of transmissibility of force, Force system and its classification.

Resolution of a force - Orthogonal components of a force, moment of a force, Varignon's Theorem.

Composition of forces – Resultant, analytical method for determination of resultant for concurrent, non-concurrent and parallel co-planar force systems – Law of triangle, parallelogram and polygon of forces.

Unit– II Equilibrium

Equilibrium and Equilibrant, Free body and Free body diagram, Analytical and graphical methods of analysing equilibrium

Lami's Theorem – statement and explanation, Application for various engineering problems.

Types of beam, supports (simple, hinged, roller and fixed) and loads acting on beam (vertical and inclined point load, uniformly distributed load, couple),

Beam reaction for cantilever, simply supported beam with or without overhang – subjected to combination of Point load and uniformly distributed load.

Beam reaction graphically for simply supported beam subjected to vertical point loads only.

Unit– III Friction

Friction and its relevance in engineering, types and laws of friction, limiting equilibrium, limiting friction, co-efficient of friction, angle of friction, angle of repose, relation between co-efficient of friction and angle of friction.

Equilibrium of bodies on level surface subjected to force parallel and inclined to plane.

Equilibrium of bodies on inclined plane subjected to force parallel to the plane only.

Unit– IV Centroid and centre of gravity

Centroid of geometrical plane figures (square, rectangle, triangle, circle, semi-circle, quarter circle)

Centroid of composite figures composed of not more than three geometrical figures

Centre of Gravity of simple solids (Cube, cuboid, cone, cylinder, sphere, hemisphere)
Centre of Gravity of composite solids composed of not more than two simple solids.

Unit – V Simple lifting machine

Simple lifting machine, load, effort, mechanical advantage, applications and advantages. Velocity
ratio, efficiency of machines, law of machine.

Ideal machine, friction in machine, maximum Mechanical advantage and efficiency, reversible and non-reversible machines, conditions for reversibility

Velocity ratios of Simple axle and wheel, Differential axle and wheel, Worm and worm wheel, Single purchase and double purchase crab winch, Simple screw jack, Weston's differential pulley block, geared pulley block.

Suggested Learning Resources:

1. Engineering Mechanics by Prof. Bhankhar Bharat Gokaldas (Download from https://ekumbh.aicte-india.org/dbook.php)
2. D.S. Bedi, Engineering Mechanics, Khanna Publications, New Delhi (2008)
3. Khurmi, R.S., Applied Mechanics, S. Chand & Co. New Delhi.
4. Bansal R K, A text book of Engineering Mechanics, Laxmi Publications.
5. Ramamrutham, Engineering Mechanics, S. Chand & Co. New Delhi.
6. Dhade, Jamadar & Walawelkar, Fundamental of Applied Mechanics, Pune Vidhyarthi Gruh.
7. Ram, H. D.; Chauhan, A. K., Foundations and Applications of Applied Mechanics, Cam- bridge University Press.
8. Meriam, J. L., Kraige, L.G., Engineering Mechanics- Statics, Vol. I, Wiley Publication, New Delhi.

Environmental Science

Course Code-TH 5(a)

(Common to 1st & 2nd sem)

Period per week:	4	IA:	30 Marks
Total Period:	60	End Sem Exam:	70 Marks
Timing of End Exam:	3 Hours	No. Of Credit:	4

Course outcomes

At the end of the course student will be able to

1. Understand the ecosystem and terminology and solve various engineering problems applying ecosystem knowledge to produce eco-friendly products.
2. Understand the suitable air, extent of noise pollution, and control measures and acts.
3. Understand the water and soil pollution, and control measures and acts.
4. Understand different renewable energy resources and efficient process of harvesting.
5. Understand solid Waste Management, ISO 14000 & Environmental Management

Course Content:

Unit-1 Ecosystem

Structure of ecosystem, Biotic & Abiotic components Food chain and food web

Aquatic (Lentic and Lotic) and terrestrial ecosystem Carbon, Nitrogen, Sulphur, Phosphorus cycle.

Global warming -Causes, effects, process, Green House Effect, Ozone depletion

Unit– 2 Air and, Noise Pollution

Definition of pollution and pollutant, Natural and man made sources of air pollution (Refrigerants, I.C., Boiler)

Air Pollutants: Types, Particulate Pollutants: Effects and control (Bag filter, Cyclone separator, Electrostatic Precipitator)

Gaseous Pollution Control: Absorber, Catalytic Converter, Effects of air pollution due to Refrigerants, I.C., Boiler

Noise pollution: sources of pollution, measurement of pollution level, Effects of Noise pollution, Noise pollution (Regulation and Control) Rules, 2000

Unit- 3 Water and Soil Pollution

Sources of water pollution, Types of water pollutants, Characteristics of water pollutants Turbidity, pH, total suspended solids, total solids BOD and COD: Definition, calculation

Waste Water Treatment: Primary methods: sedimentation, froth floatation, Secondary methods: Activated sludge treatment, Trickling filter, Bioreactor, Tertiary Method: Membrane separation technology, RO (reverse osmosis).

Causes, Effects and Preventive measures of Soil Pollution: Causes-Excessive use of Fertilizers, Pesticides and Insecticides, Irrigation, E-Waste.

Unit– 4 Renewable sources of Energy

Solar Energy: Basics of Solar energy. Flat plate collector (Liquid & Air). Theory of flat plate collector. Importance of coating. Advanced collector. Solar pond. Solar water heater, solar dryer. Solar stills.

Biomass: Overview of biomass as energy source. Thermal characteristics of biomass as fuel. Anaerobic digestion. Biogas production mechanism. Utilization and storage of biogas.

Wind energy: Current status and future prospects of wind energy. Wind energy in India. Environmental benefits and problem of wind energy.

New Energy Sources: Need of new sources. Different types new energy sources. Applications of (Hydrogen energy, Ocean energy resources, Tidal energy conversion.) Concept, origin and power plants of geothermal energy

Unit-5 Solid Waste Management, ISO 14000 & Environmental Management 06 hours

Solid waste generation- Sources and characteristics of : Municipal solid waste, E- waste, bio-medical waste.

Metallic wastes and Non-Metallic wastes (lubricants, plastics, rubber) from industries.

Collection and disposal: MSW (3R, principles, energy recovery, sanitary landfill), Hazardous waste.

Air quality act 2004, air pollution control act 1981 and water pollution and control act1996.

Structure and role of Central and state pollution control board.

Concept of Carbon Credit, Carbon Footprint. Environmental management in fabrication industry. ISO14000: Implementation in industries, Benefits.

References:

(a) Suggested Learning Resources:

Books:

1. Environmental Science (English) by Dr. Subrat Roy (Download from https://ekumbh.aicte-india.org/dbook.php)
2. S.C. Sharma & M.P. Poonia, Environmental Studies,Khanna Publishing House,NewDelhi
3. C.N. R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd., 2011.
4. Arceivala, Soli Asolekar, Shyam, Waste Water Treatment for Pollution Control and Reuse, Mc-Graw Hill Education India Pvt. Ltd., New York, 2007, ISBN:978-07-062099-
5. Nazaroff, William, Cohen, Lisa, Environmental Engineering Science, Willy, New York, 2000, ISBN 10: 0471144940.
6. O.P. Gupta, Elements of Environmental Pollution Control, Khanna Publishing House, New Delhi
7. Rao, C. S., Environmental Pollution Control and Engineering, New Age International Publication, 2007, ISBN: 81-224-1835-X.
8. Rao, M. N.Rao, H.V.N, Air Pollution, Tata Mc-Graw Hill Publication, New delhi, 1988, ISBN: 0-07- 451871-8.
9. Frank Kreith, Jan F Kreider, Principles of Solar Engineering, McGraw-Hill, New York ; 1978, ISBN: 9780070354760.

10. Aldo Vieira, Da Rosa, Fundamentals of renewable energy processes, Academic Press Oxford, UK; 2013. ISBN: 9780123978257.

11. Patvardhan, A.D, Industrial Solid Waste, Teri Press, New Delhi, 2013, ISBN:978-81-7993-502-6

12. Metcalf & Eddy, Waste Water Engineering, Mc-Graw Hill, New York, 2013, ISBN: 077441206.

13. Keshav Kant, Air Pollution & Control, Khanna Publishing House, New Delhi (Edition 2018)

(b) Open source software and website address:

1) www.eco-prayer.org
2) www.teriin.org
3) www.cpcp.nic.in
4) www.cpcp.gov.in
5) www.indiaenvironmentportal.org.in
6) www.whatis.techtarget.com
7) www.sustainabledevelopment.un.org
8) www.conserve-energy-future.com)

Teachers should use the following strategies to achieve the various outcomes of the course.

- Different methods of teaching and media to be used to attain classroom attention.
- Massive open online courses (MOOCs) may be used to teach various topics/sub topics.
- 15-20% of the topics which are relatively simpler of descriptive in nature should be given to the students for self-learning and assess the development of competency through classroom presentations.
- Micro-projects may be given to group of students for hand-on experiences.
- Encouraging students to visit to sites such as Railway station and research establishment around the institution.

Applied Chemistry

Course Code- TH 5(b)

(Common to 1st & 2nd sem)

Period per week:	4	IA:	30 Marks
Total Period:	60	End Sem Exam:	70 Marks
Timing of End Exam:	3 Hours	No. Of Credit:	4

Course Outcome:

After completing this course, student will be able to:

1) Solve various engineering problems applying the basic knowledge of atomic, molecular, electronic modifications and Chemical bonding by analyzing the technology based on them.
2) Identify the problems associated with raw water used in drinking & boilers and sewage water and solve the problems by using different water treatment methods.
3) Analyze the properties engineering materials and substitute metals with conducting polymers and also produce cheaper biodegradable polymers to reduce environmental pollution.
4) Use relevant fuel and lubricants for domestic and industrial applications
5) To impart knowledge on the essential aspects of electrochemical cells, emf, applications of emf measurements and understand the Principles of corrosion and corrosion control.

•Unit 1: Atomic Structure, Chemical Bonding and Solutions

Rutherford model of atom, Bohr's theory (expression of energy and radius to be omitted), and hydrogen spectrum explanation based on Bohr's model of atom, Heisenberg uncertainty principle, Quantum numbers – orbital concept. Shapes of s,p and d orbitals, Pauli's exclusion principle, Hund's rule of maximum multiplicity Aufbau rule, electronic configuration.

Concept of chemical bonding – cause of chemical bonding, types of bonds: ionic bonding (NaCl example), covalent bond (H_2, F_2, HF hybridization in $BeCl_2$, BF_3, CH_4, NH_3, H_2O), coordination bond in NH_4^+, and anomalous properties of NH_3, H_2O due to hydrogen bonding, and metallic bonding.

Solution – idea of solute, solvent and solution, methods to express the concentration of solution molarity (M = mole per liter), ppm, mass percentage, volume percentage and mole frac tion.

•Unit 2: Water

Graphical presentation of water distribution on Earth (pie or bar diagram). Classification of soft and hard water based on soap test, salts causing water hardness, unit of hardness and simple numerical on water hardness.

Cause of poor lathering of soap in hard water, problems caused by the use of hard water in boiler (scale and sludge, foaming and priming, corrosion etc), and quantitative measurement of water hardness by ETDA method, total dissolved solids (TDS) alkalinity estimation.

I) Water softening techniques – soda lime process, zeolite process and ion exchange process.

II) Municipal water treatment (in brief only) – sedimentation, coagulation, filtration, sterilization.

Water for human consumption for drinking and cooking purposes from any water sources and enlist Indian standard specification of drinking water (collect data and understand standards).

- **Unit 3: Engineering Materials**

  Natural occurrence of metals – minerals, ores of iron, aluminium and copper, gangue (matrix), flux, slag, metallurgy – brief account of general principles of metallurgy.

  Extraction of - iron from haematite ore using blast furnace, aluminium from bauxite along with reactions. Alloys – definition, purposes of alloying, ferrous alloys and non-ferrous with suitable examples, properties and applications.

  General chemical composition, composition based applications (elementary idea only details omitted):

  Port land cement and hardening, Glasses Refractory and Composite materials.

  Polymers – monomer, homo and co polymers, degree of polymerization, simple reactions involved in preparation and their application of thermoplastics and thermosetting plastics (using PVC, PS, PTFE, nylon – 6, nylon-6,6 and Bakelite), rubber and vulcanization of rubber.

- **Unit 4: Chemistry of Fuels and Lubricants**

  Definition of fuel and combustion of fuel, classification of fuels, calorific values (HCV and LCV), calculation of HCV and LCV using Dulong's formula.

  Proximate analysis of coal solid fuel

  petrol and diesel - fuel rating (octane and cetane numbers),

  Chemical composition, calorific values and applications of LPG, CNG, water gas, coal gas, producer gas and biogas.

  Lubrication – function and characteristic properties of good lubricant, classification with examples, lubrication mechanism – hydrodynamic and boundary lubrication, physical proper- ties (viscosity and viscosity index, oiliness, flash and fire point, could and pour point only) and chemical properties (coke number, total acid number saponification value) of lubricants.

- **Unit 5: Electro Chemistry**

  Electronic concept of oxidation, reduction and redox reactions.

  Definition of terms: electrolytes, non-electrolytes with suitable examples, Faradays laws of electrolysis and simple numerical problems.

  Industrial Application of Electrolysis –
  - Electrometallurgy
  - Electroplating
  - Electrolytic refining.

  Application of redox reactions in electrochemical cells –
  - Primary cells – dry cell,
  - Secondary cell - commercially used lead storage battery, fuel and

  Solar cells. Introduction to Corrosion of metals –
  - definition, types of corrosion (chemical and electrochemical), H_2 liberation and O_2 absorption mechanism of electrochemical corrosion, factors affecting rate of corrosion.

  Internal corrosion preventive measures –
  - Purification, alloying and heat treatment and

External corrosion preventive measures: a) metal (anodic, cathodic) coatings, b) organic inhibitors.

Suggested Sessional work:

- **Unit 1: Atomic Structure, Chemical Bonding and Solutions**

  Assignments: Writing electronic configuration of elements up to atomic number 30 (Z= 30). Numerical on molarity, ppm, mass percentage, volume percentage and mole fraction of given solution.

  Seminar: 1. Quantum numbers,

  2. Discuss the metallic properties such as malleability, ductility, hardness, high melting point, conductance of heat and electricity, magnetic properties of metals.

  Projects: Model of molecules $BeCl_2$, BF_3, CH_4, NH_3, H_2O.

- **Unit 2: Water**

  Assignments: Simple problems on hardness calculation.

  Seminar: 1. Quality and quantity requirement of water in house and industry.

  2. Quality of control measures of effluents (BOD & COD).

  Projects: Collect water samples from different water sources and measure of hardness of water.

- **Unit 3: Engineering Materials**

  Assignments: Preparation of table showing different ores of iron, copper and aluminium metals along with their chemical compositions and classify in to oxide sulphide halide ores.

  Seminar: Discuss the chemical reactions taking place in blast furnace in extraction
  of Fe, Cu and Al metals.

  Projects: Make table showing place of availability of different ores in India and show places on India map.

- **Unit 4: Chemistry of Fuels and Lubricants**

  Assignments: Calculation of HCV and LCV of fuel using fuel composition in Dulong's formula.

  Seminar: Chemical structure of fuel components influence on fuel rating.

  Projects: Mapping of energy resources in India. Collection of data of various lubricants available in the market.

- **Unit 5: Electro Chemistry**

  Assignments: Simple problems on Faradays laws of electrolysis.

  Seminar: 1. Corrosion rate and units.
  2. Corrosion preventions.

  Projects: Mapping of area in India prone to corrosion. Collection of data of various electrochemical cells batteries used in equipment and devices and avail- able in market. Visit to sites such as Railway station to watch corrosion area in railways and research establishment in and around the institution.

References/Suggested Learning Resources:

(a) Books :

✓ Applied Chemistry by Dr. Anju Rawlley (Download from https://ekumbh.aicte-india.org/dbook.php)
✓ Text Book of Chemistry for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi, 2017-18.
✓ Agarwal, & Shikha, Engineering Chemistry, Cambridge University Press; New Delhi, 2015.
✓ C.N. R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd., 2011.
✓ Dara, S. S. & Dr.S.S.Umare, Engineering Chemistry, S.Chand. Publication, New Delhi, New Del- hi, 2015.
✓ Jain & Jain, Engineering Chemistry, Dhanpat Rai and Sons; New Delhi, 2015.
✓ Dr. Vairam, S., Engineering Chemistry, Wiley India Pvt.Ltd., New Delhi, 2013.
✓ Dr. G. H. Hugar & Prof A. N. Pathak, Applied Chemistry Laboratory Practices, Vol. I and Vol. II, NITTTR, Chandigarh, Publications, 2013-14.
✓ Agnihotri, Rajesh, Chemistry for Engineers, Wiley India Pvt.Ltd., 2014.

(b) Open source software and website address:

1 www.chemguide.co.uk/atommenu.html (Atomic structure and chemical bonding)
2 www.visionlearning.com (Atomic structure and chemical bonding)
3 www.chem1.com (Atomic structure and chemical bonding)
4 https://www.wastewaterelearning.com/elearning/ (Water Treatment)
5 www.capital-refractories.com (Metals, Alloys, Cement, and Refractory Materials)
6 www.em-ea.org/guide%20books/book-2/2.1%20fuels%20and%20combustion.pdf (Fuel and Combustion)
7 www.chemcollective.org (Metals, Alloys)
8 www.wqa.org(Water Treatment)

Communication Skills in English Lab(Revised)

Course Code- PR 1(a)

(Common to 1st& 2nd Sem)

Period per week:	04	Sessional	25 Marks
Total Period:	60	End Sem:	----
Timing of End Exam:	---	No of Credit:	02

COURSE OUTCOME:

After completion of the course the students will be able to:

1. Apply 4s i.e Listening, Speaking, Reading and Writing effectively in day to day life.
2. Use of correct pronunciation, intonation, stress, rhythm, speed and pause while communicating with others .
3. Comprehend the basic etiquette of interview, GD, Conversation and Presentation
4. Analyze a given topic and way to present it.
5. Build vocabulary and use in every day situation.

Course Content:

Unit 1 : Listening Skills (10 hours)

Listening Process and Practice: Introduction to recorded lectures, poems, interviews and speeches, listening tests

Unit II : Introduction to Phonetics (20 hours)

Sounds: Consonant, Vowel, Diphthongs, Transcription of Words (IPA), weak forms, syllable division, word stress, intonation, voice

Unit III : Speaking Skills (30 hours)

Standard and formal speech: Group Discussion, Oral Presentations, Public Speaking, Business Presentations, Conversation practice and Role play

Recommended Readings:

1. Bansal And Harrison. *Spoken English*. Orient Black Swan, 2011.
2. James Hartman & et al. Ed. *English Pronouncing Dictionary.* Cambridge: Cambridge University Press, 2006.
3. Kulbhushan Kumar, Effective Communication Skills, Khanna Publishing House, New Delhi (Revised Ed. 2018)
4. J.D.O'Connor. *Better English Pronunciation.* Cambridge: Cambridge University Press, 1980.
5. Lindley Murray. *An English Grammar: Comprehending Principles and Rules.* London: Wilson and Sons, 1908.
6. Margaret M. Maison. *Examine your English.* Orient Longman: New Delhi, 1964.
7. J.Sethi & et al. *A Practice Course in English Pronunciation*. New Delhi: Prentice Hall, 2004.
8. Pfeiffer, William Sanborn and T.V.S Padmaja. *Technical Communication: A Practical Approach*. 6th edn. Delhi: Pearson, 2007.

8. Pfeiffer, William Sanborn and T.V.S Padmaja. *Technical Communication: A Practical Approach*. 6th ed. Delhi: Pearson, 2007.

Introduction to IT System Lab

Course Code- PR 1(b)

(Common to 1st & 2nd sem)

Period per week:	4	Sessional:	25 Marks
Total Period:	60	End Sem Exam:	---
Timing of End Exam:	---	No. Of Credit:	2

Course outcomes:

At the end of the course students will be able to:

1) Analyze the components of computer hardware such as ports, interfaces, cables etc. and assemble them.
2) Install & configure Linux/Windows Operating System and explore the security features/tools of OS.
3) Create & work with various Office Tools.
4) Apply the knowledge to access browsers, search engines, Web Pages and understand the features of government sites/portals by accessing the services offered by them.
5) Design & Develop the Web Pages by using mark-up language /scripts.

Course Content:

S.No.	Topics for Practice
1	Browser features, browsing, using various search engines, writing search queries
2	Visit various e-governance/Digital India portals, understand their features, services offered
3	Read Wikipedia pages on computer hardware components, look at those components in lab, identify them, recognize various ports/interfaces and related cables, etc.
4	Install Linux and Windows operating system on identified lab machines, explore various options, do it multiple times.
5	Connect various peripherals (printer, scanner, etc.) to computer, explore various features of peripheral and their device driver software.
6	Practice HTML commands, try them with various values, make your own Webpage
7	Explore features of Open Office tools, create documents using these features, do it multiple times.
8	Explore security features of Operating Systems and Tools, try using them and see what happens.

This is a skill course. More you practice, better it will be.

References:

1) Introduction to IT Systems (English) by Prof. Prashant Joshi (Download from https://ekumbh.aicte-india.org/dbook.php)
2) Online resources, Linux man pages, Wikipedia.
3) R.S. Salaria, Computer Fundamentals, Khanna Publishing House.

4) Ramesh Bangia, PC Software Made Easy – The PC Course Kit, Khanna Publishing House.
5) Mastering Linux Shell Scripting: A practical guide to Linux command-line, Bash scripting, and Shell programming, by Mokhtar Ebrahim, Andrew Mallett.
6) IT Essentials PC Hardware and Software Companion Guide, Davis Anfinson and Ken Quamme, CISC Press, Pearson Education.
7) PC Hardware and A+ Handbook, Kate J. Chase PHI (Microsoft).

Applied Physics-I Lab

Course Code- PR 2

(Common to 1st sem)

Period per week:	2	Sessional:	25 Marks
Total Period:	30	End Sem Exam:	25 Marks
Timing of End Exam:	3 Hours	No. Of Credit:	1

List of Practical's/Activities (To perform minimum 8 practicals).

1. To measure length, radius of a given cylinder, a test tube and a beaker using a Vernier caliper and find volume of each object.
2. To determine diameter of a wire, a solid ball and thickness of cardboard using a screw gauge.
3. To determine radius of curvature of a convex and a concave mirror/surface using a spherometer.
4. To verify triangle and parallelogram law of forces.
5. To find the co-efficient of friction between wood and glass using a horizontal board.
6. To determine force constant of a spring using Hook's Law.
7. To verify law of conservation of mechanical energy (PE to KE).
8. To find the moment of inertia of a flywheel.
9. To find the viscosity of a given liquid (Glycerin) by Stoke's law.
10. To find the coefficient of linear expansion of the material of a rod.
11. To determine atmospheric pressure at a place using Fortin's barometer.
12. To measure room temperature and temperature of a hot bath using mercury thermometer and convert it into different scales.

SUGGESTED STUDENT ACTIVITES & STRATEGIES

Apart from classroom and laboratory learning following are the suggested student related activities which can be undertaken to accelerate the attainment of various outcomes of the course

a. Make survey of different physical products and compare the following points
   - Measurements of dimensions
   - Properties
   - Applications
b. Library survey regarding engineering materials/products used in different industries
c. Seminar on any relevant topic.

Teachers should use the following strategies to achieve the various outcomes of the course.

- Different methods of teaching and media to be used to attain classroom attention.
- Massive open online courses (MOOCs) may be used to teach various topics/sub topics.
- 15-20% of the topics which are relatively simpler of descriptive in nature should be given to the students for self-learning and assess the development of competency through classroom presentations.
- Micro-projects may be given to group of students for hand-on experiences.

References:

1. Applied Physics-I (English) by Prof. Vinod Kumar Yadav (Download from https://ekumbh.aicte-india.org/dbook.php)
2. Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi
3. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publications (P)Ltd.,
4. Practical Physics by C. L. Arora, S. Chand Publication.
5. e-books/e-tools/ learning physics software/YouTube videos/websites etc.

Engineering Graphics

Course Code- PR 3(a)

(Common to 1st & 2nd sem)

Period per week:	4	Sessional:	25 Marks
Total Period:	60	End Sem Exam	75 Marks
Timing of End Exam:	4 Hours	No. Of Credit	2

Course Outcomes

At the end of this course, the students will be able to:

1) Select and construct appropriate drawing scales, use drawing equipment's, and understand Indian Standards of engineering drawing
2) Draw views of given object and components
3) Sketch orthographic projections into isometric projections and vice versa.
4) Apply computer aided drafting tools to create 2D engineering drawings

Course Content

Unit – I Basic elements of Drawing

Drawing Instruments and supporting materials: method to use them with applications.
Convention of lines and their applications.
Representative Fractions – reduced, enlarged and full size scales; Engineering Scales such as plain and diagonal scale.

Dimensioning techniques as per SP-46:2003 – types and applications of chain, parallel and coordinate dimensioning.

Geometrical and Tangency constructions. (Redraw the figure)

Unit – II Orthographic projections

Introduction of projections-orthographic, perspective, isometric and oblique: concept and applications. (No question to be asked in examination).

Introduction to orthographic projection, First angle and Third angle method, their symbols.

Conversion of pictorial view into Orthographic Views – object containing plain surfaces, slanting surfaces, slots, ribs, cylindrical surfaces. (use First Angle Projection method only)

Unit – III Isometric Projections

Introduction to isometric projections. Isometric scale and Natural scale.

Isometric view and isometric projection.

Illustrative problems related to objects containing lines, circles and arcs shape only.

Conversion of orthographic views into isometric view/projection.

Unit – IV Free Hand Sketches of engineering elements

Free hand sketches of machine elements: Thread profiles, nuts, bolts, studs, set screws, washer, Locking arrangements. (For branches other than mechanical Engineering, the teacher should select branch specific elements for free hand sketching)

Free hand sketches of orthographic view (on squared graph paper) and isometric view (on isometric grid paper)

Unit – V Computer aided drafting interface

Computer Aided Drafting: concept.

Hardware and various CAD software available.

System requirements and Understanding the interface.

Components of AutoCAD software window: Title bar, standard tool bar, menu bar, object properties tool bar, draw tool bar, modify tool bar, cursor cross hair. Command window, status bar, drawing area, UCS icon.

File features: New file, Saving the file, Opening an existing drawing file, Creating templates, Quit.

Setting up new drawing: Units, Limits, Grid, Snap. Undoing and redoing action.

Unit – VI Computer aided drafting

Draw basic entities like Line, Circle, Arc, Polygon, Ellipse, Rectangle, Multiline, PolyLine.

Method of Specifying points: Absolute coordinates, Relative Cartesian and Polar coordinates.

Modify and edit commands like trim, extend, delete, copy, offset, array, block, layers.

Dimensioning: Linear, Horizontal Vertical, Aligned, Rotated, Baseline, Continuous, Diameter, Radius, Angular Dimensions.

Dim scale variable.

Editing dimensions.

Text: Single line Text, Multiline text.

Standard sizes of sheet. Selecting Various plotting parameters such as Paper size, paper units, Drawing orientation, plot scale, plot offset, plot area, print preview.

S. No.	Practical Exercises	Unit No.
1	Draw horizontal, Vertical, 30 degree, 45 degree, 60 and 75 degrees lines, different types of lines, dimensioning styles using Tee and Set squares/ drafter. (do this exercise in sketch book)	I
2	Write alphabets and numerical (Vertical only) (do this exercise in sketch book)	I
3	Draw regular geometric constructions and redraw the given figure (do this exercise in sketch book) Part I	II
4	Draw regular geometric construction and redraw the given figure (do this exercise in sketch book) Part II	II
5	Draw a problem on orthographic projections using first angle method of projection having plain surfaces and slanting. Part I	III
6	Draw another problem on orthographic projections using first angle method of projection having slanting surfaces with slots. Part II	III
7	Draw two problems on orthographic projections using first angle method of projection having cylindrical surfaces, ribs. Part I	III
8	Draw two problems on Isometric view of simple objects having plain and slant- ing surface by using natural scale. Part I	IV
9	Draw some problems on Isometric projection of simple objects having cylindrical surface by using isometric scale. Part I	IV
10	Draw free hand sketches/ conventional representation of machine elements in sketch book such as thread profiles, nuts, bolts, studs, set screws, washers, Locking arrangements. Part I	V

11	Problem based Learning: Given the orthographic views of at least three objects with few missing lines, the student will try to imagine the corresponding objects, complete the views and draw these views in sketch book. Part I	III, II, V
12	Draw basic 2D entities like: Rectangle, Rhombus, Polygon using AutoCAD (Print out should be a part of progressive assessment). Part I	V
13	Draw basic 2D entities like: Circles, Arcs, circular using AutoCAD (Printout should be a part of progressive assessment). Part II	V
14	Draw basic 2D entities like: Circular and rectangular array using AutoCAD (Printout should be a part of progressive assessment). Part III	V
15	Draw blocks of 2D entities comprises of Rectangle, Rhombus, Polygon, Circles, Arcs, circular and rectangular array, blocks using AutoCAD (Print out should be a part of progressive assessment). Part IV	V
16	Draw basic branch specific components in 2D using AutoCAD (Print out should be a part of term work). Part I	VI
17	Draw complex branch specific components in 2D using AutoCAD (Print should be a part of progressive assessment). Part I	VI

SUGGESTED LEARNING RESOURCES

1. Engineering Graphics (English) by Dr. Sharad K. Pradhan (Download from https://ekumbh.aicte-india.org/dbook.php)
2. Bureau of Indian Standards. *Engineering Drawing Practice for Schools and Colleges IS: Sp-46.* BIS. Government of India, Third Reprint, October 1998; ISBN: 81-7061-091-2.
3. Bhatt, N. D. *Engineering Drawing*. Charotar Publishing House, Anand, Gujrat 2010; ISBN: 978-93- 80358-17-8.
4. Jain & Gautam, Engineering Graphics & Design, Khanna Publishing House, New Delhi (ISBN: 978- 93-86173-478)
5. Jolhe, D. A. *Engineering Drawing*. Tata McGraw Hill Edu. New Delhi, 2010; ISBN: 978-0-07- 064837-1
6. Dhawan, R. K. *Engineering Drawing*. S. Chand and Company, New Delhi; ISBN: 81-219-1431-0.
7. Shah, P. J. *Engineering Drawing*. S. Chand and Company, New Delhi, 2008, ISBN:81-219-2964-4.
8. Kulkarni, D. M.; Rastogi, A. P.; Sarkar, A. K. *Engineering Graphics with AutoCAD*. PHI Learning Pri- vate Limited-New Delhi (2010); ISBN: 978-8120337831.
9. Jeyapoovan, T. *Essentials of Engineering Drawing and Graphics using AutoCAD*. Vikas Publishing HousePvt. Ltd, Noida, 2011; ISBN: 978-8125953005.
10. Autodesk. *AutoCAD User Guide*. Autodesk Press, USA, 2015.
11. Sham, Tickoo. *AutoCAD 2016 for Engineers and Designers*. Dreamtech Press; Galgotia Publication, New Delhi, 2015; ISBN 978-9351199113.

Software/Learning Websites

1. https://www.youtube.com/watch?v=TJ4jGyD-WCw
2. https://www.youtube.com/watch?v=dmt6_n7Sgcg
3. https://www.youtube.com/watch?v=_MQScnLXL0M
4. https://www.youtube.com/watch?v=3WXPanCq9LI
5. https://www.youtube.com/watch?v=fvjk7PlxAuo
6. http://www.me.umn.edu/coursesme2011/handouts/engg%20graphics.pdf
7. https://www.machinedesignonline.com

Engineering Workshop Practice

Course Code- PR 3(b)

(Common to 1st & 2nd sem)

Period per week:	4	Sessional:	25 Marks
Total Period:	60	End Sem Exam:	75 Marks
Timing of End Exam:	4 Hours	No. Of Credit:	2

Course outcomes

At the end of the course, the student will be able to:

✓ Acquire skills in basic engineering practice to identify, select and use various marking, measuring, and holding, striking and cutting tools & equipment's and machines.

✓ Understand job drawing and complete jobs as per specifications in allotted time.

✓ Inspect the job for the desired dimensions and shape.

✓ Operate, control different machines and equipment's adopting safety practices.

Course Content:

S.No.	Details Of Practical Content
I	**Carpentry:** i) Demonstration of different wood working tools / machines. ii) Demonstration of different wood working processes, like plaining, marking, chiseling, grooving, turning of wood etc. iii) One simple job involving any one joint like mortise and tenon dovetail, bridle, half lap etc.
II	**Fitting:** i) Demonstration of different fitting tools and drilling machines and power tools ii) Demonstration of different operations like chipping, filing, drilling, tapping, sawing, cutting etc. iii) One simple fitting job involving practice of chipping, filing, drilling, tapping, cutting etc
III	**Welding:** i) Demonstration of different welding tools / machines. ii) Demonstration on Arc Welding, Gas Welding, MIG, MAG welding, gas cutting and rebuilding of broken parts with welding. iii) One simple job involving butt and lap joint
IV	**Sheet Metal Working:** i) Demonstration of different sheet metal tools / machines. ii) Demonstration of different sheet metal operations like sheet cutting, bending, edging, end curling, lancing, soldering, brazing, and riveting. iii) One simple job involving sheet metal operations and soldering and riveting.
V	**Electrical House Wiring:** Practice on simple lamp circuits (i) one lamp controlled by one switch by surface conduit wiring, (ii) Lamp circuits- connection of lamp and socket by separate switches, (iii) Connection of Fluorescent lamp/tube light, (iv) simple lamp circuits-in- stall bedroom lighting. And (v) Simple lamp circuits- install stair case wiring.
VI	**Demonstration:** i) Demonstration of measurement of Current, Voltage, Power and Energy. ii) Demonstration of advance power tools, pneumatic tools, electrical wiring tools and accessories. iii) Tools for Cutting and drilling

References:

1. Engineering Workshop Practice (English) by Dr. A. K. Sarathe (Download from https://ekumbh.aicte-india.org/dbook.php)
2. S.K. Hajara Chaudhary, Workshop Technology, Media Promoters and Publishers, New Delhi, 2015
3. B.S. Raghuwanshi, Workshop Technology, Dhanpat Rai and sons, New Delhi 2014
4. K. Venkat Reddy, Workshop Practice Manual, BS Publications, Hyderabad 2014
5. Kents Mechanical Engineering Hand book, John Wiley and Sons, New York

Fundamental of Electrical & Electronics Engineering Lab(*Revised*)

Course Code-PR4(a)

(Common to1st & 2nd Sem)

Period per week:	2	Sessional:	25 Marks
Total Period:	30	End Sem Exam:	---
Timing of End Exam:	---	No.of Credit:	1

Course Outcomes:

After completion of the course the students will be able to:

1. Classify different type of magnetic material by calculating permeability using B-H curve.
2. Calculate voltage, current and power in 1-phase and 3-phase circuit by connecting different load (R, R-L, R-C)
3. Determine the transformation ratio(K) other parameters of single phase transformer.
4. Distinguish various electronic components and measure values using multimeter,
5. Draw the input and output characteristics of transistor and Diodes and identify the region of operation.

Suggested Practicals/Exercises:

The practical in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency.

Sl.No.	List of the Practical
1.	Determine the permeability of magnetic material by plotting its B-H curve
2.	Measure voltage, current and power in 1-phase circuit with resistive load
3.	Measure voltage, current and power in R-L series circuit
4.	Determine the transformation ratio(K) of 1-phase transformer
5.	Connect single phase transformer and measure input and output quantities
6.	Make Star and Delta connection in starter to run induction motor
7.	Identify various passive and active electronics components
8.	Connect resistors in series and parallel combination and measure its value using digital multimeter
9.	Connect capacitors in series and parallel combination and measure its value using multimeter
10.	Use multimeter to measure the value of given resistor and determine the value to confirm with colour code
11.	Test the PN-junction diode and LED using digital multimeter
12.	Test the performance of PN-junction diode
13.	Test the performance of Zener diode
14.	Identify three terminals of a transistor using digital multimeter
15.	Test the performance of NPN transistor

Engineering Mechanics Lab

Course Code- PR 4(b)

(Common to 1st & 2nd sem)

Period per week:	2	Sessional:	25 Marks
Total Period:	30	End Sem Exam:	---
Timing of End Exam:	---	No. Of Credit:	1

Course outcomes:

After completion of the course the students will be able to:

1. Analyze different simple machines to find out different influencing parameters viz. Mechanical Advantage, Velocity Ratio and Efficiency.
2. Understand the phenomena of friction in different condition and make analysis through experiment to find out coefficient of friction.
3. Determine resultant of various force systems and analyse the equilibrium of a rigid body by Lamis theorem.
4. Analyse and find out the value of support reactions of different types of beam.
5. Determine Centroid of geometrical plane figures.

List of Practical to be performed:

1. To study various equipments related to Engineering Mechanics.
2. To find the M.A., V.R., Efficiency and law of machine for Differential Axle and Wheel.
3. To find the M.A., V.R., Efficiency and law of machine for Simple Screw Jack.
4. Derive Law of machine using Worm and worm wheel.
5. Derive Law of machine using Single purchase crab.
6. Derive Law of machine using double purchase crab.
7. Derive Law of machine using Weston's differential or wormed geared pulley block.
8. Determine resultant of concurrent force system applying Law of Polygon of forces using force table.
9. Determine resultant of concurrent force system graphically.
10. Determine resultant of parallel force system graphically.
11. Verify Lami's theorem.
12. Study forces in various members of Jib crane.
13. Determine support reactions for simply supported beam.
14. Obtain support reactions of beam using graphical method.
15. Determine coefficient of friction for motion on horizontal and inclined plane.
16. Determine centroid of geometrical plane figures.

Suggested Learning Resources:

1. Engineering Mechanics by Prof. Bhankhar Bharat Gokaldas (Download from https://ekumbh.aicte-india.org/dbook.php)
2. Bedi D.S., Engineering Mechanics, Khanna Publishing House
3. Khurmi, R.S., Applied Mechanics, S.Chand & Co. New Delhi.
4. Bansal R K, A text book of Engineering Mechanics, Laxmi Publications.
5. Ramamrutham, Engineering Mechanics, S.,S Chand & Co. New Delhi.
6. Dhade, Jamadar & Walawelkar, Fundamental of Applied Mechanics, Pune Vidhyarthi Gruh.
7. Ram, H. D.; Chauhan, A. K. Foundations and Applications of Applied Mechanics, Cambridge Uni- versity Press.
8. Meriam, J. L., Kraige, L.G. , Engineering Mechanics- Statics, Vol. I, Wiley Publication, New Delhi.

Sports and Yoga (*Revised*)

Course Code- PR 5(a)
(Common to 1st & 2nd Sem)

Period per week:	2	Sessional:	50 Marks
Total Period:	30	End Sem Exam:	-------
		No. Of Credit:	1

Course Outcomes:

On successful completion of the course the students will be able to:

(i) Practice Physical activities and Hatha Yoga focusing on yoga for strength, flexibility, and relaxation.

(ii) Learn breathing exercises and healthy fitness activities

(iii) Understand basic skills associated with yoga and physical activities including strength and flexibility, balance and coordination.

(iv) Perform yoga movements in various combination and forms.

(v) Identify opportunities for participation in yoga and sports activities.

(vi) Improve personal fitness through participation in sports and yogic activities.

(vii) Assess yoga activities in terms of fitness value.

Course Content:

- **Physical Fitness, Wellness & Lifestyle**
  - Meaning & Importance of Physical Fitness & Wellness
  - Components of Physical fitness
  - Components of Health related fitness
  - Components of wellness
  - Preventing Health Threats through Lifestyle Change
  - Concept of Positive Lifestyle
- **Postures**
  - Meaning and Concept of Postures.
  - Causes of Bad Posture.
  - Concept & advantages of Correct Posture.
- **Yoga**
  - Meaning & Importance of Yoga
  - Elements of Yoga
  - Introduction - Asanas, Pranayama, Meditation & Yogic Kriyas
  - Yoga for concentration & related Asanas (Sukhasana; Tadasana; Padmasana & Shashankasana)
  - Relaxation Techniques for improving concentration - Yog-nidra

- **Yoga & Lifestyle**

  - Asanas as preventive measures.

  - Hypertension: Tadasana, Vajrasana, Pavan Muktasana, Ardha Chakrasana, Bhujangasana, Shavasana.

  - Obesity: Procedure, Benefits & contraindications for Vajrasana, Hastasana, Trikonasana, Ardh Matsyendrasana.

  - Back Pain: Tadasana, Ardh Matsyendrasana, Vakrasana, Shalabhasana, Bhujangasana.

  - Diabetes: Procedure, Benefits & contraindications for Bhujangasana, Paschimottasana, Pavan Muktasana, Ardh Matsyendrasana.

  - Asthma: Procedure, Benefits & contraindications for Sukhasana, Chakrasana, Gomukhasana, Parvatasana, Bhujangasana, Paschimottasana, Matsyasana.

- **Training and Planning in Sports**

  - Meaning of Training
  - Warming up and limbering down
  - Skill, Technique & Style
  - Meaning and Objectives of Planning.
  - Tournament – Knock-Out, League/Round Robin & Combination.

- **Sports Medicine**

  - First Aid – Definition, Aims & Objectives.
  - Sports injuries: Classification, Causes & Prevention.
  - Management of Injuries: Soft Tissue Injuries and Bone & Joint Injuries

- **Sports / Games**

  Following sub topics related to any one Game/Sport of choice of student out of: Athletics, Badminton, Basketball, Chess, Cricket, Kabaddi, Lawn Tennis, Swimming, Table Tennis, Volleyball, Yoga etc.

  - History of the Game/Sport.
  - Latest General Rules of the Game/Sport.
  - Specifications of Play Fields and Related Sports Equipment.
  - Important Tournaments and Venues.
  - Sports Personalities.
  - Proper Sports Gear and its Importance.

References:

1. Modern Trends and Physical Education by Prof. Ajmer Singh.
2. Light on Yoga By B.K.S. Iyengar.
3. Health and Physical Education – NCERT (11th and 12th Classes)

Applied Chemistry Lab

Course Code- TH 5(b)

(Common to 1st & 2nd sem)

Period per week:	2	Sessional:	25 Marks
Total Period:	30	End Sem Exam:	25 Marks
Timing of End Exam:	3 Hours	No. Of Credit	1

Course Outcome:

After completion of the course the students will be able to:

1) Explain various methods of volumetric analysis i.e. Redox, Iodometric, complexometric, Neutralization etc. and use of conductivity meter for measurement of conductance of water sample.

2) Apply the use of internal and external indicators and their comparison for redox titrations and mechanisms of iodometric titrations and use of double indicator method in a single titration.

3) Estimate the % values of moisture, volatile matter, ash and carbon of fuel by Proximate analysis and instrument handling.

4) Analyse the properties of lubricants viz. Flash & fire point, viscosity, cloud & pour point and their significance.

LIST OF PRACTICALS:

Perform any 10 (Ten) Laboratory Practicals.

Volumetric and Gravimetric analysis:

1 Preparation of standard solution of oxalic acid or potassium permanganate.

2 To determine strength of given sodium hydroxide solution by titrating against standard oxalic
acid solution using phenolphthalein indicator.

3 Standardization of $KMnO_4$ solution using standard oxalic acid and Determine the percentage of
iron present in given Hematite ore by $KMnO_4$ solution.

4 Iodometric estimation of copper in the copper pyrite ore.

5 Volumetric estimation of total acid number (TAN) of given oil.

6 Volumetric estimation of

a) Total hardness of given water sample using standard EDTA solution.

b) Alkalinity of given water sample using 0.01M sulphuric acid

7 Proximate analysis of coal

a) Gravimetric estimation moisture in given coal sample

b) Gravimetric estimation ash in given coal sample

Instrumental analysis

8. Determine the conductivity of given water sample.
9. Determination of the Iron content in given cement sample using colorimeter.
10. Determination of calorific value of solid or liquid fuel using bomb calorimeter.
11. Determination of viscosity of lubricating oil using Redwood viscometer.

12. Determination of flash and fire point of lubricating oil using Able's flash point apparatus.
13. To verify the first law of electrolysis of copper sulfate using copper electrode.
14. Construction and measurement of emf of elector chemical cell (Daniel cell).
15. To study the effect of dissimilar metal combination.

Teachers should use the following strategies to achieve the various outcomes of the course.

- Different methods of teaching and media to be used to attain classroom attention.
- Massive open online courses (MOOCs) may be used to teach various topics/sub topics.
- 15-20% of the topics which are relatively simpler of descriptive in nature should be given to the students for self-learning and assess the development of competency through classroom presentations.
- Micro-projects may be given to group of students for hand-on experiences
- Encouraging students to visit to sites such as Railway station and research establishment around the institution.

Reference Books:

✓ Applied Chemistry by Dr. Anju Rawlley (Download from https://ekumbh.aicte-india.org/dbook.php)
✓ Text Book of Chemistry for Class XI & XII (Part-I, Part-II); N.C.E.R.T., Delhi, 2017-18.
✓ Dr. G. H. Hugar and Prof A. N. Pathak, Applied Chemistry Laboratory Practices, Vol. I and Vol. II, NITTTR, Chandigarh, Publications, 2013-14.
✓ Agnihotri, Rajesh, Chemistry for Engineers, Wiley India Pvt.Ltd., 2014.
✓ Jain & Jain, Engineering Chemistry, Dhanpat Rai and Sons; New Delhi, 2015.

Applied Physics-II

Course Code- TH 2

(Common to 2nd Sem)

Period per week:	4	IA:	30 Marks
Total Period:	60	End Sem Exam:	70 Marks
Timing of End Exam:	3 Hours	No. Of Credit:	4

Course Outcome:

After completion of course the student will be able to:

1) Explain various parameters of longitudinal & transverse wave motion, derive expression for various parameters of SHM and explain methods of control of sound wave for acoustics of building and uses of ultrasonic wave in various medical and Engineering application.
2) Explain basic optical laws , various optical phenomena and uses of optical instruments.
3) Apply the fundamental electrostatic laws to calculate electric field intensity, electric potential & potential difference of straight charged conductor.
4) Classify magnetic materials (Dia, Para, Ferro) & calculate magnetic field intensity, Magnetic force produced by current carrying conductor.
5) Distinguish solid materials based on conductivity & Energy band gap and explain various engineering and medical application of LASERs, Fiber optics and Nano Technology.

Course Content

UNIT - 1: Wave motion and its applications

Wave motion, transverse and longitudinal waves with examples, definitions of wave velocity, frequency and wave length and their relationship, Sound and light waves and their properties, wave equation ($y = r \sin \omega t$) amplitude, phase, phase difference, principle of superposition of waves and beat formation.

Simple Harmonic Motion (SHM): definition, expression for displacement, velocity, acceleration, time period, frequency etc. Simple harmonic progressive wave and energy transfer, study of vibration of cantilever and determination of its time period, Free, forced and resonant vibrations with examples.

Acoustics of buildings – reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time and their applications, Ultrasonic waves – Introduction and properties, engineering and medical applications of ultrasonic.

UNIT - 2: Optics

Basic optical laws; reflection and refraction, refractive index, Images and image formation by mirrors, lens and thin lenses, lens formula, power of lens, magnification and defects. Total internal reflection, Critical angle and conditions for total internal reflection, applications of total internal reflection in optical fiber.

Optical Instruments; simple and compound microscope, astronomical telescope in normal adjustment, magnifying power, resolving power, uses of microscope and telescope, optical projection systems.

UNIT - 3: Electrostatics

Coulombs law, unit of charge, Electric field, Electric lines of force and their properties, Electric flux, Electric potential and potential difference, Gauss law: Application of Gauss law to find electric field intensity of straight charged conductor, plane charged sheet and charged sphere.

Capacitor and its working, Types of capacitors, Capacitance and its units. Capacitance of a parallel plate capacitor, Series and parallel combination of capacitors (related numerical), dielectric and its effect on capacitance, dielectric break down.

UNIT - 4: Current Electricity

Electric Current and its units, Direct and alternating current, Resistance and its units, Specific resistance, Conductance, Specific conductance, Series and parallel combination of resistances. Factors affecting resistance of a wire, carbon resistances and colour coding.

Ohm's law and its verification, Kirchhoff's laws, Wheatstone bridge and its applications (slide wire bridge only), Concept of terminal potential difference and Electromotive force (EMF)

Heating effect of current, Electric power, Electric energy and its units (related numerical problems), Advantages of Electric Energy over other forms of energy.

UNIT - 5: Electromagnetism

Types of magnetic materials; dia, para and ferromagnetic with their properties, Magnetic field and its units, magnetic intensity, magnetic lines of force, magnetic flux and units, magnetization.

Concept of electromagnetic induction, Faraday's Laws, Lorentz force (force on moving charge in magnetic field). Force on current carrying conductor, force on rectangular coil placed in magnetic field.

Moving coil galvanometer; principle, construction and working, Conversion of a galvanometer into ammeter and voltmeter.

UNIT - 6: Semiconductor Physics

Energy bands in solids, Types of materials (insulator, semi-conductor, conductor), intrinsic and extrinsic semiconductors, p-n junction, junction diode and V-I characteristics, types of junction diodes. Diode as rectifier – half wave and full wave rectifier (centre taped).

Transistor; description and three terminals, Types- pnp and npn, some electronic applications (list only).

Photocells, Solar cells; working principle and engineering applications.

UNIT - 7: Modern Physics

Lasers: Energy levels, ionization and excitation potentials; spontaneous and stimulated emission; population inversion, pumping methods, optical feedback, Types of lasers; Ruby, He-Ne and semiconductor, laser characteristics, engineering and medical applications of lasers.

Fiber Optics: Introduction to optical fibers, light propagation, acceptance angle and numerical aperture, fiber types, applications in; telecommunication, medical and sensors.

Nanoscience and Nanotechnology: Introduction, nanoparticles and nanomaterials, properties at nanoscale, nanotechnology, nanotechnology based devices and applications.

References:

1. Applied Physics-I by Prof. Vinod Kumar Yadav (Download from https://ekumbh.aicte-india.org/dbook.php)
2. Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi
3. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi
4. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
5. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi.
6. Modern approach to Applied Physics-I and II, AS Vasudeva, Modern Publishers.
7. A Textbook of Optics, N Subramanyam, Brij Lal, MN Avahanulu, S Chand and Company Ltd.
8. Introduction to Fiber Optics, Ajoy Ghatak and K Thyagarajan, Cambridge University Press India Pvt. Ltd, New Delhi.
9. Nanoscience and Nanotechnology, KK Choudhary, Narosa Publishing House, Pvt. Ltd. New Delhi.
10. Nanotechnology: Importance and Applications, M.H. Fulekar, IK International Publishing House Pvt. Ltd, New Delhi.
11. e-books/e-tools/ learning physics software/websites etc.

Mathematics- II

Course Code- TH 3

(Common to 2nd sem)

Period per week:	4	IA:	30 Marks
Total Period:	60	End Sem Exam:	70 Marks
Timing of End Exam:	3 Hours	No. Of Credit:	4

Course Outcomes:

At the end of the course, the students will be able to:

(i) Apply the concept of Determinants and Matrices on 3rd order system of equations to find the unknown parameters and simple programming using MATLAB.

(ii) Apply Integral calculus to obtain area and volume of solid.

(iii) Connect algebra and geometry through graphs of lines and curves.

(iv) Differentiate between a resultant and a concurrent force through vector algebra.

(v) To model simple physical problems in the form of a differential equation, analyze and interpret its solutions.

Course Content:

UNIT - I: Determinants and Matrices

Elementary properties of determinants up to 3rd order, consistency of equations, Crammer's rule. Algebra of matrices, Inverse of a matrix, matrix inverse method to solve a system of linear equations in 3 variables.

UNIT - II: Integral Calculus

Integration as inverse operation of differentiation. Simple integration by substitution, by parts and by partial fractions (for linear factors only). Use of formulas $\int_0^{\frac{\pi}{2}} \sin^n x\, dx$, $\int_0^{\frac{\pi}{2}} \cos^n x\, dx$ and $\int_0^{\frac{\pi}{2}} \sin^m x \cos^n x\, dx$ for solving problems Where m and n are positive integers.

Applications of integration for i. Simple problem on evaluation of area bounded by a curve and axes. ii. Calculation of Volume of a solid formed by revolution of an area about axes. (Simple problems).

UNIT - III: Co-Ordinate Geometry

Equation of straight line in various standard forms (without proof), inter section of two straight lines, angle between two lines. Parallel and perpendicular lines, perpendicular distance formula.

General equation of a circle and its characteristics. To find the equation of a circle, given:

ii. Centre and radius,

iii. Three points lying on it and

iv. Coordinates of end points of a diameter;

Definition of conics (Parabola, Ellipse, Hyperbola) their standard equations without proof. Problems on conics when their foci, directories or vertices are given.

UNIT - IV: Vector Algebra

Definition notation and rectangular resolution of a vector. Addition and subtraction of vectors. Scalar
and vector products of 2 vectors. Simple problems related to work, moment and angular velocity.

UNIT-V: Differential Equations

Solution of first order and first degree differential equation by variable separation method (simple
problems). MATLAB – Simple Introduction.

References:

- ✓ Mathematics-II by Dr. Garima Singh (Download from https://ekumbh.aicte-india.org/dbook.php)
- ✓ B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
- ✓ G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995.
- ✓ S.S. Sabharwal, Sunita Jain, Eagle Parkashan, Applied Mathematics, Vol. I & II, Jalandhar.
- ✓ Comprehensive Mathematics, Vol. I & II by Laxmi Publications, Delhi.
- ✓ Reena Garg & Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi

Applied Physics-II Lab

Course Code-PR 2

(Common to 2nd sem)

Period per week:	2	Sessional:	25 Marks
Total Period:	30	End Sem Exam:	25 Marks
Timing of End Exam:	3 Hours	No. Of Credit:	1

Course Outcome:

List of Practicals/Activities: (To perform minimum 10 Practicals)

1. To determine and verify the time period of a cantilever.
2. To determine velocity of ultrasonic in different liquids using ultrasonic interferometer.
3. To verify laws of reflection from a plane mirror/ interface.
4. To verify laws of refraction (Snell's law) using a glass slab.
5. To determine focal length and magnifying power of a convex lens.
6. To verify Ohm's law by plotting graph between current and potential difference.
7. To verify laws of resistances in series and parallel combination.
8. To find the frequency of AC main using electrical vibrator.
9. To verify Kirchhoff's law using electric circuits.
10. To study the dependence of capacitance of a parallel plate capacitor on various factors and determines permittivity of air at a place.
11. To find resistance of a galvanometer by half deflection method.
12. To convert a galvanometer into an ammeter.
13. To convert a galvanometer into a voltmeter.
14. To draw V-I characteristics of a semiconductor diode (Ge, Si) and determine its knee volt- age.
15. To verify inverse square law of radiations using a photo-electric cell.
16. To measure wavelength of a He-Ne/diode laser using a diffraction grating.
17. To measure numerical aperture (NA) of an optical fiber.
18. Study of an optical projection system (OHP/LCD) - project report.

Suggested Student Activities & Strategies

Apart from classroom and laboratory learning following are the suggested student related activities which can be undertaken to accelerate the attainment of various outcomes of the course.

a. Make survey of different physical products and compare the following points
   - Measurements of dimensions
   - Properties
   - Applications
b. Library survey regarding engineering materials/products used in different industries
c. Seminar on any relevant topic.

Teachers should use the following strategies to achieve the various outcomes of the course.

- Different methods of teaching and media to be used to attain classroom attention.
- Massive open online courses (MOOCs) may be used to teach various topics/sub topics.

- 15-20% of the topics which are relatively simpler or descriptive in nature should be given to the students for self-learning and assess the development of competency through classroom presentations/projects.
- Micro-projects on relevant may be given to group of students for hand-on experiences.

Recommended Books:

1. Applied Physics-I by Prof. Vinod Kumar Yadav (Download from https://ekumbh.aicte-india.org/dbook.php)
1. Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi
2. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publications (P) Ltd., New Delhi
3. Practical Physics by C. L. Arora, S. Chand & Company Ltd.
4. e-books/e-tools/ learning physics software/you Tube videos/ websites etc.

Final

DIPLOMA CURRICULUM OF MECHANICAL ENGINEERING (SECOND YEAR) (3rd Semester)

(To be implemented from 2025-26)

Prepared by;

National Institute of Technical Teachers' Training & Research Kolkata
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Vetted by:
Domain experts from Polytechnics of Odisha

State Council for Technical Education & Vocational Training
Near Raj Bhawan, Unit-VIII, Bhubaneswar, Odisha

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PROGRAMME TITLE: MECHANICAL ENGINEERING

SEMESTER - III

SL. No	Category of Course	Code No	Course Title	Study Scheme				Evaluation Scheme				Total Marks	Credits
				Pre-requisite	Contact Hours/ week			Theory		Practical			
					L	T	P	End Exam	Progressive Assessment	End Exam	Progressive Assessment		
1	Programme core	MEPC201 TH:1	Manufacturing Processes		3	0	0	70	30	-	-	100	3
2		MEPC203 TH:2	Strength of Materials		3	0	0	70	30	-	-	100	3
3		MEPC205 TH:3	Material Science and Engineering		3	0	0	70	30	-	-	100	3
4		MEPC207 TH:4	Fluid Mechanics & Fluid Power		3	0	0	70	30	-	-	100	3
5		MEPC209 TH:5	Thermal Engineering-I		3	0	0	70	30	-	-	100	3
6		MEPC211 PR:1	Manufacturing Engineering Lab-I		0	0	4	-	-	15	35	50	2
7		MEPC213 PR:2	Material Testing and Metallography Lab		0	0	4	-	-	15	35	50	2
8		MEPC215 PR:3	Fluid mechanics & Fluid Power Lab		0	0	4	-	-	15	35	50	2
9		MEPC217 PR:4	Thermal Engineering-I Lab		0	0	4	-	-	15	35	50	2
10	Summer Internship	SI201	Summer internship – I*		0	0	0	-	-	15	35	50	2
TOTAL					**15**	**0**	**16**	**350**	**150**	**75**	**175**	**750**	**25**

*3 to 4-weeks after 2nd Semester

***The best of 2 IA conducted in a subject out of 20 marks to be considered. Assignment/ quiz etc. of 10 marks to be treated as part of IA. Besides this, Monthly Test to be conducted for each subject. Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester. Club/Innovation/ Idea Tinkering Activities etc. shall be encouraged to be performed by students beyond the above stipulated hours.**

SEMESTER – III COURSES

TH:1- MANUFACTURING PROCESSES

L	T	P		
3	0	0		**Course Code: MEPC201**
Total Contact Hours				**Theory Assessment**
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam 70
				Progressive Assessment 30
Pre Requisite		**: Nil**		
Credit		**3**		Category of Course: PC

RATIONALE: Engineering basically means production of goods and services for human consumption The knowledge of various manufacturing processes leads to production of components, which are made from different metallic and non-metallic materials. These parts are produced using a variety of manufacturing processes with requisite strength, surface finish, size and shape. As a mechanical technician/ engineer, one should have the knowledge of these manufacturing processes, which will be very helpful for discharging his duties in manufacturing or maintenance.

LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Illustrate the importance of cutting fluids & lubricants in machining.
- Study various types of basic production processes. To select, operate and control the appropriate processes for specific applications.
- Define the concept of gear making and list various gear materials.
- Describe the importance of press tools and various die operations.
- Explain grinding and finishing processes.

DETAILED COURSE CONTENTS

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	**Cutting Fluids & Lubricants:** Introduction; Types of cutting fluids, Fluids and coolants required in turning, drilling, shaping, sawing & broaching; Selection of cutting fluids, methods of application of cutting fluid; Classification of lubricants (solid, liquid, gaseous), Properties and applications of lubricants. **Lathe Operations:** Types of lathes – light duty, medium duty and heavy duty geared lathe, CNC lathe; Specifications; Basic parts and their functions; Operations and tools – Turning, parting off, Knurling, facing, Boring, drilling, threading, step turning, taper turning, Nomenclature of single point cutting tool of lathe.	10
II	**Broaching Machines:** Introduction to broaching; Types of broaching machines – Horizontal type (Single ram & duplex ram), Vertical type, pull up, pull down, and push down; Elements of broach tool; broach teeth details; Nomenclature; Tool materials. **Drilling:** Classification; Basic parts and their functions; Radial drilling machine; Types of operations; Specifications of drilling machine; Types of drills and reamers.	9

III	**Welding:** Classification; Gas welding techniques; Types of welding flames; Arc Welding – Principle, Equipment, Applications; Shielded metal arc welding; Submerged arc welding; TIG / MIG welding; Resistance welding - Spot welding, Seam welding, Projection welding; Welding defects; Brazing and soldering: Types, Principles, Applications. **Milling:** Introduction; Types of milling machines: plain, Universal, vertical; constructional details – specifications; Milling operations: simple, compound and differential indexing; Milling cutters – types; Nomenclature of teeth; Teeth materials; Tool signature of milling cutter; Tool & work holding devices.	9
IV	**Gear Making:** Manufacture of gears – by Casting, Moulding, Stamping, Coining Extruding, Rolling, Machining; Gear generating methods: Gear Shaping with pinion cutter & rack cutter; Gear hobbing; Description of gear hob; Operation of gear hobbing machine; Gear finishing processes; Gear materials and specification; Heat treatment processes applied to gears. **Press working:** Types of presses and Specifications, Press working operations - Cutting, bending, Drawing, punching, blanking, notching, lancing; Die set components- punch and die shoe, guide pin, bolster plate, stripper, stock guide, feed stock, pilot; Punch and die clearances for blanking and piercing, effect of clearance.	9
V	**Grinding and finishing processes:** Principles of metal removal by Grinding; Abrasives – Natural & Artificial; Bonds and binding processes: Vitrified, silicate, shellac, rubber, Bakelite; Factors affecting the selection of grind wheels: size and shape of wheel, kind of abrasive, grain size, grade and strength of bond, structure of grain, spacing, kinds of bind material; Standard marking systems: Meaning of letters & numbers sequence of marking, Grades of letters; Grinding machines classification-: Cylindrical, Surface, Tool & Cutter grinding machines; Construction details; Principle of centerless grinding; Advantages & limitations of centerless grinding; Finishing by grinding: Honing, Lapping, Super finishing; Electroplating: Basic principles, Plating metals, applications; Hot dipping: Galvanizing, Tin coating, Parkerizing, Anodizing; Metal spraying: wire process, powder process and applications; Organic coatings: Oil base Paint, Lacquer base, Enamels, Bituminous paints, rubber base coating; Finishing specifications.	8

REFERENCES:

1. Manufacturing technology – P N Rao, Tata McGraw-Hill Publications
2. Elements of workshop Technology (Volume I & II) – S. K. Hajra Chaudary, Bose & Roy, Media Promoters and Publishers Limited.
3. Production Technology (Volume I & II) – O. P. Khanna & Lal, Dhanpat Rai Publications.
4. Fundamental of metal cutting and machine tools– B. L. Juneja, New age international limited.
5. Manufacturing Technology, Metal Cutting & Machine tools– P. N. Rao, Tata McGraw-Hill Publications

TH:2- STRENGTH OF MATERIALS

L	T	P		
3	0	0		**Course Code: MEPC203**
Total Contact Hours				**Theory Assessment**
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam 70
				Progressive Assessment 30
Pre Requisite		**: Nil**		
Credit		**3**		Category of Course: PC

RATIONALE:

Strength of materials deals with the internal behavior of solid bodies loaded in different manner. The common solid bodies e.g. shafts, bars, beams, plates and columns are the basic components of structures and machines. This subject primarily focuses on mechanical properties of materials, analysis of stress, strain and evaluation of deformation. Hence all students should have acquainted with strength of materials to become successful technician

LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Apply the concept of Simple Stresses and Strains.
- Describe the concept of Strain Energy.
- Define the concept of Shear Force and Bending Moment Diagrams.
- Apply the concept of Theory of Simple Bending and Deflection of Beams.
- Outline the concept of Torsion in Shafts and Springs.
- Illustrate the concept of Thin Cylindrical Shells.

DETAILED COURSE CONTENTS

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	**Simple Stresses and Strains:** Types of forces; Stress, Strain and their nature; Mechanical properties of common engineering materials; Significance of various points on stress – strain diagram for M.S. and C.I. specimens; Significance of factor of safety; Relation between elastic constants; Stress and strain values in bodies of uniform section and of composite section under the influence of normal forces; Thermal stresses in bodies of uniform section and composite sections; Related numerical problems on the above topics. **Strain Energy:** Strain energy or resilience, proof resilience and modulus of resilience; Derivation of strain energy for the following cases: i) Gradually applied load, ii) Suddenly applied load, iii) Impact/ shock load; Related numerical problems.	10
II	**Shear Force & Bending Moment Diagrams:** Types of beams with examples: a) Cantilever beam, b) Simply supported beam, c) Over hanging beam, d) Continuous beam, e) Fixed beam; Types of Loads – Point load, UDL and UVL; Definition and explanation of shear force and bending moment; Calculation of shear force and bending moment and drawing the S.F and B.M. diagrams by the analytical method only for the following cases: a) Cantilever with point loads, b) Cantilever with uniformly distributed load, c) Simply supported beam with point loads, d) Simply supported beam with UDL, e) Over hanging beam with point loads, at the center and at free ends, f) Over hanging beam with UDL throughout, g) Combination of point and UDL for the above; Related numerical problems.	9

III	**Theory of Simple Bending and Deflection of Beams:** Explanation of terms: Neutral layer, Neutral Axis, Modulus of Section, Moment of Resistance, Bending stress, Radius of curvature; Assumptions in theory of simple bending; Bending Equation $M/I = \sigma/Y = E/R$ with derivation; Problems involving calculations of bending stress, modulus of section and moment of resistance; Calculation of safe loads and safe span and dimensions of cross-section; Definition and explanation of deflection as applied to beams; Deflection formulae without proof for cantilever and simply supported beams with point load and UDL only (Standard cases only); Related numerical problems.	9
IV	**Torsion in Shafts and Springs:** Definition and function of shaft; Calculation of polar M.I. for solid and hollow shafts; Assumptions in simple torsion; Derivation of the equation $T/J=f_S/R=G\theta/L$; Problems on design of shaft based on strength and rigidity; Numerical Problems related to comparison of strength and weight of solid and hollow shafts; Classification of springs; Nomenclature of closed coil helical spring; Deflection formula for closed coil helical spring (without derivation); stiffness of spring; Numerical problems on closed coil helical spring to find safe load, deflection, size of coil and number of coils.	9
V	**Unit-V: Thin Cylindrical Shells:** Explanation of longitudinal and hoop stresses in the light of circumferential and longitudinal failure of shell; Derivation of expressions for the longitudinal and hoop stress for seamless and seam shells; Related numerical Problems for safe thickness and safe working pressure.	8

REFERENCES:

1. Strength of Materials – D.S. Bedi, Khanna Book Publishing Co. (P) Ltd., Delhi, 2017
2. Strength of Materials – B.C.Punmia, Ashok Kumar Jain & Arun Kumar Jain, Laxmi Publica- tions, New Delhi, 2013
3. Strength of Materials – R.S. Khurmi, S.Chand Company Ltd. Delhi

TH:3- MATERIAL SCIENCE & ENGINEERING

L	T	P		
3	0	0		**Course Code: MEPC205**
Total Contact Hours				**Theory Assessment**
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam 70
				Progressive Assessment 30
Pre Requisite		**: Nil**		
Credit		**3**		Category of Course: PC

RATIONALE:

Engineering Materials play an important role as the vital tool for solving the problems of material selection and application in the production and manufacturing of equipment/machines, devices, tools, etc. Therefore, an engineering diploma student must be conversant with the properties, composition and behavior of materials from the point of view of reliability and performance of the product. Subject is concerned with the changes in structure and properties of matter. Many of the processes which are involved to bring out these changes, forms the basis of engineering activities. The study of basic concepts of material science and metallurgy will help the students understanding engineering subjects where the emphasis is laid on the application of these materials.

LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Explain about crystal structures and atomic bonds.
- Describe about classification of ferrous metals and their properties.
- Explain about non-ferrous metals, cutting tool materials and composites along with their properties.
- Describe about the various metallic failures and knowledge in testing of materials.
- Explain the principle of corrosion, their types, its prevention methods along with the various surface engineering processes.

DETAILED COURSE CONTENTS

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	**Crystal structures and Bonds:** Unit cell and space lattice: Crystal system: The seven basic crystal systems; Crystal structure for metallic elements: BCC, FCC and HCP; Coordination number for Simple Cubic, BCC and FCC; Atomic radius: definition, atomic radius for Simple Cubic, BCC and FCC; Atomic Packing Factor for Simple Cubic, BCC, FCC and HCP; Simple problems on finding number of atoms for a unit cell. **Bonds in solids:** Classification - primary or chemical bond, secondary or molecular bond; Typesof primary bonds: Ionic, Covalent and Metallic Bonds; Types of secondary bonds: Dispersion bond, Dipole bond and Hydrogen bond	10
II	**Unit-II: Phase diagrams, Ferrous metals and its Alloys:** Isomorphs, eutectic and eutectoid systems; Iron-Carbon binary diagram; Iron and Carbon Steels; flow sheet for production of iron and steel; Iron ores – Pig iron: classification, composition and effects of impurities on iron; Cast Iron: classification, composition, properties and uses; Wrought Iron: properties, uses/applications of wrought Iron; comparison of cast iron, wrought iron and mild steel and high carbon steel; standard commercial grades of steel as per BIS and AISI; Alloy Steels – purpose of alloying; effects of alloying elements – Important alloysteels: Silicon steel, High Speed Steel (HSS), heat resisting steel, spring steel,Stainless Steel (SS): types of SS, applications of SS – magnet steel – composition, properties and uses	9

III	**Non-ferrous metals and its Alloys:** Properties and uses of aluminum, copper, tin, lead, zinc, magnesium and nickel; Copper alloys: Brasses, bronzes – composition, properties and uses; Aluminum alloys: Duralumin, hindalium, magnelium – composition, properties and uses; Nickel alloys: Inconel, monel, nicPerome – composition, properties and uses. Anti-friction/Bearing alloys: Various types of bearing bronzes - Standard commercial grades as per BIS/ASME.	9
IV	**Failure analysis & Testing of Materials:** Introduction to failure analysis; Fracture: ductile fracture, brittle fracture; cleavage; notch sensitivity; fatigue; endurance limit; characteristics of fatigue fracture; variables affecting fatigue life; creep; creep curve; creep fracture; Destructive testing:Tensile testing; compression testing; Hardness testing: Brinell, Rockwell; bend test; torsion test; fatigue test; creep test. Non-destructive testing: Visual Inspection; magnetic particle inspection; liquid penetrant test; ultrasonic inspection; radiography.	9
V	**Corrosion & Surface Engineering:** Nature of corrosion and its causes; Electro chemical re-actions; Electrolytes; Factors affecting corrosion: Environment, Material properties and physical conditions; Types of corrosion; Corrosion control: Material selection, environment control and design; Surface engineering processes: Coatings and surface treatments; Cleaning and mechanical finishing of surfaces; Organic coatings; Electroplating and Special metallic plating; Electro polishing and photo-etching ;– Conversion coatings: Oxide, phosphate and chromate coatings; Thin film coatings: PVD and CVD; Surface analysis; Hard-facing, thermal spraying and high-energy processes; Process/mate-rial selection. Pollution norms for treating effluents as per standards.	8

REFERENCES:

1. Material Science –GBS Narang-Khanna Publishers, New Delhi
2. Material Science –R.K.Rajput –Lakshmi Publication , New Delhi
3. Material Science-R.S.Khurmi,R,S.Sedha-S.Chand,Publication
4. Material Science and Metallurgy –D.S.Nutt-S.K,Katariya and Sons,New Delhi
5. Material Science and Engineering -V.Raghavan-EEE Edition,Prentice Hall ,New Delhi

TH:4- FLUID MECHANICS & FLUID POWER

L	T	P		
3	0	0		**Course Code: MEPC207**
Total Contact Hours				**Theory Assessment**
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam 70
				Progressive Assessment 30
Pre Requisite		**: Nil**		
Credit		**3**		Category of Course : PC

RATIONALE: Use of fluids in engineering field is of great importance. It is therefore necessary to study the physical properties and characteristic of fluids which have very important use and application in automobile engineering. Fluid power plays dominant role in industrial world knowledge of which is essential for mechanical engineering students. Actual use of or action by various liquids like water and oil can be realized by a group of machines called fluid machines. Mechanical students should be conversant with design, operation and use of these fluid machines.

LEARNING OUTCOMES:

After completion of the course, the students will be able

- Identify the properties of a fluid and hydrostatics.
- Explain the basic kinematics and dynamics of fluid mechanics
- Describe the flow through orifices, notches and pipes.
- Classify different types of turbines and pumps.
- Applythe knowledge of fluid power.

DETAILED CONTENT

Unit No.	Content	Time Allotted (Hrs.)
I	**PROPERTIES OF A FLUID AND HYDROSTATICS:** Definition of a fluid, classification of fluids, various fluid properties such as density, specific weight, specific gravity, viscosity and surface tension and state the units, fluid pressure, total pressure (hydrostatic force) and location of centre of pressure on vertical, horizontal , inclined and curved surfaces by fluid, working of various measuring devices for pressure, the principle of manometers of simple, differential and inverted types, principle of buoyancy and floatation. Simple numericals on Manometer.	**9**
II	**KINEMATICS AND DYNAMICS OF FLUID MECHANICS** Various types of flow, circulation and vorticity, stream-line, path line and streak-line, various energies of fluid, law of conservation of mass, energy equation -Bernoulli's theorem, the limitations of same-application of Bernoulli's equation, the working of venturimeter, pitot tube, equation of flow rate and velocity with respect to venturimeter and pitot tube respectively, the working of flowmeter: current meter, Simple numericals.	**6**
III	**FLOW THROUGH ORIFICES AND NOTCHES, PIPES:** Definition –orifice, orifice coefficient such as Cc, Cv, Cd, Relationship between orifice coefficients, weir and notch, Discharge over rectangular notch and weir, triangular notch. Simple numericals. Definition of a pipe. laws of fluid friction, Equation of loss of head through pipe due to friction, Darcy's formula and Chezy's formula, hydraulic gradient and total energy line, Nozzle and its application, Power transmission through nozzle The condition of maximum power transmission through nozzle, Expression for diameter of nozzle for maximum power transmission.	**9**

IV	**Turbines and Pumps:** Classification of hydraulic turbines, Selection of turbine on the basis of head and discharge available, Construction and working principle of Pelton wheel, Francis and Kaplan turbines. Draft tubes – types and construction, Concept of cavitation in turbines, Calculation of Work done, Power, efficiency of turbines. Simple numericals **Centrifugal Pumps:** Principle of working and applications, Types of casings and impellers, Concept of multistage, Priming and its methods, Manometric head, Work done, Manometric efficiency, Overall efficiency. Simple numericals **Reciprocating Pumps:** Construction, working principle and applications of single and double acting reciprocating pumps, Concept of Slip, Negative slip, Cavitation and separation. Simple numericals	**12**
V	**FLUID POWER:** Definition of fluid power, classification – hydraulic power and pneumatic power, Hydraulic Systems -Basic principle of enclosed hydraulic system – Pascal's law, Oil hydraulic system – reservoir, filter pressure limiting valves, direction control valves, flow control valves, actuators (linear and rotary), accumulator, pipes and fittings, various positive displacement pumps-gear, vane, piston, drawing of hydraulic circuits - extension and retraction of linear actuator, motion of rotary actuator, holding a job, hydraulic press etc.	**9**

REFERENCES:

1. Fluid Mechanics and Hydraulic Machines – R. K. Bansal, Laxmi Publications, New Delhi.
2. Fluid Mechanics and Hydraulic Machines, S.S. Rattan, Khanna Publishing House, New Delhi.
3. Hydraulics and fluid mechanics including Hydraulic machines – Modi P.N. and Seth S.M., Standard Book House. New Delhi.
4. Hydraulics and Fluid Mechanics - Jagadish Lal- Metropolitan Book
5. Fluid Power with Applications - Anthony Esposito -Pearson Education Limited.
6. Hydraulic, fluid mechanics and fluid machines – S. Ramamrutham, Dhanpat Rai and Sons, New Delhi.

TH:5- THERMAL ENGINEERING I

L	T	P		
3	0	0		**Course Code: MEPC209**
Total Contact Hours				**Theory Assessment**
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam 70
				Progressive Assessment 30
Pre Requisite		**: Nil**		
Credit		**3**		Category of Course : PC

RATIONALE: Thermal-engineering is a crucial field that helps learners to understand and harness the power of heat transfer and energy conversion. From power generation to automotive engineering, the principles of thermal engineering have a wide range of applications in various industries.

LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Describe various sources of Energy and their applications.
- Classify I.C. engines and their working and constructional features.
- Draw the energy flow diagram of an I.C. engine and evaluate its performance.
- Describe the constructional features of air compressor and working of different air compressors.
- Describe the applications of refrigeration and Classify air-conditioning systems.

DETAILED COURSE CONTENTS

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	**Introduction to Thermodynamics:** Thermodynamic Systems (closed, open, isolated) ; Thermodynamic properties of a system (pressure, volume, temperature, entropy, enthalpy, Internal energy and units of measurement) ; Intensive and extensive properties ; Define thermodynamic processes, path, cycle , state, path function, point function; Thermodynamic Equilibrium ; Quasi-static Process ; Laws of thermodynamics (statements only) **Sources of Energy:** Brief description of energy Sources: Classification of energy sources: Renewable, Non-Renewable; Fossil fuels (CNG & LPG) ; Solar Energy: Flat plate and concentrating collectors & its applications (working principles of Solar Water Heater, Photovoltaic Cell, Solar Distillation);Definitions of Wind Energy; Tidal Energy; Ocean Thermal Energy; Geothermal Energy; Biogas, Biomass, Bio-diesel; Hydraulic Energy, Nuclear Energy; Fuel cell.	10

II	**Internal Combustion Engines:** Assumptions made in air standard cycle analysis; Brief description of Carnot, Otto and Diesel cycles with P-V and T-S diagrams; Internal and external combustion engines; advantages of I.C. engines over external combustion engines; classification of I.C. engines; neat sketch of I.C. engine indicating component parts; Function of each part and materials used for the component parts - Cylinder, crank case, crank pin, crank, crank shaft, connecting rod, wrist pin, piston, cooling pins cylinder heads, exhaust valve, inlet valve; Working of four-stroke and two stroke petrol and diesel engines; Comparison of two stroke and four stroke engines; Comparison of C.I. and S.I. engines; Valve timing and port timing diagrams for four stroke and two stroke engines.	9
III	**I.C. Engine Systems:** Fuel system of Petrol engines; Principle of operation of simple and Zenith carburettors; Fuel system of Diesel engines; Types of injectors and fuel pumps; Cooling system: air cooling, water cooling system with thermo siphon method of circulation and water cooling system with radiator and forced circulation (description with line diagram). Comparison of air cooling and water cooling system; Ignition systems – Battery coil ignition and magneto ignition (description and working). Comparison of two systems; Types of lubricating systems used in I.C. engines with line diagram; Types of governing of I.C. engines – hit and miss method, quantitative method, qualitative method and combination methods of governing; their applications; Objective of super charging.	9
IV	**Performance of I.C. Engines:** Brake power; Indicated power; Frictional power; Brake and Indicated mean effective pressures; Brake and Indicated thermal efficiencies; Mechanical efficiency;Relative efficiency; Performance test; Morse test; Heat balance sheet; Methods of determination of B,P., I.P. and F.P.; Simple numerical problems on performance of I.C. engines.	9
V	**Unit-V: Air Compressors:** Functions of air compressor; Uses of compressed air; Types of air compressors; Single stage reciprocating air compressor - its construction and working (with line diagram) using P-V diagram; Multi stage compressors – Advantages over single stage compressors; Rotary compressors: Centrifugal compressor, axial flow type compressor and vane type compressors. **Refrigeration & Air-conditioning:** Refrigeration; Refrigerant; COP; Air Refrigeration system: components, working & applications; Vapour Compression system: components, working & applications; Air conditioning; Classification of Air-conditioning systems; Comfort and Industrial Air-Conditioning; Window Air-Conditioner; Summer Air-Conditioning system, Winter Air-Conditioning system, Year-round Air-Conditioning system.	**8**

REFERENCES:

1 Introduction to Renewable Energy– Vaughn Nelson, CRC Press

2. Thermal Engineering – P. L. Ballaney, Khanna Publishers, 2002

3. A Course in Thermal Engineering – S. Domkundwar & C.P. Kothandaraman, Dhanpat Rai.

4. Thermal Engineering – R. S. Khurmi and J.K. Gupta, 18th Edition, S. Chand & Co, New Delhi.

5. Thermal Engineering – R. K. Rajput, 8th Edition, Laxmi publications Pvt Ltd, New Delhi.

PR:1- MANUFACTURING ENGINEERING LAB-I

L	T	P			
0	0	4		**Course Code: MEPC211**	
Total Contact Hours				**Practical Assessment**	
Practical		:60Hrs	**Total Marks: 50**	End Term Exam	15
				Progressive Assessment	35
Pre Requisite		:			
Credit		**2**		Category of Course : PC	

RATIONALE: Manufacturing Engineering Lab-I provides hands-on experience with machining, welding, and fabrication processes, enhancing technical skills for industrial applications. It helps students understand manufacturing techniques, safety standards, and quality control essential for mechanical engineering careers.

LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Prepare a mould sand mix and molten metal and calculate the amount of metal to be poured in the mould
- Centre the job and select the proper tool to perform the job on lathe machine.
- Calculate the taper angle and practice different taper turning methods on lathe.
- Prepare the edges for welding and select the suitable electrode, voltage and current.
- Operate the welding transformer and generator to perform various weld joint operations.

List of Experiments

S.No.	Topics for practice
1.	Moulding & casting of (i) Connecting rod (ii) Solid bearing (iii) V-Pulley/Gear Pulley
2.	Arc welding (i) Lap Joint (ii) Butt Joint (iii) T- Joint
3.	Gas welding (i) Lap Joint (ii) Butt Joint
4.	Spot welding (i) Lap Joint
5.	Turning Exercise (i) Facing, Step Turning & Chamfering (ii) Step Turning & Taper Turning (iii) Step Turning & Groove Cutting (iv) Step Turning & & Knurling (v) Step Turning & Thread Cutting (vi) Turning and Drilling
6.	Grinding the Lathe Cutting tools to the required angles
7.	Study of Lathe, Drilling machine, shaping machine and slotting machine
8.	The dismantling some of the components of lathe and then assemble the same
9.	List the faults associated with lathe and its remedies
10.	The routine and preventive maintenance procedure for lathe

REFERENCES:

1. Elements of Workshop Technology (Volume I & II) – Hajra Chowdry & Bhattacharaya, MediaPromoters, 11th Edition, 2007
2. Introduction of Basic Manufacturing Processes and Workshop Technology – Rajendersingh,New age International (P) Ltd. NewDelhi, 2006
3. Workshop Technology – Raghuwanshi, Khanna Publishers. Jain &Gupta, New Delhi, 2002
4. Production Technology – Jain & Gupta, Khanna Publishers, New Delhi, 2006.
5. Production Technology – HMT, 18th edition, Tata McGraw Hill, New Delhi
6. Manufacturing process – Myro N Begman, 5 th edition, Tata McGraw Hill, New Delhi

PR:2- MATERIAL TESTING AND METALLOGRAPHY LAB

L	T	P		
0	0	4		**Course Code: MEPC213**
Total Contact Hours				**Practical Assessment**
Practical		:60Hrs	**Total Marks: 50**	End Term Exam 15
				Progressive Assessment 35
Pre Requisite		:		
Credit		**2**		Category of Course : PC

RATIONALE: Material Testing and Metallography Lab helps students understand the mechanical properties of materials through tests like hardness, tensile, and impact testing. It also provides hands-on experience in metallographic techniques for analyzing microstructures, ensuring quality control in engineering applications.

LEARNING OUTCOMES:

After completion of the course, the students will be able to
to identify the type of material based on its grain structure
to learn the procedure for identifying the cracks in the material
to Illustrate various material testing methods to determine mechanical properties such asyield stress, Ultimate stress, percentage elongation, Young's Modulus etc.

Sl. No.	**Topics for practice**
I	Prepare a specimen and examine the microstructure of the Ferrous and Non- ferrous metals using the Metallurgical Microscope.
II	Detect the cracks in the specimen using (i) Visual inspection and ring test (ii) Die penetration test (iii) Magnetic particle test.
III	Determination of Rockwell's Hardness Number for various materials like mild steel, high carbon steel, brass, copper and aluminium.
IV	Finding the resistance of materials to impact loads by Izod test and Charpytest.
V	Torsion test on mild steel – relation between torque and angle of twist determination ofshear modulus and shear stress.
VI	Finding Young's Modulus of Elasticity, yield points, percentage elongation and percentagereduction in area, stress strain diagram plotting, tests on mild steel.
VII	Determination of modulus of rigidity, strain energy, shear stress and stiffness by load deflection method (Open & Closed coil spring)
VIII	Single or double Shear test on M.S. bar to finding the resistance of material to shear load.

REFERENCES:

1. Measurement system (Application and Design) – Ernest O Doebelin.
2. Strength of Materials – R. S. Khurmi, S. Chand Company Ltd. Delhi
3. A Text Book strength of Material– R.K. Bansal, Laxmi Publication New Delhi

PR:3- FLUID MECHANICS & FLUID POWER LAB

L	T	P		
0	0	4		**Course Code: MEPC215**
Total Contact Hours				**Practical Assessment**
Practical		:60Hrs	**Total Marks: 50**	End Term Exam 15
				Progressive Assessment 35
Pre Requisite		:		
Credit		**2**		Category of Course : PC

RATIONALE: Fluid Mechanics & Fluid Power Lab helps students understand fluid properties, flow behavior, and hydraulic and pneumatic systems. It provides hands-on experience with flow measurement, pump testing, and fluid power applications essential for mechanical engineering.

LEARNING OUTCOMES

After completion of the course, the students will be able to

- Measure various properties such as pressure, velocity, flow rate using various instruments.
- Calculate different parameters such as co-efficient of friction, power, efficiency etc. of various systems.
- Illustrate the need and importance of calibration of pressure gauges.
- Describe the construction and working of turbines and pumps.
- Test the performance of turbines and pumps and Plot characteristics curves.
- Study the hydraulic and pneumatic circuits,

List of Experiments

Sl. No.	Topics for practice
1	Verification of Bernoulli's theorem.
2	Determination of Coefficient of Discharge of Venturi meter.
3	Determination of Coefficient of Discharge, coefficient of contraction and coefficient of velocity of Orifice meter.
4	Determination of coefficient of friction of flow through pipes.
5	Determination of force exerted by the jet of water on the given vane.
6	Determination of minor losses of flow through pipes.
7	Calibration of pressure gauge using dead weight pressure gauge tester.
VIII	Trial on centrifugal pump to determine overall efficiency.
IX	Trial on reciprocating pump to determine overall efficiency.
X	Trial on Pelton wheel /Francis/Kaplan turbine to determine overall efficiency.
XI	Analysis of Hydraulic circuits in a hydraulic trainer
XII	Analysis of pneumatic circuits in a pneumatic trainer

REFERENCES:

1. Fluid Mechanics and Machinery Laboratory Manual- N. Kumara Swamy, Charotar Publishing House Pvt. Ltd., ANAND 388 001, Ed. 2008

2. Fluid Power with Applications - Anthony Esposito -Pearson Education Limited.

PR:4- THERMAL ENGINEERING-I LAB

L	T	P		Course Code: MEPC217	
0	0	4			
Total Contact Hours				**Practical Assessment**	
Practical		:60Hrs	**Total Marks: 50**	End Term Exam	15
				Progressive Assessment	35
Pre Requisite		:			
Credit		2		Category of Course : PC	

RATIONALE: Thermal Engineering-I Lab helps students understand the IC engine performance through practical experiments. It provides hands-on experience with engines, compressors, and calorimeters essential for thermal system analysis.

LEARNING OUTCOMES

After completion of the course, the students will be able to

- Determine the flash and fire point of a given sample of fuel using given apparatus (Abels, Cleveland & Penesky martin)
- Find out the viscosity of a given sample of oil using given apparatus.
- Calculate the calorific value of a given sample of fuel using given apparatus.
- Determine the amount of carbon residue of a given sample of petroleum product.
- Draw VTD /PTD of given I.C. Engine and understand how the processes are controlled during its operation.
- Describe the functions of various parts of IC engines and the working of IC engines.

Course Content

Sl. No.	Topics for practice
1	Flash & Fire point tests using Able's/Cleveland/Pensky Martin Apparatus
2	Viscosity measurement usi/Saybolt viscometer
3	Calorific value tests using Bomb Calorimeter (Solid and Liquid fuels) and Junkers Gas Calorimeter (Gaseous fuels)
4	Carbon residue test using Conradson's apparatus.
5	Assembling and disassembling of I.C. Engines
6	Port timing diagram of Petrol engine
7	Port timing diagram of Diesel engine
8	Valve timing diagram of Petrol engine
9	Valve timing diagram of Diesel engine
10	Study of petrol and diesel engine components and Models

REFERENCES:

1. Thermal Engineering – P.L. Ballaney, Khanna Publishers, 2002
2. A Course in Thermal Engineering – S. Domkundwar & C.P. Kothandaraman, Dhanpat Rai & Publication New Delhi
3. Thermal Engineering – R.S. Khurmi and J.K. Gupta, 18th Edition, S. Chand & Co, New Delhi

SUMMER INTERNSHIP – I

L	T	P			
0	0	0	Total Marks: 50	Course Code: SI201	
Total Contact Hours				Internship Assessment	
Practical		0		End Term Exam	15
				Progressive Assessment	35
Pre Requisite		: Nil			
Credits		2		Category of Course : SI	

Duration: 3-4 weeks during summer vacation after 2nd Semester.

RATIONALE

Summer Internship - I is to offer a structured and practical learning experience that prepares individuals for their future careers, helps them make informed career choices, and equips them with the skills and knowledge necessary to succeed in their chosen field. This course provides opportunities to students for hands-on industry experience.

LEARNING OUTCOMES

After completion of the course, the students will be able to:

- Apply theoretical knowledge gained in their academic coursework to real-world situations.
- Enhance specific skills relevant to their field.
- Gain hands-on experience in a professional network by interacting with mentors and industry professionals.
- Manage time effectively.
- Clarify career goals.

DETAILED COURSE CONTENTS

SUGGESTED ACTIVITIES:

I Orientation:

- Introduction to the organization's mission, values, and culture.
- Familiarization with workplace policies, procedures, and safety guidelines.
- Orientation to the team and organizational structure.

II Project-Based Learning:

- Description of the main project or tasks the intern will be working on during the internship.
- Detailed project goals and objectives.
- Training and guidance on project-specific tools, technologies, or methodologies.

III Technical and Skill Development:

- Training sessions or workshops to enhance technical skills relevant to the internship role (e.g., programming languages, software tools, laboratory techniques).
- Soft skills development, including communication, teamwork, problem solving, and time management

IV Mentorship and Supervision:

- Regular meetings with a designated mentor or supervisor for guidance, feedback, and support.
- Mentorship objectives and expectations.

V Professional Development:

- Sessions on professional etiquette, networking, and building a personal brand
- Resume writing and interview preparation workshops.

VI Industry and Field-Specific Knowledge:

- Lectures, seminars, or presentations on industry trends, best practices, and emerging technologies.
- Guest speakers from the field to share insights and experiences.

VII Reporting and Documentation:

- Training on how to document project progress, results, and findings.
- Practice in creating reports, presentations, or other deliverable.

VIII Ethics and Professionalism:

- Discussions on ethical considerations within the field.
- Scenarios and case studies related to ethical decision-making

IX Feedback and Evaluation:

- Regular performance evaluations and feedback sessions.
- Self-assessment and goal-setting exercises.

X Networking and Industry Exposure:

- Opportunities to attend industry conferences, webinars, or networking events.
- Encouragement to connect with professionals in the field.

NOTE

As per AICTE guidelines, in Summer Internship-I, students are required to be involved in Inter/ Intra Institutional Activities viz;

- Training with higher Institutions;
- Soft skill training organized by Training and Placement Cell of the respective institutions;
- contribution at incubation/ innovation /entrepreneurship cell of the institute;
- participation in conferences/ workshops/ competitions etc.;
- Learning at Departmental Lab/ Tinkering Lab/ Institutional workshop;
- Working for consultancy/ research project within the institutes and
- Participation in all the activities of Institute's Innovation Council for eg: IPR workshop/Leadership Talks/ Idea/ Design/ Innovation/ Business Completion/ Technical Expos etc.

Final

DIPLOMACURRICULUM OF MINING ENGNEERING (SECOND YEAR) (3rd Semester)

(To be implemented from 2025-26)

Prepared by;

National Institute of Technical Teachers' Training & Research Kolkata
Block – FC, Sector – III, Salt Lake City, Kolkata – 700106

Vetted by:
Domain experts from Polytechnics of Odisha

State Council for Technical Education & Vocational Training
Near Raj Bhawan, Unit-VIII, Bhubaneswar, Odisha

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PROGRAMME TITLE: MINING ENGINEERING (MIE)

SEMESTER – III

SL. No	Categoryof Course	Code No	Course Title	Teaching Scheme				Evaluation Scheme				Total Marks	Credits
				Pre-requisite	Contact Hours/ week			Theory		Practical			
					L	T	P	End Exam	Progressive Assessment	End Exam	Progressive Assessment		
1	Programme core	MIEPC201 (TH:1)	Surface Mining Technology	-	3	0	0	70	30	-	-	100	3
2		MIEPC203 (TH:2)	Mine Survey -I	-	3	0	0	70	30	-	-	100	3
3		MIEPC205 (TH:3)	Mine Geology -I	-	3	0	0	70	30	-	-	100	3
4		MIEPC207 (TH:4)	Mechanical Operationin Mines	-	3	0	0	70	30	-	-	100	3
5		MIEPC209 (TH:5)	Mine Machinery -I	-	3	0	0	70	30	-	-	100	3
6		MIEPC211 (PR:1)	Mine Survey -I Lab	-	0	0	4	-	-	15	35	50	2
7		MIEPC213 (PR:2)	Mine Geology -I Lab	-	0	0	4	-	-	15	35	50	2
8		MIEPC215 (PR:3)	Mechanical Operationin Mines Lab	-	0	0	4	-	-	15	35	50	2
9		MIEPC217 (PR:4)	Mine Machinery -I Lab	-	0	0	4	-	-	15	35	50	2
10	Summer Internship	SI201	Summer internship – I*	-	0	0	0	-	- - -	15	35	50	2
TOTAL					**15**	**0**	**16**	**350**	**150**	**75**	**175**	**750**	**25**

*3 to 4-weeks after 2nd Semester

***The best of 2 IA conducted in a subject out of 20 marks to be considered. Assignment/ quiz etc. of 10 marks to be treated as part of IA. Besides this, Monthly Test to be conducted for each subject. Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester. Club/Innovation/ Idea Tinkering Activities etc. shall be encouraged to be performed by students beyond the above stipulated hours.**

SEMESTER – III

TH:1- SURFACE MINING TECHNOLOGY

L	T	P		
3	0	0		**Course Code: MIEPC201(Th 1)**
Total Contact Hours				**Theory Assessment**
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam 70
				Progressive Assessment 30
Pre Requisite		**: Nil**		
Credit		**3**		Category of Course : PC

RATIONALE:

As a Mining Engineer, onehas to develop the basic concepts and principles of winning and working in mines. Further, he should have basic knowledge of explosives for development of mines.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

- Explain the concepts of choice of Opencast Mining.
- Define bench parametersand slope stability.
- Describe various compositions, properties of Explosives and Blasting accessories.
- Explain different drilling methods and blasting practices in Mines.
- Describe blasting techniques asper statutory provisions and safetyprovisions of magazine.

COURSE CONTENT DETAILS:

Unit No.	Content	Time Allotted (Hrs.)
I	**Choice of Opencast Mining:** Define Mine, Mining, Mineral, Ore, tenor, and mining engineering. Classify Surface Mining. State factors affecting choice of Open casting Mining method, Define stripping ratio and classify various stripping ratio, factor affecting stripping ratio. Define quarriable limit, State favorable conditions for mechanized Opencast Mines, State advantages and disadvantages surface mining, Define Box cut and its type. Determine the location of Box cut.	**9**
II	**Benching:** Determine bench parameters. Objective of benching in opencast mining. Factor affecting height, width of bench. **Slope Stability:** Define slope stability. Factors affecting slope stability. Types of slope failure. Causes and prevention of slope failure.	**9**

III	**Explosive and blasting accessories:** Define explosive, state constituents of explosives, properties and characteristics of explosives, Classify explosives, state composition and uses of explosives. Explain PMS and SMS Define permitted explosive and classify permitted explosive. Explain sheathed, equivalent sheathed and ultra-safe explosive. State properties of permitted explosives, State composition and constructional features of safety fuse, detonating fuse, detonating relay, igniter cord, nonel and raydet. Describe different types of detonators and uses, state advantages of delay detonators. State different types of exploder, its construction and safety features. Describe circuit tester stemming rod, crack detector knife, crimper.	**9**
IV	**Drilling**: Different types of drilling used in surface mining. Explain different principles and methods of exploratory drilling in surface mining,. State different types of drill machine used in Opencast mining, Describe simple constructional features of churn drill, drills master, wagon drill and jack hammer, State D.T.H, Describe different types of drill bits in drilling. **Blasting practices in Mines**: Define Conventional Blasting. Describe preparation of charge. State procedure of firing shots. Direct and inverse initiation, stemming materials, water ampoules, wiring and firing of explosive. Define blasting efficiency. State and describe plaster shooting and pop shooting, toe blasting.	**9**
V	**Controlled Blasting Techniques as per statutory provision:** State and describe pre-splitting, cushion blasting, muffle blasting, coyote hole blasting, chambered hole blasting, directional blasting, Electronics Blasting System (EBS). **Magazines:** Describe layout and arrangement of different types of magazines, state their safety features.	**9**
Total		45

REFERENCES:

1. SurfaceMining Technology S.K. DAS, Lovely Prakashan; 3rd edition, 2020.
2. Blasting Safety Manual, Pradhan, G.K., & Sandhu, M.S., 2002.
3. BlastingPractices in Mines S.K. DAS, Das, S.K., Lovely Prakashan, Dhanbad, 2001.
4. Elements of Mining Technology Vol. 2, D. J. Deshmukh, Denett & Co., 9th edition, 2016.
5. SurfaceMining Vol. 1, G.B. Mishra, DhanbadPublishers, 1979.
6. SME Mining Engineering Hand Book Vol.I & II, 2nd Edition, Society for Mining, 2019.

TH:2- MINE SURVEY – I

L	T	P		
3	0	0		**Course Code: MIEPC203 (Th 2)**
Total Contact Hours				**Theory Assessment**
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam 70
				Progressive Assessment 30
Pre Requisite		**: Nil**		
Credit		**3**		Category of Course : PC

RATIONALE:

Before the starting of the actual mining operation, it is essential for the mining engineer to survey the piece of land, where mining operation is contemplated. This is not possible without the knowledge of mine surveying. In this context, Mine Survey-1 deals with the initial aspects of surveying.

COURSE OUTCOMES:

After completion of the course, the students will be able

- Explain the concepts of chain survey.
- Describe the principles of compass survey.
- Identifythe fundamentals of plane table survey.
- Describe general methods of determining areas.
- Identify various leveling methods.
- Describe different methods of calculating ore reserves and application of theodolites in surveying.

Unit No.	Content	Time Allotted (Hrs.)
I	**Chain Survey: S**urvey conventional signs, abbreviations, Standards of lining, inking and coloring, selection of scales, principle of chain surveying, instruments and correctness, Ranging and chaining of a line, Errors in chaining, Obstruction while chaining, Chaining along a sloping ground, Use of optical square and line range and correctness, Offsets and their measurements, Reference sketches of stations. Procedure of chain surveying, Field booking and plotting of chain survey.	**9**
II	**Compass Survey:** Prismatic compass, its adjustments and use, True meridians, magnetic meridian, grid line meridian and arbitrary meridian, W.C.B. and Q.B. and conversion, Fore and back bearing and their conversion, Bearing angles, Local alteration, Local alteration and correction to the bearing, Closed and open compass surveying and its plotting, Field booking in compass and chain traverses, Adjustment of closing error in compass traversing, Surveyor compass(miner's dial),its adjustment and use, Prismatic compass with surveyor compass.	**9**
III	**Plane Table Survey:** Fundamentals of Plane Table Survey, Two point problems. Three point problems and its solution by tracing paper method, Advantages and disadvantages of plane table.	**6**
IV	**Computation of areas:** Methods of determining areas, Areas from offset to a base line using Mid ordinate rule, Average ordinate rule, Trapezoidal rule, Simpson's rule, Compute area by Planimeter and from graph paper.	6
V	**Leveling: B**enchmark M.S.L. Dumpy level, Adjust dumpy level, modern levels (Auto Level & etc.), and precise staff. Methods of leveling- Rise & fall method, height of instrument, Errors in ordinary levelling, Reciprocal leveling, subsidence leveling, setting out gradient, trigonometric leveling, geometrical leveling and physical leveling.	**6**
VI	**Calculation of Ore Reserves: R**eserves, Reserves by exploratory, Primary ore reserve by material balance method and decline curve method. **Theodolite: T**emporary and permanent adjustment of Theodolite. Principles of operation and different parts, Horizontal and Vertical angles, Setting of the instrument, Traversing with Theodolite.	9
	Total	**45**

REFERENCES:

1. Textbook of Surveying, B.C. Punmia Vol I & II, Laxmi Publications, New Delhi.
2. Textbook of Surveying, T.P Kanetkar, Griha Prakashan, Pune.

TH:3- MINE GEOLOGY – I

L	T	P		
3	0	0		**Course Code: MIEPC205 (Th 3)**
Total Contact Hours				**Theory Assessment**
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam 70
				Progressive Assessment 30
Pre Requisite		**: Nil**		
Credit		**3**		Category of Course : PC

RATIONALE:

In majority of the cases, materials that need to be mined in order to reach the hidden treasure are rocks and minerals. It is therefore, essential for a mining engineer to have the basic knowledge of geology. In this course, aspects of Geology, Crystallography and Mineralogy are discussed, which are needed for the Mining engineers.

COURSE OUTCOMES:

At the end of the course, the students will be able to:

- Discuss the concept of Geomorphology.
- Identify the fundamentals of Igneous, Sedimentary and Metamorphic rocks along with their texture and structures.
- Explain the basics of structural geology.
- Demonstrate the elements of crystallography.
- Interpret the elements of mineralogy.

COURSE CONTENT DETAILS:

Unit No.	Content	Time Allotted (Hrs.)
I	**Physical Geology:** Geology for mining engineering: branches, scope and applications – internal structure of earth and composition – layers in atmosphere - Weathering and erosion, Erosional and depositional land forms produced by wind, Erosional and depositional land forms produced by river, Glacier and iceberg, Erosional and depositional features produced by glacier, Different type of moraine with sketches.	**10**
II	**Petrology:** Define Rock and mineral. Describe Igneous, Sedimentary and Metamorphic rocks, Various textures and structures found in Igneous rocks, Structures of sedimentary rocks, Structures in metamorphic rocks, Vacancies, Interstitials and impurities, Types and causes of line defects: Edge dislocation and screw dislocation, Effect of imperfection on material properties, Deformation by slip and twinning, Effect of deformation on material properties.	**12**
III	**Structural Geology:** Dip, True dip and apparent dip, Strike, Folds, Faults, Various types of faults, Unconformity, Various type of unconformity, Joints. Various joints.	**7**
IV	**Elements of Crystallography:** Crystal, Miller's indices, Symmetryelements and forms present in the normal class of isometric system.	**9**

V	**Elements of Mineralogy: M**ineral, Physical properties of minerals. Optical properties of minerals, Silicate structures, Minerals, Mineralogy, Physical properties of Olivine, Quartz, Feldspar and Pyroxene group of minerals.	**7**
	Total	**45**

REFERENCES:

1. Textbook of Geology, P.K Mukharjee, World Press Publications, 2013.
2. Textbook of Geology, G.B. Mohapatra, CBS Publishers, 2019.
3. H. H. Read F.R.S., Rutley's Elements of Mineralogy, Springer, 1970.
4. The Principles of Petrology, G.W. Tyrrel. 1978.
5. Structural Geology, M.P. Billings, AITBS Publishers, 2012.
6. Structural Geology of Rocks at Regions,. G. Davids, 3rd Edition, 2013.

TH:4- MECHANICAL OPERATIONS IN MINES

L	T	P		
3	0	0		**Course Code: MIEPC207 (Th 4)**
Total Contact Hours				**Theory Assessment**
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam 70
				Progressive Assessment 30
Pre Requisite		**: Nil**		
Credit		**3**		Category of Course : PC

RATIONALE:

As Mining Engineers, it is essential to have the fundamental concepts of mechanical engineering, specially related to the working of machines that are used in mines. This course deals with the strength of materials, power transmission elements of hydraulics, compressed air and internal combustion engines.

COURSE OUTCOMES:

At the end of the course, the students will be able to:

- Explain the fundamentals of strength of materials.
- Identifythe fundamentals of power transmission.
- Explain the basic elements of hydraulics.
- Identifythe uses of compressed air.
- Explain the working of internal combustion engines.

COURSE CONTENT DETAILS:

Unit No.	Content	Time Allotted (Hrs.)
I	**Strength of Materials:** Cantilever with UDL over whole span, simple supported beam with concentration loading, Simple supported beam with UDL over whole span, Bending formula, Section modules, Section modules for beam sections of simple cases.	**9**
II	**Power Transmission**: Torsion and its effects, Application of torsion formula, Shaft couplings such as hydraulic and magnetic couplings, Belt, chain and rope Drive, Simple and compound gear train, Torque converters, Flywheel and governors, Watt, Porter and Proell governors.	**9**
III	**Elements of Hydraulics:** Properties of fluids, pressure of fluid and head, Working principles of various pressure measuring devices such as: Pieccometer tube, Continuity equation, Bernoulli's theorem, Venturimeter, Orifices, Discharge for rectangular orifices. Orifice and notch, Classification of notches, Discharge through notches, Laws of fluid friction, Loss of head due to friction (Darcy weisbach formula), Hydraulic gradient and energy gradient.	**9**

IV	Compressed air: Compressed air as a power, Classification of Compressors, Working principle, Various methods of transmission, Storage of compressed air, Use of compressed air in mines, Working principle of pneumatic machines.	**9**
V	**Internal Combustion Engines:** Various air cycles used in I.C Engines such as: OTTO Cycle, Diesel Cycle. Working principle of 2 stroke and 4 stroke petrol and diesel engines, I.H.P., B.H.P, Mechanical efficiency of I.C Engines. Applications of I.C Engines in Mining field.	**9**
	Total	**45**

REFERENCES:

1. Strength of Materials, Ramrutham, Dhanpat Rai Publishing Company(p) Ltd, New Delhi.
2. Applied Mechanics, Khurmi and Gupta, S Chand, New Delhi.
3. Hydraulic Fluid Mechanics and Fluid Machines, Ramrutham, Dhanpat Rai Publishing Company (p) Ltd, New Delhi.
4. Thermal Engineering, A.S. Sarao, Satya Prakashan, New Delhi.

TH:5- MINE MACHINERY –I

L	T	P		
3	0	0		**Course Code: MIEPC209 (Th 5)**
Total Contact Hours				**Theory Assessment**
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam 70
				Progressive Assessment 30
Pre Requisite		**: Nil**		
Credit		**3**		Category of Course : PC

RATIONALE:

There are various types of machines and equipment used in mining operations. As a mining engineer, it is necessary for them to understand about the Machinery used during mining. This course is very helpful, which discusses about Mine Machinery.

COURSE OUTCOMES:

At the end of the course, the students will be able to:

- Describe the features, types, construction, uses and maintenance of wires.
- Describe different types of rope haulage.
- Describe constructional and safety features of cage and shaft fittings.
- Describe different profiles of winding drum and types of friction winding.
- Explain skip-winding arrangements.
- Draw various arrangements of pit top and pit bottom layouts.

COURSE CONTENT DETAILS:

Unit No.	Content	Time Allotted (Hrs.)
I	**Wire Ropes: W**ire ropes used in Mines, Constructional features of wire ropes and lay of wire ropes, Factor of safety, Nominal and actual factor of safety of wire ropes, Factors influencing the F.O.S, Efficiency of rope construction, space factor, cross sectional area rope. Factors affecting deterioration of ropes. Care and maintenance of ropes, Testing and examination of wire ropes, Splicing of wire ropes, Rope capel for haulage winding and recapping.	**9**
II	**Rope Haulage:** Transportation in mines by rope haulage, Types of rope haulage, Safety devices on rope haulage roadways, Different types of clips and couplings.	**6**
III	**Headgear: S**tate functions of headgear. Describe constructional features of headgear pulley. Define angle of fleet. **Cage and shaft fittings: C**age, cage suspension gear, detaching hooks, safety catch at headgear and keps, Types of guide, Rigid guide, flexible shoes, guide rope suspension and tensioning arrangement.	**6**
IV	**Winding drum: D**ifferent profiles of winding Drum, Different types of winding brake, Various types of safety devices on winding system. **Friction Winding: P**rinciple and constructional features of ground-mounted and tower-mounted koepe winder, Advantages & disadvantages of koepe winding. Multi rope system of koepe winding.	**12**
V	**Skip winding:** Constructional features bottom discharge skip, Top discharge skip, Skip winding and cage winding.	**6**
VI	**Pit top & Pit bottom circuit layout: F**actors affecting pit top and pit bottom layouts, Different types of pit top and pit bottom car/tub circuit layouts.	**6**
	Total	**45**

REFERENCES:

1. Mine Hoisting, M A Ramulu, White Falcon Self-Publishing Platform; 2nd edition, 2015.
2. SME Mining Engg Handbook, Littleton, Colo. : Societyfor Mining, Metallurgy, and Exploration, 1992.
3. Material Handling in Mines, IIT Kgp NPTEL Course Material, 2022.
4. Elements of Mining Technology Vol. 2, D. J. Deshmukh, Denett & Co., 9th edition, 2016.
5. Mine Transport, N.T Kerlin.
6. Universal Mining School Volume, T. S. Southern Ltd, 1883.

PR:1- MINE SURVEY -I LAB

L	T	P		
0	0	4		**Course Code: MIEPC211(Pr 1)**
Total Contact Hours				**Practical Assessment**
Practical		: 60Hrs	**Total Marks: 50**	End Term Exam 15
				Progressive Assessment 35
Pre Requisite		**: Nil**		
Credit		**2**		Category of Course : PC

RATIONALE:

Mine surveying is important to Mining engineers. In this course, fundamentals of Mine Survey are discussed. In the field of mining, it is required to have measurements, calculations and mapping at all stages from prospecting to exploitation and utilizing mineral deposits by both surface and underground working.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

- Develop clear idea about Chain survey and Compass survey.
- Identify various components of Level and Theodolite along with their uses.
- Distinguish methods employed for measurement of horizontal and vertical angles.

COURSE CONTENT DETAILS:

Sl. No.	Topics for practice	Time Allotted (Hrs.)
I	**Chain Survey** • Ranging a line more than 100 m in length and measuring its correct length applying corrections. • Taking offsets of objects on both sides of a line. • Plotting the above details. • Overcoming obstructions in chaining. • Vision free, chaining obstructed (Pond, river) • Chaining free, vision obstructed (Raising ground) • Both vision and chaining obstructed (Building) • Measuring on sloping ground. • Chain surveying and plotting of small plot by triangulation.	**12**
II	**Compass Survey** • Finding bearing of line and applying check. • Closed traversing of a small plot with station (without intermediate filling) • Open traversing of a small length with few station (without offsets) • Plotting both the above traverses applying correction.	**12**
III	**Levels**: Temporary and permanent adjustment, sensitivity of bubble tube practice with different types of level(Auto Level & etc.)	**12**
IV	Temporary and permanent adjustment of theodolite.	**8**
V	Measurement of horizontal angle by reiteration and repetition methods.	**8**
VI	Measurement of vertical angle	**8**

REFERENCES:

1. Mine Surveying and Levelling Vol 1, S Ghatak, Lovely Prakashan, 2012.
2. Surveying & Levelling, B. C. Punamia, A.K. Jain, Arun Kumar Jain, 17th Edition, Laxmi Publications, 2016.
3. Surveying & Levelling, T.P. Kanetkar and S.V. Kulkarni, Pune Vidyarthi Girha Prakashan, 2017.
4. Mine surveying by F. Winniberg, Mining Publications, 1935.

PR:2- MINE GEOLOGY -I LAB

L	T	P		Course Code: MIEPC213 (Pr 2)	
0	0	4			
Total Contact Hours				**Practical Assessment**	
Practical		: 60Hrs	**Total Marks: 50**	End Term Exam	15
				Progressive Assessment	35
Pre Requisite		**: Nil**			
Credit		**2**		Category of Course : PC	

RATIONALE:

In majority of the cases, materials that need to be explored comprise of rocks and minerals. It is therefore, essential for a mining engineer to have the basic knowledge regarding the composition, structure and texture of both rock and minerals.

COURSE OUTCOMES:

At the end of the course, the student will be able to

- Identifyore forming and rock forming minerals.
- Determine specific gravity of minerals by workers steel yard balance.
- Analyze thin section of minerals and rocks under microscope.
- Solve the structural geology problems
- Measure strike and dip in the field

COURSE CONTENT DETAILS:

Sl. No.	Topics for practice	Time Allotted (Hrs.)
I	Identification of rock forming and ore minerals in hand specimens	**8**
II	Determination of specific gravity by workers steel yard balance	**8**
III	Analysis of thin sections of minerals under the microscopes	**8**
IV	Analysis of thin sections of rocks under the microscopes	**12**
V	Studyand sketching of models showing different types of faults, folds & their relation to topography	**12**
VI	Strike and dip measurement using Brunton Compass and Clinometer, Dip and Strike Problems.	**12**
	Total	**60**

REFERENCES:

1. Simmons & Schuden guide, Rocks and Minerals Cornelius S. Hurlbut. Jr. Dana's manual of Mineralogy, John Wiley and Sons, 1985.

PR:3- MECHANICAL OPERATION IN MINES LAB

L	T	P		
0	0	4		**Course Code: MIEPC215 (Pr 3)**
Total Contact Hours				**Practical Assessment**
Practical		: 60Hrs	**Total Marks: 50**	End Term Exam 15
				Progressive Assessment 35
Pre Requisite		**: Nil**		
Credit		**2**		Category of Course : PC

RATIONALE:

Mechanization is happening in mining sector and is vital for the growth of the mining industry. As a mining engineer, one should have some fundamental knowledge regarding the machines used in mines.

COURSE OUTCOMES:

At the end of the course, the student will be able to

- Identify the application of Bernouli's Theorem
- Determine velocity of air
- Determine volumetric efficiency of air compressor.
- Distinguish construction and working procedure of 2-stroke and 4-stroke diesel engine.
- Experiment involving the testing on I.C. Engine.

COURSE CONTENT DETAILS:

Sl. No	Topics for practice	Time Allotted (Hrs.)
I	Verify Bernoulli's Theorem by using Bernoulli's Verification Apparatus.	**8**
II	Determine rate of flow through the venturimeter set-up.	**8**
III	Conduct Tensile test of a mild steel specimen and plot stress-stain curve, show salient points on it.	**8**
IV	Determine volumetric efficiency of Air compressor	**12**
V	Study of 2-Stroke and 4-Stroke diesel engines	**12**
VI	Conduct of I.C Engine Test - Conduct I/C engine testing on single cylinder diesel engine & find out I.H.P., B.H.P. & mechanical efficiency.	**12**
	Tota	**60**

REFERENCES:

1. Strength of Materials, Ramrutham, Dhanpat Rai Publishing Company(p) Ltd, New Delhi.
2. Applied Mechanics, Khurmi and Gupta, S Chand, New Delhi.
3. Hydraulic Fluid Mechanics and Fluid Machines, Ramrutham, Dhanpat Rai Publishing Company (p) Ltd, New Delhi.
4. Thermal Engineering, A.S. Sarao, Satya Prakashan, New Delhi.

PR:4- MINE MACHINERY -I LAB

L	T	P		
0	0	4		**Course Code: MIEPC217 (Pr 4)**
Total Contact Hours				**Practical Assessment**
Practical		: 60Hrs	**Total Marks: 50**	End Term Exam 15
				Progressive Assessment 35
Pre Requisite		**: Nil**		
Credit		**2**		Category of Course : PC

RATIONALE:

It is imperative that a Mining Engineer should be thoroughly conversant with various types of machine used in mining operations.

COURSE OUTCOMES:

At the end of the course, the student will be able to

- Identifythe basics of Wire rope, rope splicing & capeling.
- Describe the details about Safety hook, keps & rope guides.
- Explain about head gear structure, suspension gear & winding drum.

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COURSE CONTENT DETAILS:

Sl. No	Topics for practice	Time Allotted (Hrs.)
I	Study of Wire rope.	**4**
II	Studyof rope splicing.	**4**
III	Studyof rope cappel.	**4**
IV	Study of safetyhook.	**4**
V	Study of keps.	**4**
VI	Studyof guide in shaft.	**4**
VII	Study of clips used in endless ropehaulage.	**4**
VIII	Model Development of Headgear Structure.	**4**
IX	Model Development of Suspension Gear.	**8**
X	Model Development of different types of winding drum	**8**
XI	Model development of different types of safetydevices used in haulageroadways.	**12**
	Tota	**60**

References:

1. Mine Hoisting, M A Ramulu, White Falcon Self-Publishing Platform; 2nd edition, 2015.
2. SME Mining Engg Handbook, Littleton, Colo. : Society for Mining, Metallurgy, and Exploration, 1992.
3. Material Handling in Mines, IIT Kgp NPTEL Course Material, 2022.
4. Elements of Mining Technology Vol. 2, D. J. Deshmukh, Denett & Co., 9th edition, 2016.
5. Mine Transport, N.T Kerlin.
6. Universal Mining School Volume, T. S. Southern Ltd, 1883.

SUMMER INTERNSHIP – I

L	T	P			
0	0	0		Course Code: SI201	
Total Contact Hours				Internship Assessment	
Practical		0	Total Marks: 50	End Term Exam	15
				Progressive Assessment	35
Pre Requisite		: Nil			
Credit		2		Category of Course : SI	

Duration: 3-4 weeks during summer vacation after 2nd Semester.

RATIONALE

Summer Internship - I is to offer a structured and practical learning experience that prepares individuals for their future careers, helps them make informed career choices, and equips them with the skills and knowledge necessary to succeed in their chosen field. This course provides opportunities to students for hands-on industry experience.

LEARNING OUTCOMES

After completion of the course, the students will be able to:

- Apply theoretical knowledge gained in their academic coursework toreal-world situations.
- Enhance specific skills relevant totheir field.
- Gain hands-on experience in a professional network by interacting with mentors and industry professionals.
- Manage time effectively.
- Clarifycareer goals.

DETAILED COURSE CONTENTS

SUGGESTED ACTIVITIES:

I Orientation:

- Introduction to the organization's mission, values, and culture.
- Familiarization with workplace policies, procedures, and safety guidelines.
- Orientation to the team and organizational structure.

II Project-Based Learning:

- Description of the main project or tasks the intern will be working on during theinternship.
- Detailed project goals and objectives.
- Training and guidance on project-specific tools, technologies, or methodologies.

III Technical and Skill Development:

- Training sessions or workshops to enhance technical skills relevant to the internship role (e.g., programming languages, software tools, laboratory techniques).
- Soft skills development, including communication, teamwork, problem solving, and time management

IV Mentorship and Supervision:

- Regular meetings with a designated mentor or supervisor for guidance, feedback, and support.
- Mentorship objectives and expectations.

V Professional Development:

- Sessions on professional etiquette, networking, and building a personal brand

- Resume writing and interview preparation workshops.

VI Industryand Field-Specific Knowledge:

- Lectures, seminars, or presentations on industrytrends, best practices, and emerging technologies.
- Guest speakers from the field to share insights and experiences.
- Field visit for practical exposures.

VII Reporting and Documentation:

- Training on how to document project progress, results, and findings.
- Practice in creating reports, presentations, or other deliverables.

VIII Ethics and Professionalism:

- Discussions on ethical considerations within the field.
- Scenarios and case studies related to ethical decision-making

IX Feedback and Evaluation:

- Regular performance evaluations and feedback sessions.
- Self-assessment and goal-setting exercises.

X Networking and Industry Exposure:

- Opportunities to attend industry conferences, webinars, or networking events.
- Encouragement to connect with professionals in the field.

NOTE

As per AICTE guidelines, in Summer Internship-I, students are required to be involved in Inter/ Intra Institutional Activities viz;

- Training with higher Institutions;
- Soft skill training organized by Training and Placement Cell of the respective institutions;
- contribution at incubation/ innovation /entrepreneurship cell of the institute;
- participation in conferences/ workshops/ competitions etc.;
- Learning at Departmental Lab/ Tinkering Lab/ Institutional workshop;
- Working for consultancy/ research project within the institutes and
- Participation in all the activities of Institute's Innovation Council for eg: IPR workshop/Leadership Talks/ Idea/ Design/ Innovation/ Business Completion/ Technical Expos etc.

Final

DIPLOMA CURRICULUM OF MECHANICAL ENGINEERING (SECOND YEAR) (4th Semester)

(To be implemented from 2025-26)

Prepared by;

National Institute of Technical Teachers' Training & Research Kolkata
Block – FC, Sector – III, Salt Lake City, Kolkata – 700106

Vetted by:
Domain experts from Polytechnics of Odisha

State Council for Technical Education & Vocational Training
Near Raj Bhawan, Unit-VIII, Bhubaneswar, Odisha

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PROGRAMME TITLE: MECHANICAL ENGINEERING

SEMESTER - IV

SL. No	Category of Course	Code No	Course Title	Study Scheme				Evaluation Scheme				Total Marks	Credits
				Pre-requisite	Contact Hours/ week			Theory		Practical			
					L	T	P	End Exam	Progressive Assessment	End Exam	Progressive Assessment		
1	Programme core	MEPC202 TH:1	Theory of machines & mechanism		3	0	0	70	30	-	-	100	3
2		MEPC204 TH:2	Thermal Engineering-II		3	0	0	70	30	-	-	100	3
3		MEPC206 TH:3	Computer-integrated Manufacturing (CIM)		3	0	0	70	30	-	-	100	3
4		MEPC208 PR:1	Theory of machines & mechanism lab		0	0	4	-	-	15	35	50	2
5		MEPC210 PR:2	Thermal Engineering-II lab		0	0	4	-	-	15	35	50	2
6		MEPC212 PR:3	CAD/CAM Lab		0	0	4	-	-	15	35	50	2
7	Programme elective	MEPE202 (Any one) TH:4	(a). Refrigeration and Air Conditioning (b). Renewable Energy Technologies c) Hydraulics & Pneumatics		3	0	0	70	30	-	-	100	3
8		MEPE204 (Any one) TH:5	(a). Computer-Aided Design and Manufacturing (b). Tool Engineering (c). Mechatronics		3	0	0	70	30	-	-	100	3
9	Minor Project	PR202 PR:4	MINOR PROJECT		0	0	4	-	-	30	70	100	2
10	Mandatory	AU202	Essence of Indian knowledge and tradition		**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
TOTAL					**17**	0	**16**	**350**	**150**	**75**	**175**	**750**	**23**

The best of 2 IA conducted in a subject out of 20 marks to be considered. Assignment/ quiz etc. of 10 marks to be treated as part of IA. Besides this, Monthly Test to be conducted for each subject. Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester. Club/Innovation/ Idea Tinkering Activities etc. shall be encouraged to be performed by students beyond the above stipulated hours

SEMESTER - IV COURSES

TH:1- THEORY OF MACHINES & MECHANISM

L	T	P		
3	0	0		**Course Code: MEPC202**
Total Contact Hours				**Theory Assessment**
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam 70
				Progressive Assessment 30
Pre Requisite		**: Nil**		
Credit		**3**		Category of Course: PC

RATIONALE: This course provides foundational knowledge in machine elements and mechanical systems, focusing on the motion, design, and analysis of mechanisms. It equips students with the skills to apply kinematics, dynamics, and innovation in real-world mechanical applications.

LEARNING OUTCOMES:

After the completion of the course, the student shall be able to

- Explain different machine elements and mechanisms.
- Analyze kinematics and dynamics of various machines and mechanisms.
- Select suitable drives and mechanisms for specific applications.
- Apply the concepts of balancing and vibration in mechanical systems.
- Develop the ability to generate innovative mechanical design ideas.
- Identify different types of cams and their motions.

DETAILED COURSE CONTENTS

Unit	Topic/Subtopic	Hours
I	**Simple mechanism:** Link ,kinematic pair and types (Lower pair and higher pair) , kinematic chain, mechanism, Inversion, four bar link mechanism and its inversion **Cams and Followers:** Concept; Definition and application of Cams and Followers; Classification of Cams and Followers; Different follower motions and their displacement diagrams like uniform velocity, SHM, uniform acceleration and Retardation;	7
II	**Power Transmission:** Types of Drives – Belt, Chain, Rope, Gear drives & their comparison; Belt Drives - flat belt, V– belt & its applications; Material for flat and V-belt; Angle of lap, Belt length. Slip and Creep; Determination of Velocity Ratio, Ratio of tight side and slack side tension; Centrifugal tension and Initial tension; Condition for maximum power transmission (Simple numerical); Chain Drives – Advantages & Disadvantages; Selection of Chain & Sprocket wheels; Methods of lubrication; Gear Drives – Spur gear terminology; Types of gears and gear trains, their selection for different applications; Train value & Velocity ratio for compound, reverted and simple epicyclic gear train; Methods of lubrication; Law of gearing; Rope Drives – Types, applications, advantages & limitations of Steel ropes.	11

III	**Flywheel and Governors:** Flywheel - Concept, function and application of flywheel with the help of turning moment diagram for single cylinder 4-Stroke I.C. Engine (no Numerical); Coefficient of fluctuation of energy, Coefficient of fluctuation of speed and its significance; Governors - Types and explanation with neat sketches (Centrifugal, Watt and Porter);Concept, function and applications & Terminology of Governors (sensitivity, stability and isochronisms); Simple numerical on Watt and Porter Governor. Comparison between Flywheel and Governor	10
IV	**Brakes, Dynamometers, Clutches & Bearings**: Function of brakes and dynamometers; Types of brakes and Dynamometers; Comparison between brakes and dynamometers; Construction and working of i) shoe brake, ii) Band Brake, Numerical problems to find braking force and braking torque for shoe & band brakes; Concept of Self Locking & Self energizing brakes Construction and working of i) Rope Brake Dynamometer, ii) Hydraulic Dynamometer Clutches- Uniform pressure and Uniform Wear theories; Function of Clutch and its application; Construction and working of i) Single plate clutch, ii) Multiplate clutch, iii) Centrifugal Clutch iv) Cone clutch and v) Diaphragm clutch. (Simple numerical on single and Multiplate clutch) Bearings – i) Simple Pivot, ii) Collar Bearing, iii) Conical pivot. Torque & power lost in friction (no derivation). Simple numerical.	10
V	**Balancing & Vibrations:** Concept of balancing; Balancing of single rotating mass; Graphical method for balancing of several masses revolving in same plane; Concept and terminology used in vibrations, Causes of vibrations in machines; their harmful effects and remedies.	7

REFERENCES:

1. Theory of machines – S.S .Rattan ,Tata McGraw-Hill publications.
2. Theory of machines – R.K.Bansal ,Laxmi publications
3. Theory of machines – R.S. Khurmi & J.K.Gupta , S.Chand publications.
4. Dynamics of Machines – J B K Das, Sapna Publications.
5. Theory of machines – Jagdishlal, Bombay Metro – Politan book Ltd.

TH:2- THERMAL ENGINEERING-II

L	T	P		
3	0	0		**Course Code: MEPC204**
Total Contact Hours				**Theory Assessment**
Theory		: 45Hrs		End Term Exam : 70
			Total Marks: 100	Progressive Assessment : 30
Pre Requisite		**:** Thermal Engineering- I (MEPC209)		
Credit		**: 3**		Category of Course: PC

RATIONALE:

Subject knowledge of thermal engineering is required in many industries. The objective of this course is to establish basic fundamental and practical knowledge in the field of gas turbines, jet propulsion, properties of steam, steam generator etc. These are major fields of mechanical engineering. Student will be able to understand different systems and apply its competencies in major fields in related industries. Knowledge of alternate fuels is required as emerging field and today's need of society which will be provided by the course content.

LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Explain the working cycle of gas turbines, and the working of Jet and Rocket Engines apart from identifying the fuels used for Jet and Rocket propulsion.
- Compute the work done, enthalpy, internal energy and entropy of steam at given conditions using steam tables and Mollier chart.
- Distinguish between water tube and fire-tube boilers and explain the function all the mountings and accessories.
- Calculate Velocity of steam at the exit of nozzle in terms of heat drop analytically and by using Mollier chart.
- State the necessity of governing and compounding of a turbine.
- Explain the principle of working of a steam turbine and distinguish between the impulse turbines and reaction turbines.

DETAILED COURSE CONTENTS

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	**Gas Turbines:** Air-standard Brayton cycle; Description with p-v and T-S diagrams; Gas turbines Classification: open cycle gas turbines and closed cycle gas turbines; comparison of gas turbine with reciprocating I.C. engines and steam turbines. Applications and limitations of gas turbines; General lay-out of Open cycle constant pressure gas turbine; P-V and T-S diagrams and working; General lay-out of Closed cycle gas turbine; P-V and T-S diagrams and working. **Jet Propulsion:** Principle of jet propulsion; Fuels used for jet propulsion; Applications of jet propulsion; Working of a turbojet engine; Principle of Ram effect; Working of a Ram jet engine; Principle of Rocket propulsion; Working principle of a rocket engine; Applications of rocket propulsion; Comparison of jet and rocket propulsions.	10

II	**Properties of Steam:** Formation of steam under constant pressure; Industrial uses of steam; Basic definitions: saturated liquid line, saturated vapor line, liquid region, vapor region, wet region, superheat region, critical point, saturated liquid, saturated vapor, saturation temperature, sensible heat, latent heat, wet steam, dryness fraction, wetness fraction, saturated steam, superheated steam, degree of superheat; Determination of enthalpy, internal energy, internal latent heat, entropy of wet, dry and superheated steam at a given pressure using steam tables and Mollier chart for the following processes: Isochoric process, Isobaric process, Hyperbolic process, Isothermal process, Isentropic process, Throttling process, Polytropic process; Simple direct problems on the above using tables and charts; Steam calorimeters: Separating, throttling, Combined Separating and throttling calorimeters – problems.	10
III	**Steam Generators:** Function and use of steam boilers; Classification of steam boilers with examples; Brief explanation with line sketches of Cochran, Babcock and Wilcox Boilers; Comparison of water tube and fire tube boilers; Description with line sketches and working of modern high pressure boilers Lamont and Benson boilers; Boiler mountings: Pressure gauge, water level indicator, fusible plug, blow down cock, stop valve, safety valve, (dead weight type, spring loaded type, high pressure and low water safety alarm); Boiler accessories: feed pump, economizer, super heater and air preheater; Study of steam traps & separators; Explanation of the terms: Actual evaporation, equivalent evaporation, factor of evaporation, boiler horse power and boiler efficiency; Formula for the above terms without proof; Simple direct problems on the above; Draught systems (Natural, forced & induced).	8
IV	**Steam Nozzles:** Flow of steam through nozzle; Velocity of steam at the exit of nozzle in terms of heat drop using analytical method and Mollier chart; Discharge of steam through nozzles; Critical pressure ratio; Methods of calculation of cross-sectional areas at throat and exit for maxi- mum discharge; Effect of friction in nozzles and Super saturated flow in nozzles; Working steam jet injector; Simple numerical problems.	10
V	**Steam Turbines:** Classification of steam turbines with examples; Difference between impulse & reaction turbines; Principle of working of a simple De-lavel turbine with line diagrams- Velocity diagrams; Expression for work done, axial thrust, tangential thrust, blade and diagram efficiency, stage efficiency, nozzle efficiency; Methods of reducing rotor speed; compounding for velocity, for pressure or both pressure and velocity; Working principle with line diagram of a Parson's Reaction turbine–velocity diagrams; Simple problems on single stage impulse turbines (without blade friction) and reaction turbine including data on blade height. Bleeding, re-heating and re-heating factors(Problems omitted); Governing of steam turbines: Throttle, By-pass & Nozzle control governing.	7

REFERENCES:

1. A Course in Thermal Engineering – S. Domkundwar & C. P. Kothandaraman, Dhanpat Rai & Publication, New Delhi
2. Thermal Engineering – R. K. Rajput, Laxmi Publication New Delhi
3. Thermal Engineering – P. L. Ballaney, Khanna Publishers, 2002
4. Treatise on Heat Engineering in MKS and SI Units – V. P. Vasandani & D.S. Kumar, Metropolitan Book Co. Pvt. Ltd, New Delhi.

TH:3- COMPUTER-INTEGRATED MANUFACTURING (CIM)

L	T	P		
3	0	0		**Course Code: MEPC206**
Total Contact Hours				**Theory Assessment**
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam 70
				Progressive Assessment 30
Pre Requisite		**: Nil**		
Credit		**3**		Category of Course: PC

RATIONALE: Computer Integrated Manufacturing (CIM) encompasses the entire range of product development and manufacturing activities with all the functions being carried out with the help of dedicated software packages. CIM is considered a natural evolution of the technology of CAD/CAM. The product data is created during design and this data is transferred from the modeling software to manufacturing software without any loss of data.

LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Describe basic components and networks involved in CIM.
- Illustrate hardware, software and product modeling at industry level
- Apply process planning and program coding of task.
- Design a manufacturing cell and cellular manufacturing system.
- Design automated material handling and storage systems for a typical production system.

DETAILED COURSE CONTENTS

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	Concept of Computer Integrated Manufacturing (CIM); Basic components of CIM; Distributed database system; distributed communication system, computer networks for manufacturing; future automated factory; social and economic factors.	10
II	Computer Aided Design (CAD): CAD hardware and software; product modelling, automatic drafting; engineering analysis; FEM design review and evaluation; Group Technology Centre.	10
III	Computer Aided Manufacturing (CAM), Computer assisted NC part programming for plain turning and step turning; Computer assisted robot programming; computer aided process planning (CAPP); computer aided material requirements planning (MRP)	8
IV	Computer aided production scheduling; computer aided inspection planning; computer aided inventory planning, Flexible manufacturing system (FMS); concept of flexible manufacturing.	10
V	Integrating NC machines, robots, AGVs, and other NC equipment; Computer aided quality control; business functions, computer aided forecasting; office automation	7

REFERENCES:

1. CAD, CAM, CIM by P. Radhakrishnan and S. Subramanyan, New Age International Publishers.
2. Computer Integrated Manufacturing by Paul G. Rankey, Prentice Hall.
3. Robotics Technology and Flexible Automation – S.R. Deb, TMH

PR:1- THEORY OF MACHINES & MECHANISM LAB

L	T	P		
0	0	4		**Course Code: MEPC208**
Total Contact Hours				**Practical Assessment**
Practical		: 60Hrs	**Total Marks: 50**	End Exam 15
				Progressive Assessment 35
Pre Requisite		**: Nil**		
Credit		**2**		Category of Course: PC

RATIONALE: This lab provides hands-on experience in analyzing and understanding the motion of various machine mechanisms. It enhances the students' ability to apply theoretical concepts in kinematics and dynamics to real-world mechanical systems.

LEARNING OUTCOMES:

After the completion of the course, the student shall be able to

- Identifyvarious links in popular mechanisms.
- Select suitable mechanismfor various applications.
- Analyzethe motion of cams and followers.
- Select relevant belts, chains anddrives for different applications.
- Select relevant brakes and clutches for various applications
- Select suitableflywheel and governor for various applications.

DETAILED COURSE CONTENTS

Sl. No.	List of Experiments
1.	Measure the ratio of time of cutting stroke to the return stroke in shaping machine available in institute's workshop by varying the stroke length.
2.	Estimate important kinematic data related to following mechanisms and sketch them (any one) a. Bicycle free wheel sprocket mechanism b. Geneva mechanism c. Ackerman's steering gear mechanism d. Foot operated air pump mechanism
3.	Study of construction and working principle of Eddy current Dynamometers
4.	Determine velocity and acceleration of various links of the given mechanism (any two) by relative velocity method for analysis of motion of links size drawing sheet).
5.	Determine velocity and acceleration in an I. C. engine's slider crank mechanism by Kleins's construction
6.	Drawing of profile of radial cam with knife-edge and roller follower with offset reciprocating motion (graphical method).
7.	Drawing of profile of radial cam with knife-edge and roller follower without offset reciprocating motion (graphical method).
8.	Estimate slip, length of belt, angle of contact in an open and cross belt drive.
9.	Calculate braking torque at different speeds and load situations of i) Internal expanding shoe brake ii) Disc Brake
10.	Assemble and dissemble different clutches.

11.	Measure radius and height of any two types of governors for different rotational speeds, mass of balls and spring stiffness (in spring loaded governors)
12.	Perform balancing of rotating unbalanced system

REFERENCES:

6. Theory of machines – S.S .Rattan ,Tata McGraw-Hill publications.
7. Theory of machines – R.K.Bansal ,Laxmi publications
8. Theory of machines – R.S. Khurmi & J.K.Gupta , S.Chand publications.
9. Dynamics of Machines – J B K Das, Sapna Publications.
10. Theory of machines – Jagdishlal, Bombay Metro – Politan book Ltd.

PR:2- THERMAL ENGINEERING-II LAB

L	T	P		Course Code: MEPC210	
0	0	4			
Total Contact Hours				**Practical Assessment**	
Practical		: 60Hrs	**Total Marks: 50**	End Exam	15
				Progressive Assessment	35
Pre Requisite		**: Nil**			
Credit		**2**		Category of Course: PC	

RATIONALE: Thermal Engineering-II Lab provides hands-on experience with heat exchangers, boilers, steam turbines, and refrigeration systems. It helps students understand energy conversion, efficiency analysis, and thermal system performance in practical applications.

LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Evaluate the performance characteristics of single cylinder diesel/petrol engine at different loads and draw the heat balance sheet.
- Find the indicated power of individual cylinders of an engine by using morse test.
- Evaluate the performance characteristics Multi stage air compressor
- Evaluate the co efficient of performance of refrigerator
- Find the thermal conductivity of material

LIST OF EXPERIMENTS

1. Study of high-pressure boiler with model
2. Study of boiler mountings and accessories
3. Conduct performance test on VCR test rig to determine COP of the refrigerator
4. Conduct performance test on multi stage reciprocating compressor
5. Conduct Morse test to determine the indicated power of individual cylinders
6. Conduct Performance test on 2-S CI/SI engine.
7. Conduct Performance test on 4-S CI/SI engine.
8. Conduct Heat balance test on CI/SI engine.
9. Conduct Economical speed test on 4-S CI/SI engine.
10. Thermal conductivity test on 1) Thick slab 2) Composite wall 3) Thick cylinder
11. Leak detection of refrigeration equipment
12. Conduct performance test on A/C test rig to determine COP of the refrigerator

REFERENCES

1. Thermal Engineering – P.L. Ballaney, Khanna Publishers, 2002
2. A Course in Thermal Engineering – S. Domkundwar & C.P. Kothandaraman, Dhanpat Rai & Publication New Delhi
3. Thermal Engineering – R.S. Khurmi and J.K. Gupta, 18th Edition, S. Chand & Co, NewDelhi

PR:3- CAD/CAM LAB

L	T	P		Course Code: MEPC212	
0	0	4			
Total Contact Hours				**Practical Assessment**	
Practical		: 60Hrs	**Total Marks: 50**	End Exam	15
				Progressive Assessment	35
Pre Requisite		**: Nil**			
Credit		**2**		Category of Course: PC	

RATIONALE: CAD/CAM Lab provides hands-on experience in computer-aided design (CAD) and computer-aided manufacturing (CAM) for product modeling and machining. It helps students develop skills in 3D modeling, CNC programming, and simulation for modern manufacturing applications.

LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Explain the 3D commands and features of a CAD software
- Create 3D solid model and find the mass properties of simples solids
- Demonstrate the working of CNC turning and milling machine
- Develop the part program using simulation software for Lathe and Milling
- Assess the part program, edit and execute in CNC turning and machining centre

LIST OF EXPERIMENTS

S. No.	Topics for practice
PART-A	Introduction: Part modelling; Datum Plane; constraint; sketch; dimensioning; extrude; revolve; sweep; blend; protrusion; extrusion; rib; shell; hole; round; chamfer; copy; mirror; assembly; align; orient. Exercises: 3D Drawings of 1). Geneva Wheel; 2). Bearing Block; 3). Bushed bearing: 4). Gib and Cotter joint; 5). Screw Jack; 6). Connecting Rod: Note: Print the orthographic view and sectional view from the above assembled 3D drawing.
PART-B	CNC Programming and Machining: Introduction; 1). Study of CNC lathe, milling; 2). Study of international standard codes: G-Codes and M-Codes; 3). Format – Dimensioning methods; 4). Program writing – Turning simulator – Milling simulator, IS practice – commands menus; 5). Editing the program in the CNC machines; 6). Execute the program in the CNC machines; Exercises: Note: Print the Program from the Simulation Software and make the Component in the CNC Machine. CNC Turning Machine: (Material: Aluminium/Acrylic/Plastic rod) 1. Using Linear and Circular interpolation - Create a part program and produce component in the Machine. 2. Using Stock removal cycle – Create a part program for multiple turning operations

	and produce component in the Machine. 3. Using canned cycle - Create a part program for thread cutting, grooving and pro duce component in the Machine. CNC Milling Machine (Material: Aluminium/ Acrylic/ Plastic) 1. Using Linear interpolation and Circular interpolation – Create a part program for grooving and produce component in the Machine. 2. Using canned cycle - Create a part program for drilling, tapping, counter sinking and produce component in the Machine. 3. Using subprogram - Create a part program for mirroring and produce component in the Machine.

REFERENCES

1. Machine Drawing – P.S. Gill S. K. Kataria & Sons, Delhi., 17th Revised edition, 2001
2. Mechanical Draughtsmanship - G.L. Tamta Dhanpat Rai & Sons, Delhi, 1992
3. Inside AutoCAD – D. Raker and H. Rice, BPB Publications, New Delhi, 1985
4. CAD/CAM/CIM – P. Radhakrishnan, S. Subramaniyan & V. Raju, New Age International Pvt. Ltd., New Delhi, 3rd Edition,
5. Engineering AutoCAD, A.P. Gautam & Pradeep Jain, Khanna Book Publishing Co., Delhi

TH:4(A)- REFRIGERATION AND AIR CONDITIONING

L	T	P		Course Code: MEPE202(A)	
3	0	0			
Total Contact Hours				**Theory Assessment**	
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam	70
				Progressive Assessment	30
Pre Requisite		**: Nil**			
Credit		**3**		Category of Course: PE	

RATIONALE: Main objective of the course in refrigeration and air conditioning is to make the students understand the basics of Refrigeration cycles. The basics of vapor compression and vapor absorption systems, components and refrigerants and lubricants of a refrigeration system, control strategies for refrigeration system and air conditioning systems are elaborated in this course.

LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Define refrigeration and types of Refrigeration cycles
- Explain Vapor Compression and Vapor Absorption System working principles
- Identify the components required for refrigeration system.
- Identify the controlling components for a refrigeration system.
- Explain the working principles of Air-conditioning.

DETAILED COURSE CONTENTS

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	Introduction to Refrigeration: Definition of Refrigeration; Refrigerating effect- unit of refrigeration- Coefficient of performance; Types of Refrigeration-Ice, dry ice, Steam jet, Throttling, Liquid nitrogen refrigeration; Carnot refrigeration Cycle; Air refrigeration- Bell - Coleman cycle, PV& TS diagram; Advantage and disadvantages in air refrigeration; Simple problems	10
II	Refrigeration systems: Basic Components, Flow diagram of working of Vapour compression cycle; Representation of the vapour compression cycle on P-H, T-S & P-V Diagram; Expression for Refrigerating effect, work done and power required; Types of Vapour Compression cycle; Effects of super heating and under cooling, its advantages and disadvantages; Simple Vapour absorptions cycle and its flow diagram; Simple Electrolux system for domestic units; Comparison of Vapour absorption and vapour compression system; Simple problems on vapour compression cycle.	10
III	Refrigeration equipment: Compressor - types of compressors; Hermetically sealed and Semi hermetically sealed compressor; Condensers - Air Cooled, water cooled, natural and forced draught cooling system; Advantages and disadvantages of air cooled and water cooled condensers; Evaporators -natural, convection, forced convection types.	8
IV	Refrigerant flow controls: Capillary tube; Automatic Expansion valve; Thermo-static expansion valve; High side and low side float valve; Solenoid valve; Evaporator pressure regulator. Application of refrigeration: Slow and quick freezing; Cold storage and Frozen storage; Dairy refrigeration; Ice making industry; Water coolers.	8

V	**Air conditioning:** Introduction to Air conditioning; Factors affecting Air conditioning; Psychometric chart and its use; Psychometric process-sensible heating and cooling, Humidifying and dehumidifying; Adiabatic saturation process; Equipment used in air conditioning cycle; Air conditioning units and plants. **Refrigeration and Air-conditioning tools:** Tools used in refrigeration and Air conditioner installation; Installation procedure; Faults in refrigeration and air conditioning system; Servicing procedure.	9

REFERENCES:

1. Refrigeration and Air Conditioning – Sadhu Singh, Khanna Book Publishing Co., New Delhi
2. Refrigeration and Air Conditioning – S. Domakundawar, Dhanpat Rai publications.
3. Refrigeration and Air Conditioning – A.S.Sarao & G.S. Gabi, 6th edition, Satya Prakashan publications, New Delhi, 2004.
4. Principles of Refrigeration – Roy J.Dossat, 5th edition, Pearson Publications, 2001.
5. Refrigeration and Air Conditioning – M.Zakria Baig, Premier/ Radiant Publishing House.
6. Refrigeration and Air Conditioning – C.P Arora, Tata McGraw Hill Education, 2000.

TH:4(B)- RENEWABLE ENERGY TECHNOLOGIES

L	T	P		
3	0	0		**Course Code: MEPE202(B)**
Total Contact Hours				**Theory Assessment**
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam 70
				Progressive Assessment : 30
Pre Requisite		**: Nil**		
Credit		**3**		Category of Course: PE

RATIONALE: The knowledge of renewable energy technologies is very much needed for diploma holders of mechanical engineering. The course is designed to give knowledge of various renewable energy sources, systems and applications in the present context and need.

LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Illustrate importance of renewable energy sources
- Describe various types of renewable energy technologies
- State applications of different renewable energy sources

DETAILED COURSE CONTENTS

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	Scenario of Renewable Energy (RE) Sources: Needs of renewable energy, advantages and limitations of RE, present energy scenario of conventional and RE sources. Solar Energy: Energy available from the sun, spectral distribution, solar radiation outside the earth's atmosphere and at the earth's surface, solar radiation geometry, Instruments for solar radiation measurements, empirical equations for prediction of availability of solar radiation, radiation on tilted surface solar energy conversion into heat, types of solar collectors, evacuated and non-evacuated solar air heater, concentrated collectors, thermal analysis of liquid flat plate collector, air heater and cylindrical parabolic collector, solar energy thermal storage, heating and cooling of buildings, solar pumping, solar cooker, solar still, solar drier, solar refrigeration and air conditioning, solar pond, heliostat, solar furnace photovoltaic system for power generation, solar cell modules and arrays, solar cell types, material, applications, advantages and disadvantages	10
II	Wind Energy: Energy available from wind, basics of lift and drag, basics of wind energy conversion system, effect of density, angle of attack and wind speed, windmill rotors, horizontal and vertical axes rotors, drag, lift, torque and power coefficients, tip speed ratio, solidity of turbine, wind turbine performance curves, wind energy potential and site selection, basics of wind farm	10

III	Bio Energy : Types of biogas plants, biogas generation, factors affecting biogas generation, advantages and disadvantages, biomass energy, energy plantation, gasification, types and applications of gasifiers, concept of green energy.	8
IV	Ocean Energy: OTEC principle, open, closed and hybrid cycle OTEC system, Energy from tides, estimation of tidal power, tidal power plants, single and double basin plants, site requirements, advantages and limitations, wave energy, wave energy conversion devices, advantages and disadvantages, ocean thermal energy	10
V	Geothermal energy: Introduction, vapor and liquid dominated systems, binary cycle, hot dry rock resources, magma resources, advantages and disadvantages, applications	7

REFERENCES:

1. Solar Energy: Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, McGraw Hill Education
2. Solar Engineering of Thermal Processes, John A. Duffie, William A. Beckman, John Wiley, New York
3. Non-conventional energyresources, Shobh Nath Singh, Pearson India
4. Solar Energy Engineering, Soteris Kalogirou, Elsevier/Academic Press
5. Principles of Solar Energy, Frank Krieth & John F Kreider, John Wiley, New York

TH:4(C)- HYDRAULICS & PNEUMATICS

L	T	P		
3	0	0		**Course Code: MEPE202(C)**
Total Contact Hours				**Theory Assessment**
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam 70
				Progressive Assessment 30
Pre Requisite		**: Nil**		
Credit		**3**		Category of Course: PE

RATIONALE: The course aims to provide students with knowledge of fluid power applications in industry and an understanding of hydraulic and pneumatic components and systems. It covers topics like fluid properties, pumps, actuators, control valves, hydraulic circuits, pneumatic systems, troubleshooting, and applications. The course objectives are to teach fluid power principles, hydraulic and pneumatic components, circuit design, and applications in industrial processes.

LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Describe the working principles of fluid power systems.
- Illustrate the fluids and components used in modern industrial fluid power system.
- Develop the design, construction, and operation of fluid power circuits.
- Explain working principles of a pneumatic power system and its components
- Applythe troubleshooting methods in fluid power systems.

DETAILED COURSE CONTENTS

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	**Fluid Power Principles and Hydraulic Pumps** Introduction to Fluid Power – Advantages and Applications – Fluid power systems – Types of fluids Properties of fluids and selection – Basics of Hydraulics – Pascal's Law – Principles of flow – Friction loss – Work, Power, and Torque- Problems, Sources of Hydraulic power: Pumping Theory – Pump Classification – Construction, Working, Design, Advantages, Disadvantages, Performance, Selection criteria of pumps – Fixed and Variable displacement pumps – Problems.	10
II	**Hydraulic Actuators and Control Components-**Hydraulic Actuators: Cylinders – Types and construction, Application, Hydraulic cushioning – Rotary Actuators-Hydraulic motors – Control Components: Direction Control, Flow control and pressure control valves – Types, Construction, and Operation – Accessories: Reservoirs, Pressure Switches – Filters –types and selection- Applications – Fluid Power ANSI Symbols – Problems.	10
III	**Hydraulic Circuits and Systems-**Accumulators, Intensifiers, Industrial hydraulic circuits – Regenerative, Pump Unloading, Double-Pump, Pressure Intensifier, Air-over oil, Sequence, Reciprocation, Synchronization, Fail-Safe, Speed Control, Deceleration circuits, Sizing of hydraulic systems, Hydrostatic transmission, Electro-hydraulic circuits, –Servo and Proportional valves – Applications- Mechanical, hydraulic servo systems.	8

IV	**Pneumatic and Electro Pneumatic Systems**-Properties of air –Air preparation and distribution – Filters, Regulator, Lubricator, Muffler, Air Control Valves, Quick Exhaust Valves, Pneumatic actuators, Design of Pneumatic circuit – classification- single cylinder and multi-cylinder circuits-Cascade method – Integration of fringe circuits, Electro Pneumatic System – Elements – Ladder diagram – timer circuits-Problems, Introduction to fluidics and pneumatic logic circuits.	10
V	**Trouble Shooting and Applications**-Installation, Selection, Maintenance, Trouble Shooting and Remedies in Hydraulic and Pneumatic systems, Conditioning of hydraulic fluids Design of hydraulic circuits for Drilling, Planning, Shaping, Surface grinding, Press and Forklift applications- mobile hydraulics; Design of Pneumatic circuits for metalworking, handling, clamping counter and timer circuits. – Low-cost Automation – Hydraulic and Pneumatic power packs, IOT in Hydraulics and pneumatics.	7

REFERENCES:

1. Fluid Power with Applications- Anthony Esposito, Prentice Hall, 2009.
2. Fluid Power Theory and Applications-James A. Sullivan, Fourth Edition, Prentice Hall, 1997.
3. Pneumatics Concepts, Design and Applications -Jagadeesha. T., Universities Press, 2015.
4. Oil Hydraulics Systems – Principles and Maintenance S.R. Mujumdar-Tata McGraw Hill, 2001
5. Hydraulic and Pneumatic Controls- R., Srinivasan. Vijay Nicole Imprints, 3rd edition,2019.

TH:5(A)- COMPUTER-AIDED DESIGN AND MANUFACTURING

L	T	P		**Course Code:** MEPE204(A)	
3	0	0			
Total Contact Hours				**Theory Assessment**	
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam	70
				Progressive Assessment	30
Pre Requisite		**: Nil**			
Credit		**3**		Category of Course: PE	

RATIONALE: This subject focuses on the use of computer technology for designing and manufacturing products. It covers CAD for creating detailed 2D and 3D models, and CAM for automated machining and production processes. These subject helps students understand modern design techniques, CNC programming, simulation, and integration of digital tools in manufacturing industries.

LEARNING OUTCOMES:

After completion of the course, the students will be able

- Provide an outline of how computers are being used in mechanical component design.
- Illustrate the application of computers in various aspects of Manufacturing
- Program the CNC machines
- Describe the concept of flexible manufacturing

DETAILED COURSE CONTENTS

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	INTRODUCTION Product cycle- Design process- sequential and concurrent engineering- Computer aided design — CAD system architecture- Computer graphics — co-ordinate systems- 2D and 3D transformations- homogeneous coordinates — Line drawing -clipping- viewing transformation-brief introduction to CAD and CAM — Manufacturing Planning, Manufacturing control- Introduction to CAD/CAM – CAD/CAM concepts —-Types of production — Manufacturing models and Metrics — Mathematical models of Production Performance	10
II	GEOMETRIC MODELING Representation of curves- Hermite curve- Bezier curve- B-spline curves-rational curves-Techniques for surface modeling — surface patch- Coons and bicubic patches- Bezier and B-spline surfaces. Solid modeling techniques- CSG and B-rep.	10

III	CAD STANDARDS Standards for computer graphics- Graphical Kernel System (GKS) — standards for exchange images- Open Graphics Library (OpenGL) — Data exchange standards — IGES, STEP, CALS etc. — communication standards.	8
IV	FUNDAMENTAL OF CNC AND PART PROGRAMING Introduction to NC systems and CNC — Machine axis and Co-ordinate system- CNC machine tools- Principle of operation CNC- Construction features including structure- Drives and CNC controllers- 2D and 3D machining on CNC- Introduction of Part Programming, types — Detailed Manual part programming on Lathe & Milling machines using G codes and M codes- Cutting Cycles, Loops, Sub program and Macros- Introduction of CAM package.	10
V	CELLULAR MANUFACTURING AND FLEXIBLE MANUFACTURING SYSTEM (FMS) Group Technology(GT), Part Families–Parts Classification and coding–Simple Problems in Opitz Part Coding system–Production flow Analysis–Cellular Manufacturing–Composite part concept–Types of Flexibility — FMS — FMS Components — FMS Application & Benefits — FMS Planning and Control — Quantitative analysis in FMS ME8691 Computer Aided Design and Manufacturing	7

REFERENCES:

1. Mastering CAD CAM -Ibrahim Zeid -Tata McGraw-Hill Publishing Co. 2007.
2. Automation, Production Systems and Computer Integrated Manufacturing -Mikell. P. Groover - Prentice Hall of India, 2008.
3. CAD/CAM/CIM- P, Radhakrishnan, S..Subramanian and V Raju.- 2nd Edition, New Age International (P) Ltd, New Delhi, 2000.
4. CAD/CAM Principles -Chris McMahon and Jimmie Browne -Practice and Manufacturing management" Second Edition, Pearson Education, 1999.
5. Principles of Computer Graphics-William M Neumann and Robert F.Sproul, McGraw Hill Book Co. Singapore, 1989.
6. Computer Graphics-Donald Hearn and M. Pauline Baker. Prentice Hall, Inc, 1992.
7. Computer graphics principles & practice- Foley, Wan Dam, Feiner and Hughes –Pearson Education – 2003.

TH:5(B)- TOOL ENGINEERING

L	T	P		Course Code: MEPE204(B)	
3	0	0			
Total Contact Hours				**Theory Assessment**	
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam	70
				Progressive Assessment	30
Pre Requisite		**: Nil**			
Credit		**3**		Category of Course: PE	

RATIONALE: Tool Engineering is a subject that focuses on the design, development, and application of cutting tools, jigs, fixtures, and dies used in manufacturing. It covers tool materials, tool design, machining processes, and optimization techniques to enhance production efficiency, precision, and quality in industrial applications.

LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Illustrate concepts, principles and procedures of tool engineering
- Classify and explain various tools and tool operations
- Select proper tool and a die for a given manufacturing operation to achieve highest produc- tivity
- Estimate tool wear and tool life

DETAILED COURSE CONTENTS

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	Metal Cutting: Mechanics of Metal cutting; requirements of tools; cutting forces; types of chips; chip thickness ratio; shear angle ; simple numerical only; types of metal cutting process; or- thogonal; oblique and form cutting; Cutting fluids: types; characteristics and applications. Tool wear: Types of wear; Tool life; Tool life equations.	10
II	Machinability: definition; factors affecting machinability; machinability index. Tool materials: Types; characteristics; applications; Heat treatment of tool steels; Specification of carbide tips; Types of ceramic coatings. Cutting Tool Geometry: Single point cutting tool; drills; reamers; milling; cutters.	10
III	Types of dies and construction: Simple Die; Compound Die; Progressive Die; Combination Die. Punch & Die mountings: pilots; strippers; misfeed detectors; Pressure Pads; Knock outs; stock guide; Feed-Stop; guide bush; guide pins.	8
IV	Die Design Fundamentals: Die Operations; blanking; piercing; shearing; cropping; notchng; lancing; coining; embossing; stamping; curling; drawing; bending; forming; Die set; Die shoe; Die area; Calculation of clearances on die and punch for blanking and piercing dies; Strip layout; Calculation of material utilization factor.	10

V	Forming Dies: Bending methods; Bending Dies; bend allowance; spring back; spanking; bending pressure; pressure pads; development of blank length. Drawing: operations; Metal flow during drawing; Calculation of Drawing blank size; variables affecting metal flow during drawing; single action and double action dies; combination dies. Fundamentals of other Tools: Constructional features of - Pressure Die casting dies; metal extrusion dies; injection molding dies; forging dies; plastic extrusion dies.	7

REFERENCES:

1. Tool Design - Donaldson Anglin, Tata McGraw Hill.
2. Production Technology- H.M.T.Jain, Tata McGraw Hill.
3. A Text Book of Production engineering – P.C. Sharma, S.Chand & Co.
4. Production Technology, R.K.Jain, Khanna Publishers.

TH:5(C)- MECHATRONICS

L	T	P		Course Code: MEPE204(C)	
3	0	0			
Total Contact Hours				**Theory Assessment**	
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam	70
				Progressive Assessment	30
Pre Requisite		**: Nil**			
Credit		**3**		Category of Course: PE	

RATIONALE: It is an interdisciplinary subject that integrates mechanical engineering, electronics, computer control, and automation. It covers sensors, actuators, microcontrollers, PLCs, and robotics, helping students understand modern automated systems used in industrial and manufacturing applications.

LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Describe about various types of sensors and transducers.
- Explain the concept of various mechanical, electrical and pneumatic actuation systems.
- Explain the basic mathematical building blocks for mechanical, electrical, thermal and fluid actuation system and its interfacing of input/output requirements.
- Illustrate the basic PLC architecture and PLC programming concepts.
- Describe the design examples of mechatronics system. Explain the condition monitoring of production systems using sensors.

DETAILED COURSE CONTENTS

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	Introduction to Mechatronics: Mechatronics; Importance of Mechatronics; Systems: Mea- surement systems; Control systems and their types; Closed-loop control System; Automatic water level controller; Sequential controllers-washing machine Measurement System terminology: Displacement, Position & Proximity Sensors; Velocity and Mo- tion Sensors; Force Sensors; Fluid Pressure Sensors; Flow Sensors; Liquid Level Sensors; Tempera- ture Sensors; Light Sensors; Selection of Sensors.	10
II	Mechanical Actuation Systems: Types of motion; Freedom and constraints; Loading; Gear Trains; Pawl & Ratchet; Belt & Chain drives; Bearings: Selection, Ball & Roller bearings; Mechanical aspects of motor selection. Electrical Actuation Systems: Switches & Relays; Solenoids; D.C Motors; A.C.Motors; Stepper Mo- tors: Specifications and Control of stepper motors; Servomotors: D.C Servomotor and A.C Servomotor. Pneumatic & Hydraulic Systems: Power supplies; DCV; PCV; Cylinders; Rotary actuators.	10
III	Mathematical Model: Introduction to Mathematical model; Mechanical System building blocks; Electrical System building blocks; Fluid System building blocks; Thermal System building blocks. System Model: Engineering.Systems: Rotational, Translational Systems; Electro-Mechanical System; Hydro-Mechanical System.	8

	Input/Output Systems: Interfacing; Input/output ports; Interface requirements: Buffers, Hand- shaking, Polling and interrupts, Serial interfacing; Introduction to PIA; Serial communications inter- face; Example of interfacing of a seven-segment display with a decoder.	
IV	Programmable Logic Controller (PLC): Definition; Basic block diagram and structure of PLC; Input/Output processing; PLC Programming: Ladder diagram, its logic functions, Latching and Sequencing; PLC mnemonics; Timers; Internal relays and Counters; Shift registers; Master and Jump Controls; Data handling; Analog input/output; Selection of PLC.	10
V	Design Examples & Advanced Applications in Mechatronics: Design process stages;Traditional Vs Mechatronics designs; Possible design solutions: Timed switch, Wind-screen wiper motion, Bath room scale; Case studies of Mechatronics systems: A pick-and-place robot, Car park barrier, Car engine management system, Automatic Camera and Automatic Washing Machine only.Sensors for Condition Monitoring Systems of Production Systems: Examples of Monitoring methods: Vibration monitoring, Temperature monitoring, Wear behavior monitoring; Mechatronics control in automated manufacturing: Monitoring of Manufacturing processes, On-line quality moni- toring, Model based systems, Hardware in-the-loop simulation, Supervisory control in manufacturing inspection, Integration of heterogeneous systems	7

REFERENCES:

1. Mechatronics – W. Bolton, Pearson Education India.
2. A Text Book on Mechatronics – R.K.Rajput, S.Chand& Co, New Delhi.
3. Mechatronics – M.D.Singh & Joshi, Prentice Hall of India.
4. Mechatronics – HMT, Tata McGraw Hill, New Delhi.
5. Mechatronics System – Devadas Shetty, PWS Publishing
6. Exploring Programmable Logic Controllers with applications – Pradeep Kumar Srivastava, BPB Publications.

PR:4- MINOR PROJECT

L	T	P		
0	0	4		Course Code: PR202
Total Contact Hours				Project Assessment
Practical		: 60Hrs	Total Marks: 100	End Exam 30
				Progressive Assessment 70
Pre Requisite		: Nil		
Credit		2		Category of Course: Project

RATIONALE:

A Minor project generally requires a larger amount of effort and more independent work than that involved in a normal assignment. It requires students to undertake their own fact-finding and analysis. The students will select the topic, perform and design work. Minor project is as preparation for the students to take on more responsibilities and bigger project in the future. It is a learning experience, which aims to provide students with the opportunity to synthesize knowledge from different areas of learning, and critically and creatively apply it to real life situations. The leadership quality, co-ordination of job and maintaining good communal harmony is an important factor of this type of activity.

LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Plan a Minor Project
- Execute a Minor Project with team.
- Implement hardware/software/analytical/numerical techniques, etc. based on project requirements.
- Optimize time related works through sharing of work responsibility
- Develop cost awareness and utilisation of fund.
- Prepare a technical report on the project.

GUIDELINES FOR MINOR PROJECT

- Minimum three and maximum five students can form a group for the minor project.
- Project type can include
    - Development of a simple prototype system/product.
    - Investigation of performance of some systems using experimental method
    - Analysis of components/systems/devices using suitable software
    - Investigation of optimum process/material for product development using market survey.
    - Solution for society/industry problems
- Project domain may not be limited to the specific area / discipline.
- Project report to be prepared and submitted by the students with following components:
    1. Title
    2. Objectives
    3. Relevance and significance
    4. Methodology
    5. Analysis-Simulation/experimentation/survey/testing etc.
    6. Result and Discussion
    7. Conclusion

ESSENCE OF INDIAN KNOWLEDGE AND TRADITION

L	T	P		
2	0	0		Course Code: AU202
Total Contact Hours				Theory Assessment
Theory		: 30Hrs	Total Marks: NA	End Term Exam 0
				Progressive Assessment* 0
Pre Requisite		: Nil		
Credit		0		Category of Course: Mandatory

***Mandatory Audit Courses will be assessed only for confirmation of student learning without reflecting in the total scores or Credit.**

RATIONALE:

Considering the need of protecting Indian knowledge and tradition, the diploma level students of Automobile Engineering should be facilitated the concepts Indian traditional knowledge and to make them understand the importance of roots of knowledge system and methods of application in today's life and how to protect traditional knowledge system. Interpretation of the concepts of Intellectual property to protect the traditional knowledge as well as importance of Traditional knowledge in Agriculture and Medicine must be known.

COURSE OUTCOME:

On successful completion of the course, students will be able to

- Discuss the concepts of traditional Indian knowledge and roots of knowledge system and indigenous knowledge system
- Explain the technique of protection of traditional Indian knowledge
- Discuss legal frameworks of traditional knowledge
- State intellectual property rights
- State traditional knowledge in Different Sectors

DETAILED COURSE CONTENTS

UNIT	TOPIC/SUB-TOPIC	Allotted HRS.
1	Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge (Unani / Siddha/ Ayurveda), Indigenous Knowledge (IK), characteristics, traditional knowledge vis-a-vis indigenous knowledge, traditional knowledge of Odisha	07
2	Protection of traditional knowledge (TK): The need for protecting traditional knowledge, Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.	07
3	Legal framework and TK: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act); The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016.	06
4	Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, Geographical Indications (GI).	04

5	Traditional Knowledge in Different Sectors: Traditional knowledge and engineering, Traditional medicine system, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK	06

REFERENCES:

1. Traditional Knowledge System in India, by Amit Jha, 2009.
2. "Knowledge Traditions and Practices of India" Kapil Kapoor.
3. Madhya Himalayi Sanskriti mein Gyan, Vigyan evam Paravigyan by Prof PC Pandey.

Suggested Online Link:

Web Links:

1. https://www.youtube.com/watch?v=LZP1StpYEPM
2. http://nptel.ac.in/courses/12110600/

Final

DIPLOMA CURRICULUM OF MINING ENGNEERING (SECOND YEAR) (4th Semester)

(To be implemented from 2025-26)

Prepared by;

National Institute of Technical Teachers' Training & Research Kolkata
Block – FC, Sector – III, Salt Lake City, Kolkata – 700106

Vetted by:
Domain experts from Polytechnics of Odisha

State Council for Technical Education & Vocational Training
Near Raj Bhawan, Unit-VIII, Bhubaneswar, Odisha

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PROGRAMME TITLE: MINING ENGINEERING

SEMESTER – IV

SL. No	Category of Course	Code No	Course Title	Teaching Scheme				Evaluation Scheme				Total Marks	Credits
				Pre-requisite	Contact Hours/ week			Theory		Practical			
					L	T	P	End Exam	Progressive Assessment	End Exam	Progressive Assessment		
1	Programme Core	MIEPC202 (TH:1)	Mine Survey -II	**MIEPC 203**	3	0	0	70	30	-	-	100	3
2		MIEPC204 (TH:2)	Mine Ventilation		3	0	0	70	30	-	-	100	3
3		MIEPC206 (TH:3)	Mine Machinery II	**MEPC 209**	3	0	0	70	30	-	-	100	3
4		MIEPC208 (PR:1)	Mine Survey -II Lab		0	0	4	-	-	15	35	50	2
5		MIEPC210 (PR:2)	Mine Ventilation Lab		0	0	4	-	-	15	35	50	2
6#		MIEPC212 (PR:3)	Mine Machinery II Lab		0	0	4	-	-	15	35	50	2
7	Programme Elective	MIEPE202 (TH:4)	(A) Underground Coal Mining (B) Mining Technology		3	0	0	70	30	-	-	100	3
8		MIEPE204 (TH:5)	(A) Special Underground Mining (B) Mine Legislation and General Safety – I (C) Advanced Mine Survey		3	0	0	70	30	-	-	100	3
9	**Minor Project**	PR202 PR:4	MINOR PROJECT		0	0	4	-	-	30	70	100	2
10	**Mandatory**	AU202	Essence of Indian knowledge and tradition		2	0	0	-	-	0	0	0	0
TOTAL					**17**	**0**	**16**	**350**	**150**	**75**	**175**	**750**	**23**

The best of 2 IA conducted in a subject out of 20 marks to be considered. Assignment/ quiz etc. of 10 marks to be treated as part of IA. Besides this, Monthly Test to be conducted for each subject. Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester. Club/Innovation/ Idea Tinkering Activities etc. shall be encouraged to be performed by students beyond the above stipulated hours.

TH:1- MINE SURVEY –II

L	T	P		
3	0	0		**Course Code: MIEPC202 (TH 1)**
Total Contact Hours				**Theory Assessment**
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam 70
				Progressive Assessment 30
Pre-Requisite		**: Nil**		
Credit		**3**		Category of Course: PC

RATIONALE:

Before starting the actual mining operation, it is essential for mining engineer to first survey the piece of land where mining operation is contemplated. This is not possible without the knowledge of mine surveying.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

- Comprehend the principle of tachometry and its applications in measurement of distance.
- Explain the principle of triangulation & trilateration.
- Explain principles of correlations by different methods.
- Define various terms in connection with cove setting, laying out of curves by different methods.
- Explain different methods of stope surveying, transfer of stope faces to mine Plan.
- Explain the basic principle of global positioning systems & total station.

COURSE CONTENT DETAILS:

Unit No.	Topics for practice	Time Allotted (Hrs.)
I	**Tachometry:** Stadia and its principle, Diaphragm, reticules, tacheometer, instruments constants, Height and distance from stadia intercepts, tangential systems, movable hair method.	**10**
II	**Triangulation and Trilateration:** Triangulation and trilateration method. Triangulation survey primary, secondary and tertiary colliery triangulation. Reconnaissance survey. Measuring angle, types of theodolite used in triangulation survey. Methods of base line measurement using E.D.M. Tape correction. Triangulation station of permanent nature.	**10**
III	**Correlation of surface and underground survey: D**irect correlation by traversing and optical methods, Orientation by wires in two shafts, Correlation by mines in vertical shafts, Co-planning/ alignment, weissbach triangle, weis-quadrilateral methods, precise magnetic correlation.	**10**
IV	**Setting out curves: E**lements of curves, Designation of curves, simple, compound and reverse curves, setting of surface and underground curves by chords and offsets, chords and angle, tangent and offset, plate layers method, Various setting out by chain and one theodolite, two theodolites, Super elevation, transition and vertical curves.	**9**
V	**Stope Surveying: T**ape triangulation, instrumental survey, Stope face, Preparation of stope planes, plotting the stope station, plotting of stope face to	**6**

	the mine plan. Area of extraction by Planimeter and calculation of triangle thereof. **G.P.S. and Total Station**: Basic principles of global positioning system and total station, Introduction to DGPS.	
	Total	**45**

REFERENCES:

1. Surveying Vol I, E. Mason.
2. Surveying and Levelling, T.P. Kanetkar, 2008.
3. Geodetic Surveying Vol I, David Clerk, CBS Publishers, 2018.
4. Mineral Economics, Sinha and Sharma, CBS Publishers, 2019.

TH:2- MINE VENTILATION

L	T	P		
3	0	0		**Course Code: MIEPC204 (TH 2)**
Total Contact Hours				**Theory Assessment**
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam 70
				Progressive Assessment 30
Pre-Requisite		**: Nil**		
Credit		**3**		Category of Course: PC

RATIONALE:

The provision of proper ventilation is very essential for any underground mining operation. As a mining Engineer, one should have the thorough knowledge of types of ventilation, methods of air crossing, types of fans etc.

COURSE OUTCOMES:

- Describe different types of natural ventilation and laws of mine air friction.
- Describe different methods of air crossings and distribution.
- Illustrate different types of fans, fan characteristics, Mine characteristics and selection of fans.
- Identify different locations of booster fan, auxiliary ventilation and its advantages and disadvantages.
- Explain different ways of pressure survey, quantity survey & quality survey, leakage of air in mines.

COURSE CONTENT DETAILS:

Unit No.	Content	Time Allotted (Hrs.)
I	**Natural Ventilation**: Objective of ventilation. Define geothermic gradient. Definition of natural ventilation and factors affecting natural ventilation, Different types of Barometer, Kata thermometer, Sources of moisture content of mine air. Effects of heat and humidity, Natural ventilation, motive column, Laws of mine air friction and solve problems.	**9**
II	**Air Crossing and distribution**: Ventilation stopping, air crossing, ventilation door, brattice partition, Different types of ventilation, Accessional and declensional ventilation, Homotropal and Antitropal ventilation, Boundary ventilation, Central and combined ventilation, Splitting of air current and solve numerical problems on splitting. Air locks at pit top.	**9**
III	**Mechanical Ventilation**: Construction and principle of operation of centrifugal flow fans, Fan laws & calculate fan efficiency and capacity, Installation of mine fan with reversal arrangement. Fan drift, fan drive, evasee and diffusers. Fan characteristics and mine characteristics, Methods of output control of mine fans. Forcing fan vs. exhaust fan	**9**
IV	**Booster fan and its Effects: I**nstallation, location and purpose & disadvantages of booster fan. **Auxiliary Ventilation: S**ystems of auxiliary ventilation, Advantages and disadvantages of auxiliary ventilation.	**9**

V	**Ventilation Survey**: Methods of pressure survey using barometer, gauge and pitot tube with manometer, Method of measurement of cross-sectional area, Method of velocity measurements by using anemometer, velometer, pitot- static tube, smoke & cloud method, Determination of percentage of oxygen, methane, carbon monoxide, SO_2 and H_2S by using multigas detector. **Leakage of air in Mines**: Causes and preventive measures of leakage of air in mines.	**9**
	Total	**45**

REFERENCES:

1. Mine Ventilation, G B Mishra, OUP India Publishers, 1989.
2. Elements of Mining Technology Vol. 2, D. J. Deshmukh, Denett & Co., 9th edition, 2016
3. Coal Mine Practices, E. Mason
4. Mine Ventilation, L C KAKU, Lovely Prakashan, 2020.
5. Universal Mining School Volume, T. S. Southern Ltd, 1883.
6. SME Mining Engineering Hand Book Vol.I & II, 2nd Edition, Society for Mining, Metallurgy, and Exploration; A.B. Cummins, I.A Given, 2nd edition, 1992.

TH:3- MINE MACHINERY – II

L	T	P		Course Code: MIEPC206 (TH 3)	
3	0	0			
Total Contact Hours				**Theory Assessment**	
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam	70
				Progressive Assessment	30
Pre-Requisite		**: Nil**			
Credit		**3**		Category of Course: PC	

RATIONALE:

There are various types of machines and equipment used in mining operations. As a mining engineer, it is necessary for them to understand about the Machinery used during mining. This course is very helpful, which discusses about Mine Machinery, which were not details in Mine Machinery-I course.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

- Describe various underground face machineries and their applicability.
- Describe various opencast machineries and their applicability.
- Describe various types of pump and their applicability.
- Describe various types of bore hole pumps and their applications.
- Elaborate details about various pipes and valves used in mines.

COURSE CONTENT DETAILS:

Unit No.	Topics for practice	Time Allotted (Hrs.)
I	**Underground Face Machineries:** Electric coal drill, Constructional features, operation, principle and use of electric coal drill, Types of drill rods & drill bits used in electric coal drill, Constructional features and operation principle of gathering arm loader, scraper loader, side discharge loader, load and haul loader, Jack hammer drill and air leg rock drill. Road header and Shearer loader.	**12**
II	**Opencast machineries: C**onstructional features of surface miner, dragline, shovel and backhoe, bucket wheel excavator, Dumper, dozer, scraper and road grader.	**6**
III	**Mine Pumps:** Mine pumps, Constructional features, working & use of ram pumps, Constructional features, Principle of centrifugal and turbine pumps and their applicability, Balancing the axial thrust of turbine pumps, Characteristic curves for turbine pumps, Constructional features and working principle and use of roto pump (screw pump), Constructional features & working principle of sinking pump, Suspension in shaft.	**12**
IV	**Bore hole pump:** Constructional features and working of bore hole pump, Installation of bore hole pump.	**6**
V	**Pipes and valves:** Types of pipes and valves used in Mines, Constructional features of various type of valves, Different types of pipe joints. Describe Pipe line layout.	**9**
	Total	**45**

REFERENCES:

1. Electrical equipment in Mine, H. Cotton, Newnes Publishers, 1955.
2. Winning and Working of Iron Ore, R.J Desmukh and D.J. Desmukh, Published by Amravati D J Deshmukh 1967.
3. Elements of Mining Technology VOL III, D.J.Desmukh, NAGPUR DENETT Publishers, 2014.

PR:1- MINE SURVEY -II LAB

L	T	P	Total Marks: 50	Course Code: MIEPC208 (PR 1)	
0	0	4			
Total Contact Hours				**Practical Assessment**	
Practical		: 60Hrs		End Exam	15
				Progressive Assessment	35
Pre-Requisite		**: Nil**			
Credit		**2**		Category of Course: PC	

RATIONALE:

Mine surveying is important to Mining engineers. In this course, fundamentals of Mine Survey are discussed. In the field of mining, it is required to have measurements, calculations and mapping at all stages from prospecting to exploitation and utilizing mineral deposits by both surface and underground working. In this course, advanced equipment like Tacheometry, GPS and DGPS along with the uses of Autocad and software in Mine planning are practiced.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

- Identify the working of about Tacheometer and Tacheometry.
- Demonstrate various components of GPS, DGPS and their uses.
- Use total station in calculations of various components in mining field.
- Applycomputational tools and software in Mine planning.

COURSE CONTENT DETAILS:

Unit No.	Content	Time Allotted (Hrs.)
I	Fix triangulation and measurement of peripheral and hub angles. Base line measurement applying all corrections and plotting by co-ordinates.	**4**
II	Determine the north, Setting of curves by Total Station and Theodolites.	**4**
III	Correlate underground and surface survey during survey camp.	**4**
IV	Measurement of Horizontal & Vertical angles, measurement of distance by Total Station.	**4**
V	Mining lease boundary survey using Total Station, Base line fixation using Total Station.	**4**
VI	Coordinate point shifting and reference point shifting by Total Station.	**4**
VII	Fixation of control point by 02 traversing (both Horizontal and Vertical control points) with Total Station and auto level.	**4**
VIII	Topographic survey & existing features, Area and Volume calculation using software.	**4**
IX	GPS Survey.	4
X	Preparation of plan and section using AUTOCAD.	**8**
XI	DGPS Survey.	**8**
XII	Reserve calculation of Ore.	**8**

	Total	**60**

REFERENCES:

1. Surveying Vol I, E. Mason.
2. Surveying and Levelling, T.P. Kanetkar, 2008.
3. Geodetic Surveying Vol I, David Clerk, CBS Publishers, 2018.
4. Mineral Economics, Sinha and Sharma, CBS Publishers, 2019.

PR:2- MINE VENTILATION LAB

L	T	P		
0	0	4		**Course Code: MIEPC210 (PR 2)**
Total Contact Hours				**Practical Assessment**
Practical		: 60Hrs	**Total Marks: 50**	End Exam 15
				Progressive Assessment 35
Pre-Requisite		**: Nil**		
Credit		**2**		Category of Course: PC

RATIONALE:

Proper ventilation is very essential for any underground mining operation. As a mining Engineer, one should have the practical exposure to different types of mechanical ventilators, different measuring instruments and air leakage protecting devices used in mines. This course deals with different types of ventilation aspects.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

- Explain the uses of stationary and storrow's hygrometer in calculation of relative humidity.
- Calculate cooling power of air with help of kata thermometer.
- Illustrate different types of fans, fan characteristics and selection of fans.
- Explain the uses of Regulators and Air locks in different parts of mine.
- Calculate velocityof air with the help of vane anemometer.
- Explain different ways of pressure survey, quantity survey & quality survey.

COURSE CONTENT DETAILS:

Unit No.	Content	Time Allotted (Hrs.)
I	Determine the relative humidity bystationary hygrometer.	**4**
II	Determine the relative humidityby storrow's hygrometer.	**4**
III	Determine the cooling power of mine air using Kata thermometer.	**4**
IV	Studyand sketching of air crossing.	**4**
V	Study& use of Vane Anemometer.	**4**
VI	Study& use of Digital Anemometer.	**4**
VII	Study of constructional features of axial flow fan.	**4**
VIII	Determination of fan characteristic curve.	**4**
IX	Studyand sketching of regulator &airlocks.	**8**
X	Studyand use of Pitot static-tube measurement of quantity of air flow.	**8**
XI	Study of constructional features of centrifugal fans and reversal arrangement.	**12**
	Total	**60**

REFERENCES:

1. Mine Ventilation, G B Mishra, OUP India Publishers, 1989.
2. Elements of Mining Technology Vol. 2, D. J. Deshmukh, Denett & Co., 9th edition, 2016
3. Coal Mine Practices, E. Mason

4. Mine Ventilation, L C KAKU, Lovely Prakashan, 2020.
5. Universal Mining School Volume, T. S. Southern Ltd, 1883.
6. SME Mining Engineering Hand Book Vol.I & II, 2nd Edition, Society for Mining, Metallurgy, and Exploration; A.B. Cummins, I.A Given, 2nd edition, 1992.

PR:3- MINE MACHINERY -II LAB

L	T	P		
0	0	4		**Course Code: MIEPC212 (PR 3)**
Total Contact Hours				**Practical Assessment**
Practical		: 60Hrs	**Total Marks: 50**	End Exam 15
				Progressive Assessment 35
Pre-Requisite		**: Nil**		
Credit		**2**		Category of Course: PC

RATIONALE:

It is imperative that a Mining Engineer should be thoroughly conversant with various types of machines used in mining operations.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

- Prepare an electrical switch board to control 2 light points & 1 plug points.
- Describe circuit breakers and draw circuit diagram of gate-end box and drill panel.
- Describe different types of protective system and Relays.
- Distinguish different types of cables used for mining purpose
- Explain the uses of Megger check and continuity of windings.

COURSE CONTENT DETAILS:

Expt No.	Content	Time Allotted (Hrs.)
I	Study of Centrifugal Pumps.	**4**
II	Study of Turbine Pumps.	**4**
III	Study of Roto Pump.	**4**
IV	Study of Sinking Pump.	**4**
V	Study of electric coal drills & its accessories.	**4**
VI	Study of Jack Hammer Drill with air leg.	**4**
VII	Study& plotting of characteristics curve of Turbine pump.	**12**
VIII	Study of scrapper loader.	**8**
IX	Model Development of Gathering arm loader.	**8**
X	Study of scrapper & shaker conveyor.	**8**
	Total	**60**

REFERENCES:

1. Electrical equipment in Mine, H. Cotton, Newnes Publishers, 1955.
2. Winning and Working of Iron Ore, R.J Desmukh and D.J. Desmukh, Published by Amravati D J Deshmukh 1967.
3. Elements of Mining Technology VOL III, D.J.Desmukh, NAGPUR DENETT Publishers, 2014.

TH:4(A)- UNDERGROUND COAL MINING

L	T	P		
3	0	0		**Course Code: MIEPE202A (TH 4)**
Total Contact Hours				**Theory Assessment**
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam 70
				Progressive Assessment 30
Pre-Requisite		**: Nil**		
Credit		**3**		Category of Course: PE

RATIONALE:

As a Mining Engineer, one should know different methods of underground working in coal mining and operational principles. This course deals with the aspects of Underground Coal Mining.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

- Explain different mining methods and working of B.P. method and its development and depillaring, precautions against fire and water and B.P. layout.
- Explain long wall method.
- Describe elementary idea about thick seam mining and horizon mining.
- Explain hydraulic and pneumatic stowing along with support and roof control in Mines.
- Describe Subsidence due to Mining.

COURSE CONTENT DETAILS:

Unit No.	Topics for practice	Time Allotted (Hrs.)
I	**Introduction to Underground Coal Mining: Diff**erent methods of mining Underground Coal Mining Methods. **Bord and Pillar Method: V**arious application of Bord and Pillar method, Various layouts of Bord & Pillar method. Depillaring method with stowing and caving. Precautions against fire and water during and after depillaring, Various machineries used in working face, contiguous seam, working of contiguous seams, working of seams above and below goaved out area, advantages and disadvantages of Bord & Pillar method.	**9**
II	**Longwall Method:** Longwall advancing and retreating methods, Single unit and double unit face, Cyclic and non-cyclic L/W layouts, Mechanized longwall working with armoured flexible conveyor, shield support and shearer loader.	**9**
III	**Thick seam Mining: T**hick seams, Thick seam Mining, layouts of horizontal slicing, incline slicing, blasting gallery and sublevel caving. **Horizon Mining:** Conditions, advantages, disadvantages and limitations of Horizon Mining, Layout of Horizon Mining.	**9**
IV	**Hydraulic and Pneumatic stowing**: Hydraulic stowing, Pneumatic stowing. **Support and roof control in Mines:** Properties of various types of roof & roof behaviour, Pressure arch theory in B&P and longwall working, Testing of roof, Support system in Mines construction, principle of operation application and load bearing capacity assessment.	**9**
V	**Subsidence due to Mining**: Angle of draw, Factors of subsidence, critical area of extraction, Factors affecting subsidence, Precautionary measures against damage due to subsidence, Shaft pillar. **Shaft Sinking: V**ertical shaft and inclined shaft; Shape and size of shaft, location of	**9**

	shaft. Sinking through normal ground. State shaft plumbing, Sinking through difficult ground, cementation, freezing, mechanized shaft sinking, sinking upward, widening and deepening of shafts.	
	Total	**45**

REFERENCES:

1. Coal Mining, S. Mathur, Sahyog Publishers, 2008.
2. Elements of Mining Technology VOL III, D.J.Desmukh, Nagpur Denett Publishers, 2014.
3. Modern Coal Mining, S.K. Das, Lovely Prakashan, 1994.
4. Advanced Coal Mining, RT Deshmukh & B.Borovjev
5. Universal Mining School Volume, T. S. Southern Ltd, 1883.
6. Coal Mine Ground Control, S S Peng, Society for Mining Metallurgy; 3rd edition, 2008.
7. SME Mining Engineering Hand Book Vol.I & II, 2nd Edition, Society for Mining, Metallurgy, and Exploration; A.B. Cummins, I.A Given, 2nd edition, 1992.
8. Strata Control in Mineral Engineering by Z. T., Bieniawski, 1987.

TH:4(B)- MINING TECHNOLOGY

L	T	P		
3	0	0		**Course Code: MIEPE202B (TH 4)**
Total Contact Hours				**Theory Assessment**
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam 70
				Progressive Assessment 30
Pre-Requisite		**: Nil**		
Credit		**3**		Category of Course: PE

RATIONALE:
The student of Mining must be aware of the Mineral Industry in the country and the Departments, which deal with mineral exploration, exploitation, safety, conservation and control of the mining industry. All technical definitions and terminologies connected with above are included here, as the students at this stage must be acquainted with these to cope up with the contents at later stage. Blasting is an important operation in all the mining operations. Knowledge of all the types of explosives, their properties and selection for different conditions/situation types of detonator/fuses etc is a must for them. Also, it is essential for a mining engineer to understand systems of support of the mine workings. These all aspects have been included in this course.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

- State various organizations engaged in coal and noncoal mining, their role and functions.
- Identify various technical terms, operations involved in coal & noncoal mining.
- Describe the properties of explosives, procedure of conducting shot firing operation in underground coalmines with due regards to safety.
- Explain the procedure of erection of temporary supports in underground coalmines.
- Discuss the major method of extraction of coal used in underground coal mines, their conditions of applicability.

COURSE CONTENT DETAILS:

Unit No.	Topics for practice	Time Allotted (Hrs.)
I	**Introduction to Mineral & Important Mining Organizations:** Definition of minerals, Uses of important minerals mined, Important Organizations involved like DGMS, IBM, GSI, CIL, MECL, CIMFR, CMPDIL etc their role and functions.	**6**
II	**Mining Terminology and Definition:** Common terminologies used in coal mining, Common terminologies used in metal mining, Common terminologies used in mine ventilation and environment, Common terminologies used in mine supports, Simple definition, explanation, purposes and sketches	**9**

III	**Explosives and Accessories:** Common explosive bases, Properties of Explosives, High Explosive and Low explosive, their comparison. Permitted explosives their types, composition, properties, uses, advantages and disadvantages. Brand names of some commonly used explosive of each type. A detonator, common types of detonators, plain detonators, instantaneous and delay action detonators their construction, uses, comparison etc. low tension and high-tension detonators, Safety fuses, detonating cords, detonating relays. Exploders	**6**
IV	**Shot Firing:** Drilling patterns for shot firing on machine cut face, in stone drift etc., Shot Firing tools, Face preparation for shot firing, Preparation of priming charge, charging of hole in coal and rock in underground working only, Direct and inverse initiation, shot firing circuits, procedure of shot firing of holes in gassy mine, precautions. Simultaneous & delay firing, Solid blasting, conditions to be satisfied before doing solid blasting, advantages of solid blasting, drilling patterns used with solid blasting	**9**
V	**Safety in Shot firing operation**: Explosive required for blasting in coal/rock. Powder factor, detonator factor. Precaution to improve blasting results. Misfires, causes, remedy and method of relieving dealing with misfires, blown out shots, blown through shots causes and precautions. Purpose of stemming, Stemming materials used for shot firing, water ampoules for stemming. Storage of explosives, Magazines Disposal of outdated explosives.	**6**
VI	**Introduction to coal mining method**: Classifications of method of working, Board & Pillar , Open cast method. Long wall. Applicability condition for selection of each methods of working. Layout of each method. Advantages & disadvantages	**9**
	Tota	**45**

REFERENCES:

1. G.K. Pradhan Explosive and Blasting Techniques Publisher 1996 1993 S.K. Das
2. Explosives and Blasting Techniques Mintech publication Bhubaneshwar. Lovely prakashan Dhanbad.
3. D.J. Deshmukh Elements of Mining Technology Vol.- I 1995 Central techno publication, Nagpur

TH:5(A)- SPECIAL UNDERGROUND MINING

L	T	P		
3	0	0		**Course Code: MIEPE204A (TH 5)**
Total Contact Hours				**Theory Assessment**
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam 70
				Progressive Assessment 30
Pre-Requisite		**: Nil**		
Credit		**3**		Category of Course: PE

RATIONALE:

It is important for the Mining engineers to learn about various special methods practiced in underground mines. This course takes care of all such details.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

- Describe Bord & Pillar method using Continuous Miner.
- Identify mining in thick and thin seams.
- Explain hydraulic mining method.
- Describe the methods in underground coal gasification.
- Identify the basics of the highwall mining method.

COURSE CONTENT DETAILS:

Unit no.	Content	Time allotted (hrs.)
I	**Bord & Pillar method using Continuous Miner:** Formation and extraction of pillars by Bord & Pillar method using Continuous Miner - Split and Fender method, Wongawilli method, Rib pillar extraction method, Statutory provisions regarding formation and extraction of pillars by Bord & Pillar method using Continuous Miner, Machineries used in Bord and Pillar working using Continuous Miner– Continuous Miner, Shuttle Car/ Ram Car, Rock Bolters (Twin/ Quad Bolter etc.), Feeder Breaker, LHD – operational aspects only, Simple layouts of formation and extraction in Bord and Pillar method using Continuous Miner, Case studies of Bord & Pillar mining method using Continuous Miner in India	12
II	**Mining of thick and thin seams:** Problems of mining thick seams; Longwall based multi-slice methods: Inclined slicing, horizontal slicing and cross-slicing in ascending and descending sequence, Under winning methods: sub-level caving, integral caving, Longwall Top Coal Caving, Blasting Gallery Method, Problems in Mining thin seams, Equipment and methods for thin seam extraction.	9
III	**Hydraulic Mining of Coal:** Conditions suitable for hydraulic Mining of Coal, Hydraulic Mining Operation, Layout of workings for hydraulic mining of moderately thick seams.	9
IV	**Underground Coal Gasification (UGC);** Conditions suitable for Underground Coal Gasification, Basic principle and technology of underground coal gasification, Advantage and disadvantage of UCG, Scope of application of UCG in Indian conditions.	9
V	**Highwall Mining**: Introduction, Applicability and Method, Scope of application of Highwall Mining in Indian conditions	6
	Total	**45**

REFERENCES:

1. Singh, T. N., Underground winning of Coal, Oxford and IBH, New Delhi, 1992
2. Statham, I. C. F., Coal Mining Practice, Caxton eastern agencies, Calcutta, Reprint, 1964
3. Das, S. K., Modern Coal Mining Technology, Lovely Prakashan, Dhanbad, 1992
4. Singh, R. D., Principles & Practices of Modern Coal Mining, New Age International, New Delhi, 1997
5. Peng, S. S. and Chiang, H. S., Longwall Mining, John Willey and Sons, New York, 1992.

TH:5(B)- MINE LEGISLATION AND GENERAL SAFETY -I

L	T	P		
3	0	0		**Course Code: MIEPE204B (TH 5)**
Total Contact Hours				**Theory Assessment**
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam 70
				Progressive Assessment 30
Pre-Requisite		**: Nil**		
Credit		**3**		Category of Course: PE

RATIONALE:

Mining operations involve complex processes and mechanisms. Accidents may occur if appropriate safety measures are not taken care. It is very important for the mining engineer to be thoroughly conversant with various acts and rules framed for providing safety to workers.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

- Describe various aspects of Mines Act 1952.
- Describe various aspects of Mines Rule 1955.
- Describe various aspects of Coal Mines Regulations 2017.
- Describe various aspects of Mines Rescue Rules 1985.
- Describe various aspects of Indian Explosive Rules 2008.
- Describe various aspects of Central Electricity Authority 2010.

COURSE CONTENT DETAILS:

Unit No.	Content	Time Allotted (Hrs.)
I	**Mines Act 1952 & Mines Rules 1955** Mines Act: Important definition: Adolescent, adult, child, Employed, Mine, Open cast working, Relay, Shift, Serious bodily injury. Provisions under chapter V, Provision for health and safety. Provisions regarding leave with wages, Act 49 to 56 .Hours & Limitations of Employment, act 28 to 48.Mines rules: Provisions regarding health & sanitation, first aid and medical appliances. Mines Rules- Provisions connected with leave with wages and over time and welfare amenities. Employment of persons, Rule 46 to 52	**9**
II	**Coal Mines Regulations: Important definitions:** Duties and responsibilities of workman, competent person & officials. Provisions of Reg. 38, 39, 43, 44, 45, 46, 48, 56 Planes and sections Reg. 58, 59, 61, 63.Means of access & egress. Reg. 66 to 70 Provisions regarding winding in shaft Reg. 71 to 86. Transport of men & material Reg. 88, 89,90,91,92,93,94,95 mine working Reg. to 115 Precautions against dangers from the dust, gas & water .Reg. 116 to 128. Ventilation Reg. 130 to 149 Provisions regarding lighting and safety lamp. Reg. 150 to 158. Explosives & Blasting Reg. 158 to 180 Provisions regarding machinery, plant & equipment and important provisions under chapter on miscellaneous.	**9**

III	**Mine accidents** : Basic concept and their classification , accident costs, accident report, procedure for conducting an enquiry to ascertain the causes of accidents, procedure for investigating and reporting mine accidents, accident proneness, Industrial fatigue, fatality rate, frequency rate, severity rate, role of supervisor in accident prevention, statistical analysis of accidents, accident statistics- its need and method of data processing , Effect of accidents in productivity.	**9**
IV	**Mine Rescue rules 1985:** Explain Various provision MRR 1985	**9**
V	**Indian Explosive rule 2008** Discuss various provisions of Indian Explosive rules	**9**
	Tota	**45**

REFERENCES:

1 Mines Act, 1952.
2 Mines Rules, 1955.
3 Coal Mine Regulations, 2017.
4 Mines Rescue Rules, 1985.
5 Indian Explosive Rules, 2008.

TH:5(C)- ADVANCED MINES SURVEY

L	T	P		
3	0	0		**Course Code: MIEPE204C (TH 5)**
Total Contact Hours				**Theory Assessment**
Theory		: 45Hrs	**Total Marks: 100**	End Term Exam 70
				Progressive Assessment 30
Pre-Requisite		**: Nil**		
Credit		**3**		Category of Course: PE

RATIONALE:

A Mining engineer entrusted with the responsibility of supervising mine survey works should be through conversant with the latest developments techniques employed in mine surveying.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

- Explain the fundamental concepts of Spherical Trigonometry.
- Describe the important ideas of File Astronomy.
- Explain the essential elements of Photogrametry.
- Describe the fundamental concepts of Global Positioning System.
- Explain the important notions of Total Station

COURSE CONTENT DETAILS:

Unit No.	Content	Time Allotted (Hrs.)
I	**Spherical Trigonometry:** Common terms used in Spherical Trigonometry like Sphere. Great circle, Small circle, Side of a triangle, Angle of a Triangle, Spherical axes, Spherical Triangle, Right Angled Triangle, Rectangular to Spherical coordinates. Convergence of meridian and parallel of latitude.	**9**
II	**Field Astronomy:** Terms used in field astronomy like, Celestial Sphere, Celestial Latitude, Celestial Longitude, Azimuth, Hour angle, Declination, Altitude, Zenith, Nadir, Right Ascension, Celestial Meridian, Celestial Equator, Zenith Distance, Vertical Circle, Celestial Horizon. Astronomical Triangle etc. Astronomical coordinates for heavenly bodies. Apparent time, Meantime, Sidereal time, Standard Time, Relation between different types of times. Latitude , Longitude, Time and azimuth of a place.	**12**
III	**Element of Photogrammetry:** Photo theodolite, Camera axis, Picture Plane, Principal points, Focal Length, Nodal Point, Prospective centre, Principal Distance, Principal Plane, Print, Isocentre in terrestrial Photogrammetry. Fundamental principles behind stereo phtogrammetry. Vertical photograph, Tilted Photograph, Oblique photograph, Prospective projection, Explosure station, Flying height focal length, Principal Point, Nadir Point, Ground	**12**

	Nadir Point, Till, Principle plane, Principle Line, Isocentre, Azimuth of Principle Plane, Horizontal Point. Find out the scale of Photography.	
IV	**Global Positioning System:** Global Positioning System. Principle of working of the system in brief, Application of GPS in Mining Engineering.	**6**
V	**Total Station:** Different components of Total Station, Applications of Total Station in Mines.	**6**
	Tota	**45**

REFERENCES:

1. Surveying Volume –III, Dr. B. C. Punmia, Laxmi Publication, 1990.
2. Modern Concepts of Mine Surveying. Vol-II by Alam Chand, News Sketch Press, Dhanbad.

PR:4- MINOR PROJECT

L	T	P		
0	0	4		**Course Code: PR 202**
Total Contact Hours				**Project Assessment**
Theory		: 60Hrs	**Total Marks: 100**	End Exam 30
				Progressive Assessment 70
Pre-Requisite		**: Nil**		
Credit		**2**		Category of Course : Project

RATIONALE:

A Minor project generally requires a larger amount of effort and more independent work than that involved in a normal assignment. It requires students to undertake their own fact-finding and analysis. The students will select the topic, perform and design work. Minor project is as preparation for the students to take on more responsibilities and bigger project in the future. It is a learning experience, which aims to provide students with the opportunity to synthesize knowledge from different areas of learning, and critically and creatively apply it to real life situations. The leadership quality, co-ordination of job and maintaining good communal harmony is an important factor of this type of activity.

LEARNING OUTCOMES:

After completion of the course, the students will be able to

- Plan a Minor Project
- Execute a Minor Project with team.
- Implement hardware/software/analytical/numerical techniques, etc. based on project requirements.
- Optimize time related works through sharing of work responsibility
- Develop cost awareness and utilization of fund.
- Prepare a technical report on the project.

GUIDELINES FOR MINOR PROJECT

Unit No.	Topic/Sub-Topic
I	○ Minimum three and maximum five students can form a group for the minor project.
II	○ Project type can include • Development of a simple prototype system/product. • Investigation of performance of some systems using experimental method • Analysis of components/systems/devices using suitable software • Investigation of optimum process/material for product development using market survey.

	• Solution for society/industry problems
III	○ Project domain may not be limited to the specific area / discipline.
IV	○ Project report to be prepared and submitted by the students with following components: 1. Title 2. Objectives 3. Relevance and significance 4. Methodology 5. Analysis-Simulation/experimentation/survey/testing etc. 6. Result and Discussion 7. Conclusion

ESSENCE OF INDIAN KNOWLEDGE AND TRADITION

L	T	P		
2	0	0		**Course Code: AU 202**
Total Contact Hours				**Theory Assessment**
Theory		: 30Hrs	**Total Marks:0**	End Term Exam 0
				Progressive Assessment 0
Pre-Requisite		**: Nil**		
Credit		**0**		Category of Course : AU

RATIONALE:

Considering the need of protecting Indian knowledge and tradition, the diploma level students of Automobile Engineering should be facilitated the concepts Indian traditional knowledge and to make them understand the importance of roots of knowledge system and methods of application in today's life and how to protect traditional knowledge system. Interpretation of the concepts of Intellectual property to protect the traditional knowledge as well as importance of Traditional knowledge in Agriculture and Medicine must be known.

LEARNING OUTCOMES:

After completion of the course, the students will be able to**:**

- Understand the foundational principles of Indian knowledge systems by exploring the Vedas, Upavedas, Vedangas, and their interrelation with ancient and modern disciplines.
- Develop an appreciation for the integration of traditional Indian practices with modern science, focusing on holistic health care, yoga, and sustainable living practices.
- Analyze case studies to evaluate the practical applications of Indian knowledge systems in modern technological and scientific domains, including AI and ML.
- Foster interdisciplinary thinking by bridging ancient wisdom with contemporary educational and technological frameworks.

DETAILED COURSE CONTENTS:

Unit No.	Topic/Sub-Topic	Allotted Time (Hours)
I	Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge (Unani / Siddha/ Ayurveda), Indigenous Knowledge (IK), characteristics, traditional knowledge vis-a-vis indigenous knowledge, traditional knowledge of Odisha	7
II	Protection of traditional knowledge (TK): The need for protecting traditional knowledge, Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.	7

III	Legal framework and TK: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act); The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016.	6
IV	Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, Geographical Indications (GI).	4
V	Traditional Knowledge in Different Sectors: Traditional knowledge and engineering, Traditional medicine system, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK	6

REFERENCES:

1. Cultural Heritage of India- Course Material by V. Sivaramakrishna Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014.
2. Modern Physics and Vedant by Swami Jitatmanand, Bharatiya Vidya Bhavan.
3. The wave of Life by Fritzof Capra
4. Tao of Physics by Fritzof Capra
5. Tarkasangraha of Annam Bhatta, Inernational by V N Jha Chinmay Foundation, Velliarnd, Amaku,am
6. Science of Consciousness Psychotherapy and Yoga Practices by RN Jha Vidyanidhi Prakasham, Delhi, 2016

CURRICULLUM OF 5TH SEMESTER

For

DIPLOMA IN MECHANICAL ENGINEERING

(Effective FROM 2020-21 Sessions)

STATE COUNCIL FOR TECHNICAL EDUCATION & VOCATIONAL TRAINING, ODISHA, BHUBANESWAR

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA									
TEACHING AND EVALUATION SCHEME FOR 5th Semester (Mechanical.) (wef 2020-21)									
Subject Number	Subject Code	Subject	Periods/week			Evaluation Scheme			
			L	T	P	Internal Assessment/ Sessional	End Sem Exams	Exams (Hours)	Total
		Theory							
Th.1		Entrepreneurship and Management & Smart Technology	4		-	20	80	3	100
Th.2		Design of Machine elements	4		-	20	80	3	100
Th.3		Hydraulic Machines &Industrial Fluid Power	4		-	20	80	3	100
Th.4		Mechatronics	4			20	80	3	100
Th.5		Refrigeration and air-conditioning	4			20	80	3	100
		Total	20			100	400	-	500
		Practical							
Pr.1		Refrigeration and Air conditioning lab	-	-	4	25	50	3	75
Pr.2		Hydraulic machines &Industrial Fluid power lab	-	-	4	25	50	3	75
Pr.3		CAD/CAM LAB	-	-	4	25	50	3	75
Pr.4		Project Work Phase -I		-	4	25	-	-	25
		Student Centered Activities (SCA)			3				
		Total	-	-	*19*	*100*	*150*	-	*250*
		Grand Total	**20**	**-**	**19**	**200**	**550**	**-**	**750**
Abbreviations: L-Lecturer, T-Tutorial, P-Practical. Each class is of minimum 55 minutes duration									
Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%									
SCA shall comprise of Extension Lectures/ Personality Development/ Environmental issues /Quiz /Hobbies/ Field visits/ cultural activities/Library studies/Classes on MOOCS/SWAYAM etc. ,Seminar and SCA shall be conducted in a section.									
There shall be 1 Internal Assessment done for each of the Theory Subject. Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester									

Th1. ENTREPRENEURSHIP and MANAGEMENT & SMART TECHNOLOGY

(Common to All Branches)

Theory	**4 Periods per week**	**Internal Assessment**	**20 Marks**
Total Periods	**60 Periods**	**End Sem Exam**	**80 Marks**
Examination	**3hours**	**Total Marks**	**100Marks**

Topic Wise Distribution of Periods

Sl No.	Topic	Periods
1	Entrepreneurship	10
2	Market Survey and Opportunity Identification(Business Planning)	8
3	Project report Preparation	4
4	Management Principles	5
5	Functional Areas of Management	10
6	Leadership and Motivation	6
7	Work Culture, TQM & Safety	5
8	Legislation	6
9	Smart Technology	6
	TOTAL	60

RATIONALE

In the present day scenario, it has become imperative to impart entrepreneurship and management concepts to students, so that a significant percentage of them can be directed towards setting up and managing their own small enterprises. It may be further added that an entrepreneurial mind set with managerial skill helps the student in the job market. The students can also be introduced with Startup and Smart Technology concept, which shall radically change the working environment in the coming days in the face of Industry 4.0

In this subject, the Students shall be introduced/ exposed to different concepts and Terminologies in brief only, so that he/she can have broad idea about different concepts/items taught in this subject. Solving numerical problem on any topic/item is beyond the scope of this subject.

OBJECTIVES

After undergoing this course, the students will be able to :

- Know about Entrepreneurship, Types of Industries and Startups
- Know about various schemes of assistance by entrepreneurial support agencies
- Conduct market survey
- Prepare project report
- know the management Principles and functional areas of management
- Inculcate leadership qualities to motivate self and others.
- Maintain and be a part of healthy work culture in an organisation.
- Use modern concepts like TQM
- Know the General Safety Rules
- Know about IOT and its Application in SMART Environment.

DETAILED CONTENTS

1. **Entrepreneurship**

- Concept /Meaning of Entrepreneurship
- Need of Entrepreneurship
- Characteristics, Qualities and Types of entrepreneur, Functions
- Barriers in entrepreneurship
- Entrepreneurs vrs. Manager
- Forms of Business Ownership: Sole proprietorship, partnership forms and others
- Types of Industries, Concept of Start-ups
- Entrepreneurial support agencies at National, State, District Level(Sources): DIC, NSIC,OSIC, SIDBI, NABARD, Commercial Banks, KVIC etc.
- Technology Business Incubators (TBI) and Science and Technology Entrepreneur Parks

2. **Market Survey and Opportunity Identification (Business Planning)**

- Business Planning
- SSI, Ancillary Units, Tiny Units, Service sector Units
- Time schedule Plan, Agencies to be contacted for Project Implementation
- Assessment of Demand and supply and Potential areas of Growth
- Identifying Business Opportunity
- Final Product selection

3. **Project report Preparation**

- Preliminary project report
- Detailed project report, Techno economic Feasibility
- Project Viability

4. **Management Principles**

- Definitions of management
- Principles of management
- Functions of management (planning, organising, staffing, directing and controlling etc.)
- Level of Management in an Organisation

5. **Functional Areas of Management**

a) Production management
    - Functions, Activities
    - Productivity
    - Quality control
    - Production Planning and control

b) Inventory Management
    - Need for Inventory management
    - Models/Techniques of Inventory management

c) Financial Management
    - Functions of Financial management
    - Management of Working capital
    - Costing (only concept)
    - Break even Analysis
    - Brief idea about Accounting Terminologies: Book Keeping, Journal entry, Petty Cash book, P&L Accounts, Balance Sheets(only Concepts)

d) Marketing Management
    - Concept of Marketing and Marketing Management
    - Marketing Techniques (only concepts)
    - Concept of 4P s (Price, Place, Product, Promotion)

e) Human Resource Management
- Functions of Personnel Management
- Manpower Planning, Recruitment, Sources of manpower, Selection process, Method of Testing, Methods of Training & Development, Payment of Wages

6. **Leadership and Motivation**

a) Leadership

- Definition and Need/Importance
- Qualities and functions of a leader
- Manager Vs Leader
- Style of Leadership (Autocratic, Democratic, Participative)

b) Motivation
- Definition and characteristics
- Importance of motivation
- Factors affecting motivation
- Theories of motivation (Maslow)
- Methods of Improving Motivation
- Importance of Communication in Business
- Types and Barriers of Communication

7. **Work Culture, TQM & Safety**
- Human relationship and Performance in Organization
- Relations with Peers, Superiors and Subordinates
- TQM concepts: Quality Policy, Quality Management, Quality system
- Accidents and Safety, Cause, preventive measures, General Safety Rules , Personal Protection Equipment(PPE)

8. **Legislation**
a) Intellectual Property Rights(IPR), Patents, Trademarks, Copyrights
b) Features of Factories Act 1948 with Amendment (only salient points)
c) Features of Payment of Wages Act 1936 (only salient points)

9. **Smart Technology**
- Concept of IOT, How IOT works
- Components of IOT, Characteristics of IOT, Categories of IOT
- Applications of IOT- Smart Cities, Smart Transportation, Smart Home, Smart Healthcare, Smart Industry, Smart Agriculture, Smart Energy Management etc.

Syllabus to be covered before IA: Chapter 1,2,3,4

RECOMMENDED BOOKS

1. Entrepreneurship Development and Management by R.K Singhal, Katson Books., New Delhi
2. Entrepreneurship Development and Management by U Saroj and V Mahendiratta, Abhishek Publications, Chandigarh
3. Entrepreneurship Development and Management by Vasant Desai, Himalaya Pub.House
4. Industrial Engineering and Management by O.P Khanna ,Dhanpat Rai and Sons
5. Industrial Engineering and Management by Banga and Sharma, Khanna Publications
6. Internet of Things by Jeeva Jose, Khanna Publications, New Delhi
7. Online Resource on Startups and other concepts
8. https://www.fundable.com/learn/resources/guides/startup

TH.2 DESIGN OF MACHINE ELEMENTS

Name of the Course: Diploma in MECHANICAL ENGINEERING			
Course code:		**Semester**	**5th**
Total Period:	**60**	**Examination**	**3 hrs.**
Theory periods:	**4 P/W**	**I.A:**	**20**
Maximum marks:	**100**	**End Semester Examination:**	**80**

A. RATIONALE:

Machine design is the art of planning or devising new or improved machines to accomplish specific purposes. Idea of design is helpful in visualizing, specifying and selection of parts and components which constitute a machine. Hence all mechanical engineers should be conversant with the subject.

B. COURSE OBJECTIVES

At the end of the course the students will be able to

1. Understanding the behaviours of material and their uses.
2. Understanding the design of various fastening elements and their industrial uses.
3. Understanding the different failures of design elements.
4. Understanding the change of design to accomplish the different field of applications.
5. Design shafts, keys, couplings required for power transmission.
6. Design closed coil helical spring

C. CHAPTER WISE DISTRIBUTION OF PERIORDS

Sl.No.	Topic	Periods
01	INTRODUCTION	12
02	DESIGN OF FASTENING ELEMENTS	12
03	DESIGN OF SHAFT AND KEYS	12
04	DESIGN OF COUPLING	12
05	DESIGN OF CLOSED COIL HELICAL SPRING	12
	TOTAL	60

D. COURSE CONTENTS

1.0 Introduction:

1.1 Introduction to Machine Design and Classify it.
1.2 Different mechanical engineering materials used in design with their uses and their mechanical and physical properties.
1.3 Define working stress, yield stress, ultimate stress & factor of safety and stress –strain curve for M.S & C.I.
1.4 Modes of Failure (By elastic deflection, general yielding & fracture)
1.5 State the factors governing the design of machine elements.
1.6 Describe design procedure.

2.0 Design of fastening elements:

2.1 Joints and their classification.
2.2 State types of welded joints .
2.3 State advantages of welded joints over other joints.
2.4 Design of welded joints for eccentric loads.
2.5 State types of riveted joints and types of rivets.
2.6 Describe failure of riveted joints.
2.7 Determine strength & efficiency of riveted joints.
2.8 Design riveted joints for pressure vessel.
2.9 Solve numerical on Welded Joint and Riveted Joints.

3.0 Design of shafts and Keys:

3.1 State function of shafts.
3.2 State materials for shafts.
3.3 Design solid & hollow shafts to transmit a given power at given rpm based on
   a) Strength: (i) Shear stress, (ii) Combined bending tension;
   b) Rigidity: (i) Angle of twist, (ii) Deflection, (iii) Modulus of rigidity
3.4 State standard size of shaft as per I.S.
3.5 State function of keys, types of keys & material of keys.
3.6 Describe failure of key, effect of key way.
3.7 Design rectangular sunk key considering its failure against shear & crushing.
3.8 Design rectangular sunk key by using empirical relation for given diameter of shaft.
3.9 State specification of parallel key, gib-head key, taper key as per I.S.
3.10 Solve numerical on Design of Shaft and keys.

4.0 Design of Coupling:

4.1 Design of Shaft Coupling
4.2 Requirements of a good shaft coupling
4.3 Types of Coupling.
4.4 Design of Sleeve or Muff-Coupling.
4.5 Design of Clamp or Compression Coupling.
4.6 Solve simple numerical on above.

5.0 Design a closed coil helical spring:

5.1 Materials used for helical spring.
5.2 Standard size spring wire. (SWG).
5.3 Terms used in compression spring.
5.4 Stress in helical spring of a circular wire.
5.5 Deflection of helical spring of circular wire.
5.6 Surge in spring.
5.7 Solve numerical on design of closed coil helical compression spring.

Syllabus covered up to I.A-Chapters 1,2 &3

LEARNING RESOURCES

SL.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER
01	PANDYA AND SHAH	MACHINE DESIGN	CHAROTAR PP
02	R.S.KHURMI &J.K.GOPTA	A TEXT BOOK OF MACHINE DESIGN	S.CHAND
03	P.C.SHARMA &D.K AGRAWAL	A TEXT BOOK OF MACHINE DESIGN	S.K.KATARIYA
04	V.B.BHANDARI	DESIGNOF MACHINE ELEMENTS	TMH
05	S.MD.JALAUDEEN	DESIGN DATA BOOK	ANURADHA PUBLICATION

TH.3 HYDRAULIC MACHINES &INDUSTRIAL FLUID POWER

Name of the Course: Diploma in MECHANICAL ENGINEERING			
Course code:		**Semester**	**5TH**
Total Period:	**60**	**Examination**	**3 hrs.**
Theory periods:	**4 P/W**	**Class Test:**	**20**
Maximum marks:	**100**	**End Semester Examination:**	**80**

A. RATIONALE:

Use of fluids can be realized by a group of machines called hydraulic machine and use of hydraulic control and pneumatic control system in automation and in earth movers.

B. COURSE OBJECTIVES:

At the end of the course the students will be able to

1.Distinguish the working principle of pumps and turbines
2.Explain the working of centrifugal pumps and gear pumps.
3.Compare pneumatic system with hydraulic system.
4.Draw pneumatic circuits for industrial application.
5.State the properties of hydraulic system.
6.Develop hydraulic circuit for machine tool operation.

C. CHAPTERWISE DISTRIBUTION OF PERIORDS.

SL.NO	TOPICS	PERIORDS
01	HYDRAULIC TURBINES	15
02	CENTRIFUGAL PUMPS	05
03	PNEUMATIC SYSTEM	20
04	HYDRAULIC SYSTEM	20
	TOTAL	60

D.COURSE CONTENTS

1.0 HYDRAULIC TURBINES.

1.1 Definition and classification of hydraulic turbines
1.2 Construction and working principle of impulse turbine.
1.3 Velocity diagram of moving blades, work done and derivation of various efficiencies of impulse turbine.
1.4 Velocity diagram of moving blades, work done and derivation of various efficiencies of Francis turbine.
1.5 Velocity diagram of moving blades, work done and derivation of various efficiencies of Kaplan turbine

1.6 Numerical on above
1.7 Distinguish between impulse turbine and reaction turbine.

2.0 CENTRIFUGAL PUMPS

2.1 Construction and working principle of centrifugal pumps
2.2 work done and derivation of various efficiencies of centrifugal pumps.
2.3 Numerical on above

3.0 RECIPROCATING PUMPS

.
3.1 Describe construction & working of single acting reciprocating pump.
3.2 Describe construction & working of double acting reciprocating pump.
3.3 Derive the formula foe power required to drive the pump (Single acting & double acting)
3.5 Define slip.
3.5 State positive & negative slip & establish relation between slip & coefficient of discharge.
3.6 Solve numerical on above

4.0 PNEUMATIC CONTROL SYSTEM

4.1Elements –filter-regulator-lubrication unit
4.2 Pressure control valves

4.2.1 Pressure relief valves
4.2.2 Pressure regulation valves

4.3 Direction control valves

4.3.1 3/2DCV,5/2 DCV,5/3DCV
4.3.2 Flow control valves
4.3.3. Throttle valves

4.4 ISO Symbols of pneumatic components

4.5. Pneumatic circuits

4 .5.1 Direct control of single acting cylinder
4.5.2 Operation of double acting cylinder
4.5.3 Operation of double acting cylinder with metering in and metering out control

5.0 HYDRAULIC CONTROL SYSTEM

5.1 Hydraulic system, its merit and demerits

5.2 Hydraulic accumulators

5.3.1 Pressure control valves
5. 3.2 Pressure relief valves
5.3.3 Pressure regulation valves

5.3 Direction control valves
5.3.1 3/2DCV,5/2 DCV,5/3DCV
5.3.2 Flow control valves
5.3.3 Throttle valves

5.4 Fluid power pumps

5.4.1 External and internal gear pumps
5.4.2 Vane pump
5.4.3 Radial piston pumps

5.5 ISO Symbols for hydraulic components.

5.6 Actuators

5.7 Hydraulic circuits

5.7.1 Direct control of single acting cylinder
5.7.2 Operation of double acting cylinder
5.7.3 Operation of double acting cylinder with metering in and metering out control

5.8 Comparison of hydraulic and pneumatic system

Syllabus to be covered up to I.A –CHAPTER 1.,2, &3

LEARNING RESOURCES

SL.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER
01	DR.JAGDISH LAL	HYDRAULIC MACHINES	METROPOLITAN BOOK CO
02	ANDREW	HYDRAULICS	
03	K SHANMUGA, SUNDARAM	HYDRAULIC &PNEUMATIC CONTROL	S.CHAND
04	MAJUMDAR	HYDRAULIC &PNEUMATIC CONTROL	TMH
05	J.F. BLACKBURN, G.REETHOF &J.L SHEARER	FLUID POWER CONTROL	

TH.4 MECHATRONICS

Name of the Course: Diploma in Mechanical Engg.			
Course code:		Semester	5th
Total Period:	60	Examination	3 hrs.
Theory periods:	4 P/W	I.A:	20
Maximum marks:	100	End Semester Examination:	80

A. RATIONALE:

Day by day, engineering and technology experiences a tremendous growth. Mechatronics plays a major role in developing engineering and technology. It can be defined as the applications of electronics and computer technology to control the motions of mechanical systems. With the help of microelectronics and sensor technology, mechatronics systems are providing high levels of precision and reliability.

B. COURSE OBJECTIVES:

At the end of the course the students will be able to

1. To study the definition and elements of mechatronics system.
2. To learn how to apply the principle of mechatronics for the development of productive systems.
3. To learn the CNC technology and applications of mechatronics in manufacturing automation.
4. Define different type of system and Sensors and solve the simple problems.
5. Explain the concept of Mechanical actuation, Electrical actuation and solve the simple problems.
6. Find out the various types of System Models & Input /Output parts and solve the problems.
7. Describe the programmable Logic Controller and develop programme in PLC.
8. To learn the Industrial robotics

C. CHAPTERWISE DISTRIBUTION OF PERIORDS

Sl No.	Topic	Periods
01	Introduction to Mechatronics	05
02	Sensors and Transducers	10
03	Actuators-Mechanical, Electrical	10
04	Programmable logic controllers	15
05	Elements of CNC Machines	15
06	Robotics	05

D.COURSE CONTENTS

1.0 INTRODUCTION TO MECHATRONICS

1.1 Definition of Mechatronics
1.2 Advantages & disadvantages of Mechatronics
1.3 Application of Mechatronics
1.4 Scope of Mechatronics in Industrial Sector
1.5 Components of a Mechatronics System
1.6 Importance of mechatronics in automation

2.0 **SENSORS AND TRANSDUCERS**

2.1Defination of Transducers

2.2 Classification of Transducers

2.3 Electromechanical Transducers

2.4 Transducers Actuating Mechanisms

2.5 Displacement &Positions Sensors
2.6 Velocity, motion, force and pressure sensors.
2.7 Temperature and light sensors.

3.0 ACTUATORS-MECHANICAL, ELECTRICAL

3.1Mechanical Actuators
- 3.1.1 Machine, Kinematic Link, Kinematic Pair
- 3.1.2 Mechanism, Slider crank Mechanism
- 3.1.3 Gear Drive, Spur gear, Bevel gear, Helical gear, worm gear
- 3.1.4 Belt & Belt drive
- 3.1.5 Bearings

3.2 Electrical Actuator
- 3.2.1 Switches and relay
- 3.2.2 Solenoid
- 3.2.3 D.C Motors
- 3.2.4 A.C Motors
- 3.2.5 Stepper Motors
- 3.2.6 Specification and control of stepper motors
- 3.2.7 Servo Motors D.C & A.C

4.0 PROGRAMMABLE LOGIC CONTROLLERS(PLC)

4.1 Introduction

4.2 Advantages of PLC

4.3 Selection and uses of PLC

4.4 Architecture basic internal structures

4.5 Input/output Processing and Programming

4.6 Mnemonics

4.7 Master and Jump Controllers

5.0 ELEMENTS OF CNC MACHINES

5.1 Introduction to Numerical Control of machines and CAD/CAM

5.1.1 NC machines

5.1.2 CNC machines

5.1.3.CAD/CAM

5.1.3.1 CAD

5.1.3.2 CAM

5.1.3.3 Software and hardware for CAD/CAM

5.1.3.4 Functioning of CAD/CAM system

5.1.3.4 Features and characteristics of CAD/CAM system

5.1.3.5 Application areas for CAD/CAM

5.2 elements of CNC machines

5.2.1 Introduction

5.2.2 Machine Structure

5.2.3 Guideways/Slide ways

5.2.3.1 Introduction and Types of Guideways

5.2.3.2 Factors of design of guideways

5.2.4 Drives

5.2.4.1 Spindle drives

5.2.4.2 Feed drive

5.2.5 Spindle and Spindle Bearings

6.0 **ROBOTICS**

6.1 Definition, Function and laws of robotics

6.2Types of industrial robots

6.3 Robotic systems

6.4 Advantages and Disadvantages of robots

Syllabus to be covered up to 1st I.A : Chapters 1,2,3 & 4

LEARNING RESOURCES:

SL.NO.	AUTHOR	TITLE OF THE BOOK	PUBLISHER
1	W. Bolton	Mechatronics	Pearson Education India
2	R.K Rajput	Text book of Mechatronics	S. Chand
3	R. RADHAKRISHNA, S,SUBRAMANIAN	CAD/CAM/CIM	NEW AGE INTERNATIONAL PVT.LTD
4	MIKELL GROVER	CAD/CAM	

Th.5 REFRIGERATION AND AIR CONDITIONING

Name of the Course: Diploma in MECHANICAL ENGINEERING			
Course code:		**Semester**	**5th**
Total Period:	**60**	**Examination**	**3 hrs**
Theory periods:	**4 P/W**	**I.A:**	**20**
Maximum marks:	**100**	**End Semester Examination:**	**80**

A. RATIONALE:

Food Preservation is the basic need of food industry to improve effective utilization of food. Hence the study of Refrigeration and Air-conditioning is essential. Comfort is the basic requirement of customers and machines through air conditioning & hence learning the concept of air-conditioning and methods of air-conditioning facilities quality design of air conditioning.

B. COURSE OBJECTIVE:

At the end of the course the students will be able to

1.Explain the working of open & closed air system of air refrigeration system

2.Describe the working and construction of compressor, Condenser, evaporator, expansion valve used for air conditioning and refrigeration.

3.Explain Vapor Compression refrigeration system.

4.Explain Vapor Absorption refrigeration system.

5.Compare different refrigerants properties.

6.Describe equipment for air conditioning.

7.Explain the cooling load for the given requirement.

C. CHAPTER WISE DISTRIBUTION OF PERIODS

Sl.No.	Topic	Periods
01	**AIR REFRIGERATION CYCLE**	05
02	**SIMPLE VAPOUR COMPRESSION REFRIGERATION SYSTEM**	10
03	**VAPOUR ABSORPTION REFRIGERATION SYSTEM**	07
04	**REFRIGERATION EQUIPMENTS**	08
05	**REFRIGERANT FLOW CONTROLS, REFRIGERANTS & APPLICATION OF REFRIGERANTS**	10
06	**PSYCHOMETRICS &COMFORT AIR CONDITIONING SYSTEMS**	10
07	**AIR CONDITIONING SYSTEMS**	10
	TOTAL	60

D.COURSE CONTENTS

1.0 AIR REFRIGERATION CYCLE.

1.1 Definition of refrigeration and unit of refrigeration.
1.2 Definition of COP, Refrigerating effect (R.E)
1.3 Principle of working of open and closed air system of refrigeration.
1.3.1 Calculation of COP of Bell-Coleman cycle and numerical on it.

2.**0 SIMPLE VAPOUR COMPRESSION REFRIGERATION SYSTEM**

2.1 schematic diagram of simple vapors compression refrigeration system'
2.2 Types
2.2.1 Cycle with dry saturated vapors after compression.
2.2.2 Cycle with wet vapors after compression.
2.2.3 Cycle with superheated vapors after compression.
2.2.4 Cycle with superheated vapors before compression.
2.2.5 Cycle with sub cooling of refrigerant
2.2.6 Representation of above cycle on temperature entropy and pressure enthalpy diagram
2.2.7 Numerical on above (determination of COP,mass flow)

3.0 VAPOUR ABSORPTION REFRIGERATION SYSTEM

3.1 Simple vapor absorption refrigeration system
3.2 Practical vapor absorption refrigeration system
3.3 COP of an ideal vapor absorption refrigeration system
3.4.Numerical on COP.

4.0 REFRIGERATION EQUIPMENTS

4.1 REFRIGERANT COMPRESSORS

4.1.1 Principle of working and constructional details of reciprocating and rotary compressors.

4.1.2 Centrifugal compressor only theory

4.1.3 Important terms.

4.1.4 Hermetically and semi hermetically sealed compressor.

4.2 CONDENSERS

4.2.1 Principle of working and constructional details of air cooled and water cooled condenser
4.2.2 Heat rejection ratio.
4.2.3 Cooling tower and spray pond.

4.3 EVAPORATORS

1.6.1 Principle of working and constructional details of an evaporator.
1.6.2 Types of evaporator.
1.6.3 Bare tube coil evaporator, finned evaporator, shell and tube evaporator.

5.0 REFRIGERANT FLOW CONTROLS, REFRIGERANTS & APPLICATION OF REFRIGERANTS

5.1 EXPANSION VALVES

5.1.1 Capillary tube

5.1.2 Automatic expansion valve

5.1.3 Thermostatic expansion valve

5.2 REFRIGERANTS

5.2.1 Classification of refrigerants

5.2.2 Desirable properties of an ideal refrigerant.

5.2.3 Designation of refrigerant.

5.2.4 Thermodynamic Properties of Refrigerants.

5.2.5 Chemical properties of refrigerants.

5.2.6 commonly used refrigerants, R-11, R-12, R-22, R-134a, R-717

5.2.7 Substitute for CFC

5.3 Applications of refrigeration

5.3.1 cold storage

5.3.2 dairy refrigeration

5.3.3 ice plant

5.3.4 water cooler

5.3.5 frost free refrigerator

6.0 PSYCHOMETRICS &COMFORT AIR CONDITIONING SYSTEMS

6.1 Psychometric terms

6.2 Adiabatic saturation of air by evaporation of water

6.3 Psychometric chart and uses.

6.4 Psychometric processes

6.4.1 Sensible heating and Cooling

6.4.2 Cooling and Dehumidification

6.4.3 Heating and Humidification

6.4.4 Adiabatic cooling with humidification

6.4.5 Total heating of a cooling process

6.4.6 SHF, BPF,

6.4.7 Adiabatic mixing

6.4.8 Problems on above.

6.5 Effective temperature and Comfort chart

7.0 AIR CONDITIONING SYSTEMS

7.1 Factors affecting comfort air conditioning. .
7.2 Equipment used in an air-conditioning.
7.3 Classification of air-conditioning system
7.4 Winter Air Conditioning System
7.5 Summer air-conditioning system.
7.6 Numerical on above

Syllabus to be covered up to I.A- Chapters1.2&3.

LEARNING RESOURCES

SL.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER
01	C.P ARRORA	REFRIGERATION AND AIR CONDITIONING	TMH
02	R.S.KHURMI &J.K.GOPTA	REFRIGERATION AND AIR CONDITIONING	S.CHAND
03	P.L BALLANY	REFRIGERATION AND AIR CONDITIONING	KHANNA PUBLISHER
04	DOMKUNDRA AND ARORA	REFRIGERATION AND AIR CONDITIONING	DHANPAT RAY AND SONS

Pr.1 REFRIGERATION AND AIR CONDITIONING LAB

Name of the Course: Diploma in Mechanical Engg.			
Course code:		Semester	5th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Sessional:	25
Maximum marks:	100	End Semester Examination:	50

COURSE OBJECTIVES

At the end of the course the students will be able to

1.Study the construction features of Domestic Refrigerator, water cooler, Window Air Conditioner, Split Air Conditioner

2.Determining the capacity, COP, of Refrigerator Test Rig, Window air Conditioner, Split Air Conditioner, Water cooler.

3.Evacuating the entire system

4.Locating the leakage in refrigerating system

5.Charging of the refrigerating system

List of Practicals

1. Study the construction features of Domestic Refrigerator.
2. Study the construction features of water cooler.
3. Study the construction features of window air conditioner
4. Study the construction features of split air conditioner
5.Determine the capacity and cop of vapour compression Refrigerator test rig
6.Determine the capacity and cop of water cooler
7.Determine the capacity and cop of window air conditioner
8.Determine the capacity and cop of split air conditioner
9. Determine the capacity and cop of vapour absorption Refrigerator test rig.
10.Complete charging of a domestic refrigerator and its leak test.

Pr 2. HYDRAULIC MACHINES &INDUSTRIAL FLUID POWER LAB

Name of the Course: Diploma in Mechanical Engg.			
Course code:		Semester	5th
Total Period:	60	Examination	3 hrs.
Theory periods:	4 P/W	Sessional:	25
Maximum marks:	100	End Semester Examination:	50

COURSE OBJECTIVES

At the end of the course the students will be able to

1.0 Conducting performance test on impulse and reaction turbine

2.0 Conducting performance test on centrifugal pump

3.0 Designing &operating pneumatic circuits

4.0 Designing &operating industrial fluid power circuits

List of Practicals

1.0 Performance test on impulse turbine and to find out the efficiency

2.0 Performance test on Kaplan turbine and to find out the efficiency

3.0 Performance test on Francis turbine and to find out the efficiency

4.0 Performance test on centrifugal pump and to find out the characteristic curves

5.0 Direct operation of single &double acting pneumatic cylinder.

6.0 Operating double acting pneumatic cylinder with quick exhaust valve

7.0 Speed control double acting pneumatic cylinder using metering in and metering out circuits.

8.0 Direct operation of single &double acting hydraulic cylinder

9.0 Direct operation of hydraulic motor

10.0 Speed control double acting hydraulic cylinder using metering in & metering out circuits.

Pr.3 CAD/CAM LAB

Name of the Course: Diploma in Mechanical Engg.			
Course code:		Semester	5th
Total Period:	60	Examination	3 Hrs
Theory periods:	4 P/W	Sessional:	25
Maximum marks:	75	End Semester Examination:	50

OBJECTIVES

At the end of the course the students will be able to

1.To understand the fundamentals and use of CAD.

2.To conceptualize drafting and modelling in CAD.

3.To interpret the various features in the menu of solid modelling package.

4.To synthesize various parts or components in an assembly.

5.Toprepare CNC programmes for various jobs

COURSE CONTENTS

PART-A.

INTRODUCTION:

Part modelling, Datum plane, Datum plane; constraint; dimensioning; extrude; revolve; sweep; protrusion; extrusion; rib; shell; hole; round; chamfer; copy; mirror; assembly; align; orient.

EXERCISES:

2D Drawings of Rectangle, circle, polygon and its dimensioning

3D Drawings of;

1.Gib and cutter joint

2.Screw Jack;

3.Connecting Rod;

4.Bearing Block.

Print the orthographic view from the above assembled 3Ddrawing

PART-B.

CNC Programming and Machining

INTRODUCTION;

1.Study of CNC lathe, milling;

2.Study of international codes; G-Codes and M –Codes

3.Format –Dimensioning methods;

4.Programme writing –Turning Simulator-Milling simulator IS practice-commands menus

5.Editing the programme in the CNC MACHINES;

6.Execute the programme in the CNC machines;

Exercise;

1. Print the programme and make the component in the CNC machine;

2.Using canned cycle-create a part programme for thread cutting, grooving and produce component in the CNC Turning Machine

3.Using Linear interpolation and Circular Interpolation-Create a part programme for grooving and produce component in the CNC Milling Machine

Pr 4. PROJECT WORK (Phase-I)

Course code:		Semester	5th
Total Period:	60	Examination :	-
Theory periods:	4P / week	Sessional Marks	25
		TOTAL Marks	25

RATIONALE

Students' Project Work aims at developing innovative skills in the students whereby they apply the knowledge and skills gained through the course covered in many subjects and Labs, by undertaking a project. The prime emphasis of the project work is to understand and apply the basic knowledge of the principles of mechanical engineering practices in real life situations, so as to participate and manage a large mechanical engineering projects in future. *Entire Project shall spread over 5th and 6th Semester*. Part of the Project covered in 5th Semester shall be named as *Project Phase-I* and balance portion to be covered in 6th Semester shall be named as *Project Phase-II*.

OBJECTIVES

After undergoing the Project Work, the student will be able to:

- Implement the theoretical and practical knowledge and skills gained through various subjects/courses into an application suitable for a real life working environment, preferably in an industrial environment.
- Develop working models or applications and implement these for the actual needs of the community/industry.
- Explain the working of industrial environment and its work ethics.
- Explain what entrepreneurship is and how to become an entrepreneur.
- Identify and contrast gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional knowledge as required.
- Carry out cooperative learning through synchronous guided discussions within the class in key areas, asynchronous document sharing and discussions, as well as prepare collaborative edition of the final project report.
- Find latest ideas on robotics, automation and mechatronics based projects.

General Guidelines

The individual students have different aptitudes and strengths and also areas of interest. Project work, therefore, should match the strengths and interest of the students. For this purpose, students should be asked to identify the type of project work, they would like to execute. The activity of problem identification should begin well in advance (right from beginning of 5th semester). Students should be allotted a problem of interest to him/her as a project work. It is also essential that the faculty of the respective department may have a brainstorming session to identify suitable project assignments for their students. The project assignment can be individual assignment or a group assignment. Preferably there should not be more than 5 students, if the project work is given to a group. The project work identified in collaboration with industry should be preferred.

Following are the broad suggestive areas of project work

- ✓ Automobile based projects.
- ✓ Refrigeration based &Air conditioning based projects.
- ✓ Hydraulic control &Pneumatic control based automation projects
- ✓ Fabrication based projects.
- ✓ Wind mill
- ✓ Solar energy based projects.
- ✓ Thermal power plant using steam.
- ✓ Hydel power dam.
- ✓ Cooling tower.

- ✓ Solenoid based hammer.
- ✓ Unmanned railway crossing.
- ✓ Engine based air compressor.
- ✓ Mobile all round year air conditioner
- ✓ Driverless car.
- ✓ Hybrid motorbike.
- ✓ Any other areas found suitable.
- ✓ Torque testing machine.
- ✓ Spring testing machine.
- ✓ Mechanical sanitizer.
- ✓ Solar powered refrigerator.
- ✓ Door opener.

A suggestive criterion for assessing student performance by the external (preferably person from industry) and internal (teacher) examiner is given in table below:

Sl. No.	**Performance Criteria**
1.	Selection of project assignment
2.	Planning and execution of considerations
3.	Quality of performance
4.	Providing solution of the problems or production of final product
5.	Sense of responsibility
6.	Self expression/ communication/ Presentation skills
7.	Interpersonal skills/human relations
8.	Report writing skills
9	Viva voce

The teachers are free to evolve other criteria of assessment, depending upon the type of project work.

It is proposed that the institute may organize an annual exhibition of the project work done by the students and invite leading Industrial organizations to such an exhibition.

Project Phase-I and Phase-II

The Project work duration shall cover 2 semesters(5th and 6th sem). The Grouping of students, selection of Project, assignment of Project Guide to the Group shall be done in the beginning of 5th sem under Project Phase-I. The students may be allowed to study literature, any existing system and then define the Problem/objective of the Project. Preliminary work upto Design of the system have to be complete in Phase-I. Execution of work may begin in Phase-I depending on the Project. Project Milestones are to be set so that progress can be tracked . In Phase-II Execution of work and Documentation have to be complete. Project Report have to be prepared and complete in Phase-II. All Project reports should be organized uniformly in proper order, irrespective of group. Teacher Guides can make suitable alteration in the components of Task and schedule.

At the end of Project Phase-I in 5th semester there shall be one presentation by each group to mark to progress and also to judge whether the Project is moving in right direction as per the objective of the Project.

EQUIPMENT LIST

REFRIGERATION AND AIR –CONDITIONING LAB

SL.NO	NAME OF THE EQUIPMENTS	QUANTITY
01	Domestic Refrigerator test rig	01 no
02	water cooler test rig	01 no
03	Window Air Conditioner test rig	01 no
04	Split Air Conditioner test rig	01 no
05	Vacuum pump set with accessories	01 no
06	Charging cylinder with accessories	02 nos
07	Halide torch or any leak tester	02 nos
08	Vapour absorption test rig	01

HYDRAULIC MACHINES & INDUSTRIAL FLUID POWER LAB

SL.NO	NAME OF THE EQUIPMENTS	QUANTITY
01	Impulse turbine(PELTON WHEEL) Test Rig with arrangements to find efficiency	01no
02	Kaplan turbine Test Rig with arrangements to find efficiency	01no
03	Francis turbine Test Rig with arrangements to find efficiency	01no
04	Centrifugal pump Test Rig with arrangements to find efficiency	01no
05	Pneumatic Trainer Kit with accessories	02nos
06	Hydraulic Trainer Kit with accessories	01no
07	Manual or Digital Tachometer	05nos

CAD/CAM LAB

SL.NO	NAME OF THE EQUIPMENTS	QUANTITY
01	DESKTOP COMPUTER with UPS	30 no
02	AUTOCAD SOFTWARE 2D/3D	01 each
03	CNC TURNING MACHINE	01 no
04	CNC MILLING MACHINE	01 no
05	PRINTER	02 nos

CURRICULLUM OF 5TH SEMESTER

For

DIPLOMA IN MINING ENGINEERING

(Effective FROM 2020-21 Sessions)

STATE COUNCIL FOR TECHNICAL EDUCATION & VOCATIONAL TRAINING, ODISHA, BHUBANESWAR

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING,ORISSA

TEACHING AND EVALUTION SCHEME FOR 5th Semester Mining Engg. (w e f 2020-21)

SUBJECT NUMBER	SUBJECT CODE	SUBJECT	Periods/Week			Evaluation Scheme			
			L	T	P	Internal assessment /Sessional	End Sem Exam	Exams (Hours)	Total
		Theory							
Th. 1		Entrepreneurship and Management & Smart Technology	4	-	-	20	80	3	100
Th .2		Mine Hazard and Safety	4	-	-	20	80	3	100
Th .3		Mine Legislation and General Safety -I	4	-	-	20	80	3	100
Th .4		Mine Machinery -I	4	-	-	20	80	3	100
Th. 5		Underground Metal Mining	4	-	-	20	80	3	100
		Total	20			100	400		500
		Practical							
Pr .1		Mine Hazard and Safety Lab	-	-	6	50	50	3	100
Pr .2		Mine Machinery -I Lab	-	-	6	50	50	3	100
Pr .3		Project Phase - I	-	-	4	50	-		50
		Student Centred Activities(SCA)	-	-	3	-	-		
		Total			19	150	100		250
		Grand Total	20		19	250	500		750

Abbreviations : L-Lecturer ,T-Tutorial ,P-Practical .Each class is of minimum 55 minutes duration.

Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%

SCA shall comprise of Extension Lectures/Personality Development/Environmental issues /Quiz/Hobbies/Field visits/Cultural Activities/Library Studies/Classes on MOOCS/SWAYAM etc. ,Seminar and SCA shall be conducted in a section.

There shall be 1 Internal Assesment done for each of Theory subject .Sessional Marks shall be total of the performance of individual different jobs/experiments in a subject throughout the semester

Th1. ENTREPRENEURSHIP and MANAGEMENT & SMART TECHNOLOGY

(Common to All Branches)

Theory	**4 Periods per week**	**Internal Assessment**	**20 Marks**
Total Periods	**60 Periods**	**End Sem Exam**	**80 Marks**
Examination	**3hours**	**Total Marks**	**100Marks**

Topic Wise Distribution of Periods

Sl No.	Topic	Periods
1	Entrepreneurship	10
2	Market Survey and Opportunity Identification(Business Planning)	8
3	Project report Preparation	4
4	Management Principles	5
5	Functional Areas of Management	10
6	Leadership and Motivation	6
7	Work Culture, TQM & Safety	5
8	Legislation	6
9	Smart Technology	6
	TOTAL	60

RATIONALE

In the present day scenario, it has become imperative to impart entrepreneurship and management concepts to students, so that a significant percentage of them can be directed towards setting up and managing their own small enterprises. It may be further added that an entrepreneurial mind set with managerial skill helps the student in the job market. The students can also be introduced with Startup and Smart Technology concept, which shall radically change the working environment in the coming days in the face of Industry 4.0

In this subject, the Students shall be introduced/ exposed to different concepts and Terminologies in brief only, so that he/she can have broad idea about different concepts/items taught in this subject. Solving numerical problem on any topic/item is beyond the scope of this subject.

OBJECTIVES

After undergoing this course, the students will be able to :

- Know about Entrepreneurship, Types of Industries and Startups
- Know about various schemes of assistance by entrepreneurial support agencies
- Conduct market survey
- Prepare project report
- know the management Principles and functional areas of management
- Inculcate leadership qualities to motivate self and others.
- Maintain and be a part of healthy work culture in an organisation.
- Use modern concepts like TQM
- Know the General Safety Rules
- Know about IOT and its Application in SMART Environment.

DETAILED CONTENTS

1. **Entrepreneurship**
   - Concept /Meaning of Entrepreneurship
   - Need of Entrepreneurship
   - Characteristics, Qualities and Types of entrepreneur, Functions
   - Barriers in entrepreneurship

- Entrepreneurs vrs. Manager
- Forms of Business Ownership: Sole proprietorship, partnership forms and others
- Types of Industries, Concept of Start-ups
- Entrepreneurial support agencies at National, State, District Level(Sources): DIC, NSIC,OSIC, SIDBI, NABARD, Commercial Banks, KVIC etc.
- Technology Business Incubators (TBI) and Science and Technology Entrepreneur Parks

2. **Market Survey and Opportunity Identification (Business Planning)**

- Business Planning
- SSI, Ancillary Units, Tiny Units, Service sector Units
- Time schedule Plan, Agencies to be contacted for Project Implementation
- Assessment of Demand and supply and Potential areas of Growth
- Identifying Business Opportunity
- Final Product selection

3. **Project report Preparation**

- Preliminary project report
- Detailed project report, Techno economic Feasibility
- Project Viability

4. **Management Principles**
- Definitions of management
- Principles of management
- Functions of management (planning, organising, staffing, directing and controlling etc.)
- Level of Management in an Organisation

5. **Functional Areas of Management**
   a) Production management
      - Functions, Activities
      - Productivity
      - Quality control
      - Production Planning and control
   b) Inventory Management
      - Need for Inventory management
      - Models/Techniques of Inventory management
   c) Financial Management
      - Functions of Financial management
      - Management of Working capital
      - Costing (only concept)
      - Break even Analysis
      - Brief idea about Accounting Terminologies: Book Keeping, Journal entry, Petty Cash book, P&L Accounts, Balance Sheets(only Concepts)
   d) Marketing Management
      - Concept of Marketing and Marketing Management
      - Marketing Techniques (only concepts)
      - Concept of 4P s (Price, Place, Product, Promotion)
   e) Human Resource Management
   - Functions of Personnel Management

- Manpower Planning, Recruitment, Sources of manpower, Selection process, Method of Testing, Methods of Training & Development, Payment of Wages

6. **Leadership and Motivation**

a) Leadership
- Definition and Need/Importance
- Qualities and functions of a leader
- Manager Vs Leader
- Style of Leadership (Autocratic, Democratic, Participative)

b) Motivation
- Definition and characteristics
- Importance of motivation
- Factors affecting motivation
- Theories of motivation (Maslow)
- Methods of Improving Motivation
- Importance of Communication in Business
- Types and Barriers of Communication

7. **Work Culture, TQM & Safety**
- Human relationship and Performance in Organization
- Relations with Peers, Superiors and Subordinates
- TQM concepts: Quality Policy, Quality Management, Quality system
- Accidents and Safety, Cause, preventive measures, General Safety Rules , Personal Protection Equipment(PPE)

8. **Legislation**

a) Intellectual Property Rights(IPR), Patents, Trademarks, Copyrights
b) Features of Factories Act 1948 with Amendment (only salient points)
c) Features of Payment of Wages Act 1936 (only salient points)

9. **Smart Technology**
- Concept of IOT, How IOT works
- Components of IOT, Characteristics of IOT, Categories of IOT
- Applications of IOT- Smart Cities, Smart Transportation, Smart Home, Smart Healthcare, Smart Industry, Smart Agriculture, Smart Energy Management etc.

Syllabus to be covered before IA: Chapter 1,2,3,4

RECOMMENDED BOOKS

1. Entrepreneurship Development and Management by R.K Singhal, Katson Books., New Delhi
2. Entrepreneurship Development and Management by U Saroj and V Mahendiratta, Abhishek Publications, Chandigarh
3. Entrepreneurship Development and Management by Vasant Desai, Himalaya Pub.House
4. Industrial Engineering and Management by O.P Khanna ,Dhanpat Rai and Sons
5. Industrial Engineering and Management by Banga and Sharma, Khanna Publications
6. Internet of Things by Jeeva Jose, Khanna Publications, New Delhi
7. Online Resource on Startups and other concepts
8. https://www.fundable.com/learn/resources/guides/startup

Th.2. MINE HAZARD AND SAFETY

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	5th
Total Periods:	60	Examination	3 hrs
Theory Periods:	4P/week	Internal Assessment	20
Maximum Marks:	100	End Semester Examination	80

RATIONALE

As a Mining Engineer, one must be thoroughly conversant with various sources of mining hazards as also the remedial measures needed to be undertaken to avoid any mishap and able to understand total operation of rescue and recovery.

OBJECTIVES

After completion of the subject, students will be able to:

- Testing of different mine gases. Physiological effect on miners, detection of fire damp by flame safety lamp, explains the method of gas testing by CO-detectors & methanometer.
- Explain how firedamp is emitted in mines.
- Explain causes of mine fires & spontaneous heating.
- Define explosion, explain causes & elaborate necessary steps required for prevention of coal dust & firedamp explosion.
- Define mine inundation, explain causes & elaborate necessary preventive measures required.
- Describe lighting arrangement, lighting standards explain glare & its effect
- Explain the effect of noise & vibration on miners & mine structures & other surface structure.
- Explain rescue and recovery work when mine hazard occurs.

Topic- wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Mine gases & gas testing	6
2	Emission of firedamp in U/g coal mines	6
3	Mine fires & spontaneous heating	10
4	Mine Explosion	10
5	Mine Inundation	8
6	Mine lighting & Illumination	5
7	Noises & Vibration	5
8	Mine Rescue and Recovery	10
	Total	60

COURSE CONTENTS

1. **Mine gases & gas testing**
   - Composition of atmospheric air. Different mine gases, their properties and physical effects .
   - State fire damps, black damp, stink damp, white damp and after damp in mines.
   - Describe flame safety lamp & its working principle.
   - Explain gas testing by flame safety lamp by accumulation test & percentage test.
   - State precaution for gas testing.
   - Describe various parts of flame safety lamp, special features.
   - State limitations of flame safety lamp.

2. **Emission of firedamp in U/g workings**
   - Describe gradual exudation, blower & outbursts of firedamp in U/g workings.

3. **Define fires & spontaneous heating**

   - Define incubation period
   - Define spontaneous heating and its causes and effects.
   - State preventive measures against spontaneous heating.
   - Explain CO/O_2 ratio & CO_2/O_2 ratio.

4. **Mine Explosion**
   - Describe coal dust explosion & fire damp explosion with their causes & prevention.
   - State inflammability of coal dust & fire damp.
   - Explain Coward's diagram.
   - State prevention, suppression & treatment of dust.
   - Describe sampling of dust in Mines.
   - Stone dust barrier.

5. **Mine Inundation**
   - State sources of water in mines & its danger.
   - State precaution against inundation.
   - Describe burnside safety boring apparatus.
   - State precaution while approaching water logged area.
   - Describe water dams- its construction & design. (Without derivation of formula)
   - Explain water danger plan.
   - Statutory provision for working near water body.

6. **Mine lighting & illumination**
   - Define illumination and its units.
   - Standards of lighting at different parts of mine as per mine regulation.

7. **Noise and Vibration .**
   - Explain the effect of noise & vibration on miners & mine structures & other surface structure with respect to statutory provision.

8. **Mine Rescue and Recovery**

   - Proto-IV, Proto-V, Drager BG-174, Self rescuer, Smoke helmet, Gas mask.
   - Construction of Rescue brigade and their role in rescue and recovery operation.
   - Mine Rescue rules 1985 Annexure I,II,III.

SYLLABUS COVERAGE UP TO I.A

Chapter 1,2,3,4

Learning Resourses:		
Sl. No.	Title of the Book	Name of Authors
1	Mine Ventilation	G B Mishra
2	EMT - II	D J Deshmukh
3	Coal Mine Practices	E Mason
4	UMS Vol - I	
5	Coal mine Regulations - 2017	
6	Mine Rescue	M A Ramlu

Th. 3. MINE LEGISLATION & GENERAL SAFETY-I

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	5th
Total Periods:	60	Examination	3 hrs
Theory Periods:	4P/week	Internal Assessment	20
Maximum Marks:	100	End Semester Examination	80

RATIONALE

Since Mining operations involve frequent accidents, it is very important for a mining engineer to be thoroughly conversant with various acts & rules framed for providing safety to workers.

OBJECTIVES

On completion of the course, students will be able to :

- Describe various aspects of Mines Act 1952.
- Describe various aspects of Mines Rule 1955.
- Describe various aspects of Coal Mines Regulations 2017.
- Describe various aspects of Mines Rescue Rules 1985.
- Describe various aspects of Indian Explosive Rules 2008.
- Describe various aspects of Central Electricity Authority 2010.

Topic- wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Mines Act 1952	14
2	Mines Rules 1955	10
3	Coal Mines Regulations 2017	18
4	Mine Rescue Rules 1985	5
5	Indian Explosive Rule 2008	7
6	Central Electricity Authority 2010	6
	Total	60

COURSE CONTENTS

1. **Mines Act 1952**
   - Discuss various provisions of Mines Act 1952.

2. **Mines Rules 1955**
   - Discuss various provisions of Mines Rule 1955.

3. **Coal Mines Regulation 2017**
   - Discuss various Provisions of C.M.R. 2017.

4. **Mines Rescue Rules 1985**
   - Discuss various provisions of Mines Rescue Rules 1985.

5. **Indian Explosive Rules 2008**
   - Discuss various provisions of Indian Explosive Rules 2008.

6. **Central Electricity Authority 2010**
   - Discuss various provisions of Central Electricity Authority 2010.

SYLLABUS COVERAGE UP TO I.A

Chapter 1,2

Learning Resourses		
Sl. No.	Title of the Book	Name of Authors
1	Mines Act - 1952	
2	Mines Rules - 1955	
3	Coal Mine Regulations - 2017	
4	Mines Rescue Rules - 1985	
5	Indian Explosive Rules - 2008	
6	Central Electricity Authority - 2010	

Th.4. MINE MACHINERY – I

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	5th
Total Periods:	60	Examination	3 hrs
Theory Periods:	4P/week	Internal Assessment	20
Maximum Marks:	100	End Semester Examination	80

RATIONALE

It is imperative that a Mining Engineer should be thoroughly conversant with various types of machine used in mining operations.

OBJECTIVES

On completion of the subject, students will be able to:

- Describe type & construction of wire, their uses, maintenance & related calculation.
- Describe different types of transportation methods in mines.
- Explain headgear's functions & its design factors.
- Describe constructional & safety features of cage and shaft.
- Describe different profiles of winding drum, various safety devices & related calculations.
- Describe different types of friction winding & its function.
- Explain skip-winding arrangements.
- Draw various arrangements at pit top & pit bottom layouts.

Topic- wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Wire ropes	12
2	Rope Haulage	14
3	Headgear	5
4	Cage & shaft fittings	6
5	Winding drum	6
6	Friction Winding	5
7	Skip Winding	6
8	Pit top & Bottom Layout	6
	Total	60

COURSE CONTENTS

1. Wire Ropes

- State the types of wire ropes used in Mines.
  - Describe constructional features of wire ropes & lay of wire ropes.
- Define factor of safety to wire ropes nominal & actual factor of safety of wire ropes.
  - State factors influencing the F.O.S.
- State efficiency of rope construction, space factor & cross sectional area rope.
- State factors affecting deterioration of ropes.
- Describe care & maintenance of ropes.
- State & describe testing & examination of wire ropes.
- Give the procedure of splicing of wire rope
- Describe rope capel for haulage winding & recapping.

2. Rope Haulage

- Transportation in mines by rope haulage.
- State type of rope haulage.
- Describe various types of rope haulage with simple sketches.
- State & describe different type of safety devices on rope haulage roadways.
- State & describe different types of clips & couplings.

3. Headgear

- State function of headgear.
- Describe constructional features of headgear pulley.
- Define angle of fleet.

4. Cage and shaft fittings

- Describe cage, cage suspension gear, detaching hooks & its function, safety catch at headgear & keps.
- State types of guide.
- State & describe rigid guide, flexible shoes, guide rope suspension & tensioning arrangement.

5. Winding drum

- State different profiles of winding Drum.
- Describe different types of winding brake.
- Describe various types of safety devices on winding system.

6. Friction Winding

- State & describe principle & constructional features of ground-mounted & tower-mounted koepe winder.
- State advantages & disadvantages of koepe winding.
- Describe multirope system of koepe winding.

7. Skip winding

- Describe constructional features bottom discharge skip, Top discharge skip.
- Compare skip winding cage winding.

8. Pit top & Pit bottom circuit layout

- State factors affecting pit top & pit bottom layouts.
- Describe different types of pit top & pit bottom car/tub circuit layouts.

SYLLABUS COVERAGE UP TO I.A.

Chapter 1,2.3.4

Learning Resourses		
Sl. No.	Title of the Book	Name of Authors
1	Mine Hoisting	M A Ramulu
2	SME Mining Engg Handbook	
3	Material Handling in Mines,IIT KGP	
4	EMT III	D.J.Desmukh
5	Mine Transport	N.T Kerlin
6	UMS Volume	

Th. 5. UNDERGROUND METAL MINING

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	5th
Total Periods:	60	Examination	3 hrs
Theory Periods:	4P/week	Internal Assessment	20
Maximum Marks:	100	End Semester Examination	80

RATIONALE

As Mining Engineer, one should have the knowledge in fundamental principles of generation in underground metal mines.

OBJECTIVES

On completion of the subject, students will be able to :

- Describe various methods to access an ore body.
- Explain various methods of development used in underground metal mines.
- Compare between coal & metal mining.
- Explain various stopping methods used in u/g metal mines.
- Stone Drifting.
- Explain causes & prevention of rock burst.
- Describe about face mechanization.

Topic- wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Access to ore body	5
2	Development in underground metal mines	12
3	Comparative study between Coal & Metal Mining	3
4	Stoping Method	18
5	Stone Drifting.	7
6	Rock burst.	5
7	Face mechanization	10
	Total	60

COURSE CONTENTS (Based on specific objectives)

1. Access to ore body

- Classify modes of entries – Adits , inclines and shafts ,applicability of entries.

2. Development in underground Metal Mine.

- Explain formation of blocks of mineral deposit.

- Explain level interval
- Describe
- Open raising method
- Two compartment method
- Jora raise lift
- Long hole drilling method./Vertical Crater retreat (VCR) method.
- Alimak raise climber
- Raise borer.
- Development of Ore passe system.

3. Give a comparative study between coal and metal Mining.

4. Stoping methods.

- Classify stoping methods with application and factors affecting methods of stopping.
- Preparatory arrangement for stoping.
- Describe the following methods with layout including drilling, blasting, transportation and supports.
- Open stoping.
- Open stoping with pillar support.
- Shrinkage stoping.
- Cut & fill stoping.
- Square set stoping.
- Block caving.
- Sub-level caving.
- Top slicing.

5. Stone Drifting

- Describe conventional methods of drifting. Find out direction gradient of drift. Describe drilling and blasting, support, transportation, drainage, ventilation and lighting arrangements, organization and supervision in mechanised method of drifting.

6. Rock Burst

- Explain causes and prevention of rock burst.

7. Face mechanization

- Describe use of jumbo drill with air leg.
- Describe various Loading & Transportation System like
  - L.H.D., L.P.D.T.(Low Profile Dump Truck), rocker shovel, spiral chutes and draw points, Scraper etc.

<u>SYLLABUS COVERAGE UP TO I.A.</u>

Chapter 1,2,3

Learning Resourses		
Sl. No.	Title of the Book	Name of Authors
1	SME Mining Engineering Hand Book Vol.I & II-1993 edition.	
2	Metal Mining	Chacharker
3	Mining Engineering Hand Book	Peele
4	EMT Vol.II	D.J.Desmukh
5	Mining Ground control	Prof. B.S. Verma
6	Rock Mechanics	Jermic
7	Rock Mechanics	Jugger & Cook
8	Metalliferous Mining	Higam
9	Underground Mining Method	Bullock.

Pr.1 MINING HAZARDS & SAFETY LAB

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	5th
Total Periods:	90	End Examination	50
Practical Periods:	6P/week	Sessional	50
		Total	100

A. RATIONALE:

As a Mining Engineer, one must be thoroughly conversant with various sources of mining hazards as also the remedial measures needed to be undertaken to avoid any mishap and able to understand total operation of rescue and recovery.

B. OBJECTIVES:

On completion of lab students will able to :

- Develop a clear idea about Methanometer & CO detector.
- Know details about procedure of analysis of gases by halden & Orsat apparatus.
- Sample the dust particles by using Gravimetric dust Sampler.

Topic wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Estimation of CH_4 in air sample using flame safety lamp and methanometer.	18
2	Study & use of different types of methonometer.	10
3	Determination of CO by using CO-dectector.	6
4	Determination of CO_2 in air sampling by CO_2 detectors	10
5	Gas analysis by (I) Orsat apparatus.	8
6	Haldane apparatus for gas analysis.	8
7	Study & uses of Konimeter.	6
8	Sampling of dust by gravimetric dust sampler.	10
9	Study of Rescue Apparatus	6
10	Multi gas Detector (NOx, H_2S, CO, CO_2)	8
	Total	90

C. COURSE CONTENT.

- Estimation of CH_4 in air sample using flame safety lamp and detection by a methanometer.

  - Accumulation & percentage test of CH_4 by flame safety lamp.

- Study & use of different types of methonometer.
- Determination of CO by using CO-dectector.
- Determination of CO_2 in air sampling by CO_2 detectors.
- Gas analysis by (I) Orsat apparatus.
- Haldane apparatus for gas analysis.
- Study & uses of Konimeter.
- Sampling of dust by gravimetric dust sampler.
- Study of Rescue Apparatus.
- Multi gas Detector (NOx, H_2S, CO, CO_2

Pr.2. MINE MACHINERY – I LAB.

Name of the Course : Diploma in Mining Engineering			
Course code:		Semester	5th
Total Periods:	90	End Examination	50
Practical Periods:	6P/week	Sessional	50
		Total	100

RATIONALE

It is imperative that a Mining Engineer should be thoroughly conversant with various types of machine used in mining operations.

OBJECTIVES:

On completion of lab students will able to :

- Develop a clear idea about Wire rope,rope splicing & capeling.
- Know details about Safety hook,keps & rope guides.
- Generate a clear idea about head gear structure,suspension gear & winding drum.

Topic wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Study of Wire rope.	8
2	Study of rope splicing.	8
3	Study of rope capel.	8
4	Study of safety hook.	10
5	Study of keps.	8
6	Study of guide in shaft.	8
7	Study of clips used in endless rope haulage.	8
8	Model Development of Headgear Structure.	8
9	Model Development of Suspension Gear.	8
10	Model Development of different types of winding drum.	8
11	Model development of different types of safety devices used in haulage.	8
	Total	90

COURSE CONTENT.

- Study of Wire rope.
- Study of rope splicing.

- Study of rope cappel.
- Study of safety hook.
- Study of keps.
- Study of guide in shaft.
- Study of clips used in endless rope haulage.
- Model Development of Headgear Structure.
- Model Development of Suspension Gear.
- Model Development of different types of winding drum.
- Model development of different types of safety devices used in haulage roadways.

Pr 3. PROJECT WORK (Phase-I)

Name of the Course: Diploma in Mining			
Course code:		Semester	5th
Total Period:	60	Examination :	-
Theory periods:	4P / week	Sessional Marks	50
		TOTAL Marks	50

RATIONALE

Students' Project Work aims at developing innovative skills in the students whereby they apply the knowledge and skills gained through the course covered in many subjects and Labs, by undertaking a project. The prime emphasis of the project work is to understand and apply the basic knowledge of the principles of Mining Engineering and practices in real life situations, so as to participate and manage a Mining projects in future.
Entire Project shall spread over 5th and 6th Semester. Part of the Project covered in 5th Semester shall be named as *Project Phase-I* and balance portion to be covered in 6th Semester shall be named as *Project Phase-II*.

OBJECTIVES

After undergoing the Project Work, the student will be able to:

- Implement the theoretical and practical knowledge and skills gained through various subjects/courses into an application suitable for a real practical working environment, preferably in an industrial environment.
- Identify and contrast gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional knowledge as required.
- Carry out cooperative learning through synchronous guided discussions within the class in key areas, asynchronous document sharing and discussions, as well as prepare collaborative edition of the final project report.
- To achieve real life experience in Mines operation and management.
- To develop the skill of writing Project Report

General Guidelines

The individual students have different aptitudes and strengths and also areas of interest. Project work, therefore, should match the strengths and interest of the students. For this purpose, students should be asked to identify the type of project work, they would like to execute. The activity of problem identification should begin well in advance (right from beginning of 5th semester). Students should be allotted a problem of interest to him/her as a project work. It is also essential that the faculty of the respective department may have a brainstorming session to identify suitable project assignments for their students. The project assignment can be individual assignment or a group assignment. Preferably there should not be more than 5 students, if the project work is given to a group. The project work identified in collaboration with industry should be preferred.

A suggestive criterion for assessing student performance by the external (preferably person from industry) and internal (teacher) examiner is given in table below:

Sl. No.	**Performance Criteria**
1.	Selection of project assignment
2.	Planning and execution of considerations
3.	Quality of performance
4.	Providing solution of the problems or production of final product
5.	Sense of responsibility
6.	Self expression/ communication/ Presentation skills
7.	Interpersonal skills/human relations
8.	Report writing skills
9	Viva voce

The teachers are free to evolve other criteria of assessment, depending upon the type of project work.
It is proposed that the institute may organize an annual exhibition of the project work done by the students and invite leading Industrial organisations to such an exhibition.

Project Phase-I and Phase-II

The Project work duration shall cover 2 semesters(5th and 6th sem). The Grouping of students, selection of Project, assignment of Project Guide to the Group shall be done in the beginning of 5th sem under Project Phase-I. The students may be allowed to study literature, any existing system and then define the Problem/objective of the Project. Preliminary work including Design of the system have to be complete in Phase-I. Project Milestones are to be set so that progress can be tracked . In Phase-II detailed work, Testing, Documentation have to be complete. Project Report have to be prepared and complete in Phase-II. All Project reports should be organized uniformly in proper order, irrespective of group. Teacher Guides can make suitable alteration in the components of Task and schedule.
At the end of Project Phase-I in 5th semester there shall be one presentation by each group to mark to progress and also to judge whether the Project is moving in right direction as per the objective of the Project.

Equipment List

MINE HAZARD AND SAFETY LAB

(a) GL50 and GL60 flame safety lamp.
(b) MSA D6 Methanometer.
(c) CO detector.
(d) CO2 detector.
(e) Orsat apparatus
(f) Konometer.
(g) GDS dust sampler.
(h) Multigas detector
(i) Hygrometer.
(j) Haldane apparatus.
(k) DRAGER BG174 self-contained breathing apparatus.
(l) Self-contained open circuit breathing apparatus.
(m) Face mask for rescue apparatus.

MINE MACHINERY –I LAB

(a) Pieces of standard and non standard Rope.
(b) Model of rope splicing.
(c) Rope splicing tools.
(d) King detaching safety hook.
(e) Ormoured safety hook.
(f) Model of Keps.
(g) Models of rope guide and rigid guide.
(h) Rope guide and rigid guide shoe.
(i) Model of different types of clips such as cam clip, small man clip, lashing chain, Screw clip.
(j) Model of headgear structure.
(k) Models of cylindrical drum, conical drum, bi cylindro conical drum.
(l) Models of different types of safety devices used in haulage rode way such as Back stay, Drop warrick, Runaway switches, Stop block, Monkey Catches.

CURRICULLUM OF 6TH SEMESTER

For

DIPLOMA IN MECHANICAL ENGINEERING

(Effective FROM 2020-21 Sessions)

STATE COUNCIL FOR TECHNICAL EDUCATION & VOCATIONAL TRAINING,

ODISHA, BHUBANESWAR

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA									
TEACHING AND EVALUATION SCHEME FOR 6th Semester (Mechanical Engg.) (wef 2020-21)									
Subject Number	Subject Code	Subject	Periods/week			Evaluation Scheme			
			L	T	P	Internal Assessment/ Sessional	End Sem Exams	Exams (Hours)	Total
		Theory							
Th.1		INDUSTRIAL ENGINEERING & MANAGEMENT	4		-	20	80	3	100
Th.2		AUTOMOBILE ENGINEERING AND HYBRID VEHICLES	4		-	20	80	3	100
Th.3		POWER STATION ENGINEERING	4		-	20	80	3	100
Th.4		ELECTIVE (any One)	4			20	80	3	100
Th.4(a)		COMPOSITE MATERIALS							
Th.4(b)		ADVANCE MANUFACTURING PROCESSES							
Th.4(c)		INDUSTRIAL ROBOTICS & AUTOMATION							
		Total	**16**			**80**	**320**	**-**	**400**
		Practical							
Pr.1		AUTOMOBILE ENGINEERING LAB	-	-	4	50	50	3	100
Pr.2		POWER STATION ENGINEERING LAB	-	-	4	25	50	3	75
Pr.3		PROJECT WORK PHASE -II		-	10	50	100	3	150
Pr.4		LIFE SKILL	-	-	2	25	-	-	25
		STUDENT CENTERED ACTIVITIES (SCA)			3				
		Total	**-**	**-**	***23***	***150***	***200***	**-**	***350***
		Grand Total	**16**	**-**	**23**	**230**	**520**	**-**	**750**

Abbreviations: L-Lecturer, T-Tutorial, P-Practical. Each class is of minimum 55 minutes duration

Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%

SCA shall comprise of Extension Lectures/ Personality Development/ Environmental issues /Quiz /Hobbies/ Field visits/ cultural activities/Library studies/Classes on MOOCS/SWAYAM /Idea Tinkering and Innovation Lab Practice etc. ,Seminar and SCA shall be conducted in a section.

There shall be 1 Internal Assessment done for each of the Theory Subject. Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester

TH1. INDUSTRIAL ENGINEERING & MANAGEMENT

Name of the Course: Diploma in MECHANICAL ENGINEERING			
Course code:		Semester	6th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Internal assessment	20
Maximum marks:	100	End Semester Examination:	80

A. RATIONALE:

Main objective of Mechanical Engineering is to produce goods and services for benefit to mankind. Such productions are done utilizing various resources like Men, Materials, machines and Money. Industrial engineering and quality control is the subject which allows optimized use of such resources and hence very important for a mechanical engineer.

B. COURSE OBJECTIVES:

After undergoing this course, the students will be able to:

1.Identify the place for a new plant set up and systematic arrangement of machinery and shop for smooth production.

2.Take right decisions to optimize resources utilizations by improving productivity of the lands ,buildings,people,material,machines,money,methods and management effectively.

3.Understanding of stock management and maintenance to reduce plant ideal time.

4 To use the charts to record the quality of products.

5.To eliminate unproductive activities under the control of the management, supervisor, worker and the design of products and processes.

C. CHAPTER WISE DISTRIBUTION OF PERIORDS

Sl No.	Topic	Periods
1	**PLANT ENGINEERING**	10
2	**OPERATIONS RESEARCH**	10
3	**INVENTORY CONTROL**	10
4	**INSPECTION AND QUALITY CONTROL**	15
5	**PRODUCTION PLANNING AND CONTROL**	15

D. COURSE CONTENT

1. PLANT ENGINEERING:

1.1 Selection of Site of Industry.

1.2 Define plant layout.

1.3 Describe the objective and principles of plant layout.

1.4 Explain Process Layout, Product Layout and Combination Layout.

1.5 Techniques to improve layout.

1.6 Principles of material handling equipment.

1.7 Plant maintenance.

1.7.1 Importance of plant maintenance.
1.7.2 Break down maintenance.
1.7.3 Preventive maintenance.
1.7.4 Scheduled maintenance.

2. OPERATIONS RESEARCH:

2.1 Introduction to Operations Research and its applications.
2.2 Define Linear Programming Problem,
2.3Solution of L.P.P. by graphical method.
2.4 Evaluation of Project completion time by Critical Path Method and PERT (Simple problems)-
2.5Explain distinct features of PERT with respect to CPM.

3. INVENTORY CONTROL:

3.1 Classification of inventory.
3.2 Objective of inventory control.
3.3 Describe the functions of inventories.
3.4 Benefits of inventory control.
3.5 Costs associated with inventory.
3.6 Terminology in inventory control
3.7 Explain and Derive economic order quantity for Basic model. (Solve numerical)
3.8 Define and Explain ABC analysis.

4. INSPECTION AND QUALITY CONTROL:

4.1Define Inspection and Quality control.
4.2Describe planning of inspection.
4.3 Describe types of inspection.
4.4 Advantages and disadvantages of quality control.
4.5 Study of factors influencing the quality of manufacture.
4.6 Explain the Concept of statistical quality control, Control charts (X, R, P and C - charts).
4.7 Methods of attributes.
4.8 Concept of ISO 9001-2008.
4.9.1 Quality management system, Registration /certification procedure.
4.9.2 Benefits of ISO to the organization.
4.9.3 JIT, Six sigma,7S, Lean manufacturing
4.9.4 Solve related problems.

5.0 PRODUCTION PLANNING AND CONTROL

5.1 Introduction
5.2 Major functions of production planning and control
5.3 Methods of forecasting
5.3.1 Routing
5.3.2Scheduling
5.3.3 Dispatching
5.3.4 Controlling
5.4 Types of production
5.4.1 Mass production
5.4.2 Batch production
5.4.3 Job order production
5.5 Principles of product and process planning.

Syllabus to be covered before IA: Chapter 1,2,3

Learning Resources:			
Sl. No.	***Name of Authors***	***Title of the Book***	***Name of the Publisher***
1	O.P.KHANNA	INDUSTRIAL ENGINEERING & MANAGEMENT	DHANPAT RAI & SONS
2	MARTAND TELSANG	INDUSTRIAL ENGG & PRODUCTION MANAGEMENT	S.CHAND
3	M.MAHAJAN	STATISTICAL QUALITY CONTROL	DHANPAT RAI &SONS
4			

TH.2 AUTOMOBILE ENGINEERING AND HYBRID VEHICLES

Name of the Course: Diploma in MECHANICAL ENGINEERING			
Course code:		Semester	6th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Internal assessment	20
Maximum marks:	100	End Semester Examination:	80

A. RATIONALE:

Automobiles are the principal mode of transport system. Their manufacture and maintenance gives a major scope for employment. Many entrepreneur pass outs go for servicing of automobiles or trading/ manufacturing of auto components. Thus automobile engineering is an important subject to be in the regular curriculum of the mechanical engineering.

B. COURSE OBJECTIVES:

At the end of the course the students will be able to:

- Understand automobile chassis, transmission, breaking and fuel system etc.
- Understand the basics of electric vehicle kinematics.
- Understand the concepts of hybrid electric vehicles.

C.TOPIC WISE DISTRIBUTION OF PERIODS

Sl No.	Topic	Periods
1	Introduction & Transmission System	12
2	Braking system	5
3	Ignition & Suspension System	10
4	Cooling and Lubrication	8
5	Fuel system	10
6	Hybrid and Electric Vehicles	15

C.COURSE CONTENTS

1.0 INTRODUCTION & TRANSMISSION SYSTEM:

1.1 Automobiles: Definition, need and classification: Layout of automobile chassis with major components (Line diagram)
1.2 Clutch System: Need, Types (Single & Multiple) and Working principle with sketch
1.3 Gear Box: Purpose of gear box, Construction and working of a 4 speed gear box
1.4 Concept of automatic gear changing mechanisms
1.5 Propeller shaft: Constructional features
1.6 Differential: Need, Types and Working principle

2.0 BRAKING SYSTEM:

2.1 Braking systems in automobiles: Need and types
2.2 Mechanical Brake
2.3 Hydraulic Brake
2.4 Air Brake
2.5 Air assisted Hydraulic Brake
2.6 Vacuum Brake

3.0 IGNITION & SUSPENSION SYSTEM:

3.1 Describe the Battery ignition and Magnet ignition system

3.2 Spark plugs: Purpose, construction and specifications

3.3 State the common ignition troubles and its remedies

3.4 Description of the conventional suspension system for Rear and Front axle

3.5 Description of independent suspension system used in cars (coil spring and tension bars)

3.6 Constructional features and working of a telescopic shock absorber

4.0 COOLING AND LUBRICATION:

4.1 Engine cooling: Need and classification

4.2 Describe defects of cooling and their remedial measures

4.3 Describe the Function of lubrication

4.4 Describe the lubrication System of I.C. engine

5.0 FUEL SYSTEM:

5.1 Describe Air fuel ratio

5.2 Describe Carburetion process for Petrol Engine

5.3 Describe Multipoint fuel injection system for Petrol Engine

5.4Describe the working principle of fuel injection system for multi cylinder Engine 5.5 Filter for Diesel engine

5.6 Describe the working principle of Fuel feed pump and Fuel Injector for Diesel engine

6.0 ELECTRIC AND HYBRID VEHICLES:

6.1 Introduction, Social and Environmental importance of Hybrid and Electric Vehicles

6.2 Description of Electric Vehicles, operational advantages, present performance and applications of Electric Vehicles

6.3 Battery for Electric Vehicles, Battery types and fuel cells

6.4 Hybrid vehicles, Types of Hybrid and Electric Vehicles: Parallel, Series, Parallel and Series configurations;6.5 Drive train

6.6 Solar powered vehicles

D.SYLLABUS COVERED UP TO I.A-CHAPTERS 1,2 &3

E.LEARNING RESOURCES:

Sl. No.	***Name of Authors***	***Title of the Book***	***Name of the Publisher***
1	R.B.Gupta	Automobile Engineering	Satya Prakashan
2	Dr Kirpal Singh	Automobile Engineering Vol- I & II	Standard Publishers
3	C.P.Nakra	Automobile Engineering	Dhanpat Rai Publication
4	W.H.Course	Automotive Engine	McGraw Hill
5	Iqbal Hussain	Electric & Hybrid Vehicles – Design Fundamentals	CRC Press, 2
6	A.K. Babu	Statistical Electric & Hybrid Vehicles	Khanna Publishing House, New Delhi, 2018

TH.3 POWER STATION ENGINEERING

Name of the Course: Diploma in MECHANICAL ENGINEERING			
Course code:		Semester	6th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Internal assessment	20
Maximum marks:	100	End Semester Examination:	80

A. RATIONALE:

Bulk powers used in industries and for domestic purposes are generated in power stations. A large number of diverse and specialized equipment and system are used in a power plant should have this important subject in mechanical engineering.

B. COURSE OBJECTIVES:

At the end of the course the students will be able to:

- Understand the generation of power by utilizing various energy sources.
- Understand the use of steam, its operation in thermal power stations.
- Understand the nuclear energy sources and power developed in nuclear power station.
- Understand the basics of diesel electric power station and hydroelectric power station.
- Understand the basics of gas turbine power station
-

C.TOPIC WISE DISTRIBUTION OF PERIODS

Sl No.	Topic	Periods
1	**INTRODUCTION**	05
2	**THERMAL POWER STATIONS**	20
3	**NUCLEAR POWER STATIONS**	10
4	**DIESEL ELECTRIC POWER STATIONS**	10
5	HYDEL POWER STATIONS	10
6	GAS TURBINE POWER STATIONS	05

D.COURSE CONTENTS:

1.0 INTRODUCTION:

1.1 Describe sources of energy.
1.2 Explain concept of Central and Captive power station.
1.3 Classify power plants.
1.4 Importance of electrical power in day today life.
1.5 Overview of method of electrical power generation.

2.0 THERMAL POWER STATIONS:

2.1 Layout of steam power stations.
2.2 Steam power cycle. Explain Carnot vapour power cycle with P-V, T-s diagram and determine thermal efficiency.
2.3 Explain Rankine cycle with P-V, T-S & H-s diagram and determine thermal efficiency, Work done, work ratio, and specific steam Consumption.
2.4 Solve Simple Problems.
2.5. List of thermal power stations in the state with their capacities.
2.6 Boiler Accessories: Operation of Air pre heater, Operation of Economiser, Operation Electrostatic precipitator and Operation of super heater. Need of boiler mountings and operation of boiler

2.7 Draught systems (Natural draught, Forced draught & balanced draught) with their advantages & disadvantages.
2.8 Steam prime movers: Advantages & disadvantages of steam turbine, Elements of steam turbine, governing of steam turbine. Performance of steam turbine: Explain Thermal efficiency, Stage efficiency and Gross efficiency.
2.9 Steam condenser: Function of condenser, Classification of condenser. function of condenser auxiliaries such as hot well, condenser extraction pump, air extraction pump, and circulating pump.
2.10 Cooling Tower: Function and types of cooling tower, and spray ponds
2.11 Selection of site for thermal power stations.

3.0 NUCLEAR POWER STATIONS:

3.1 Classify nuclear fuel (Fissile & fertile material)
3.2 Explain fusion and fission reaction.
3.3 Explain working of nuclear power plants with block diagram .
3.4 Explain the working and construction of nuclear reactor .
3.5 Compare the nuclear and thermal plants.
3.6 Explain the disposal of nuclear waste.
3.7 Selection of site for nuclear power stations.
3.8 List of nuclear power stations.

4.0 DIESEL ELECTRIC POWER STATIONS:

4.1 State the advantages and disadvantages of diesel electric power stations.
4.2 Explain briefly different systems of diesel electric power stations: Fuel storage and fuel supply system, Fuel injection system, Air supply system, Exhaust system, cooling system, Lubrication system, starting system, governing system.
4.3 Selection of site for diesel electric power stations.
4.4 Performance and thermal efficiency of diesel electric power stations.

5.0 HYDEL POWER STATIONS:

5.1 State advantages and disadvantages of hydroelectric power plant.
5.2 Classify and explain the general arrangement of storage type hydroelectric project and explain its operation.
5.3 Selection of site of hydel power plant.
5.4 List of hydro power stations with their capacities and number of units in the state.
5.5 Types of turbines and generation used.
5.6 Simple problems.
6.0 GAS TURBINE POWER STATIONS
6.1 Selection of site for gas turbine stations.
6.2 Fuels for gas turbine
6.3 Elements of simple gas turbine power plants
6.4 Merits, demerits and application of gas turbine power plants.

Syllabus covered up to I.A-Chapters 1,2 &3

E.LEARNING RESOURCES:			
Sl. No.	***Name of Authors***	***Title of the Book***	***Name of the Publisher***
1	R.K Rajput	Power Plant Engineering	Laxmi Publication
2	P.K.NAG	Power Plant Engineering	TMH
3	Nag pal G,R	Power plant Engineering	Khanna Publisher
4	P.C.SHARMA	Power Plant Engineering	S.K KATARIA &SONS

Th-4a-COMPOSITE MATERIALS (ELECTIVE)

Name of the Course: Diploma in MECHANICAL ENGINEERING			
Course code:		Semester	6th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Internal assessment	20
Maximum marks:	100	End Semester Examination:	80

RATIONALE: Composite material is the advanced engineering material and plays an important Role in design of engineering products.it is s.a valuable subject for mechanical engineer

COURSE OBJECTIVES:

At the end of the course the students will be able to:

- Understand the basic concept of composite materials
- Understand the Classification of Composites
- Understand the Mechanical Properties of Composites
- Understand the Laminates
- Understand the Joining Methods and Failure Theories.

Topic Wise Distribution of Periods

Sl No.	Topic	Periods
1	Introduction	15
2	Classification of Composites	8
3	Mechanical Properties of Composites	12
4	Laminates	15
5	Joining Methods and Failure Theories	10

CHAPTERS

1.0 Introduction:

1.1 Classifications of Engineering Materials, Concept of composite materials.

1.2 Matrix materials, Functions of a Matrix, Desired Properties of a Matrix, Polymer Matrix (Thermosets and Thermoplastics), Metal matrix, Ceramic matrix, Carbon Matrix, Glass Matrix etc.

1.3 Types of Reinforcements/Fibers: Role and Selection or reinforcement materials.

1.4 Types of fibers, Glass fibers, Carbon fibers, Aramid fibers , Metal fibers, Alumina fibers, Boron Fibers, Silicon carbide fibers, Quartz and Silica fibers, Multiphase fibers, Whiskers, Flakes etc.,

1.5 Mechanical properties of fibers.

2.0 Classification of Composites:

2.1Classification based on Matrix Material: Organic Matrix composites, Polymer matrix composites (PMC), Carbon matrix Composites or Carbon-Carbon Composites, Metal matrix composites (MMC), Ceramic matrix composites (CMC).

2.2 Classification based on reinforcements: Fiber Reinforced Composites, Fiber Reinforced Polymer (FRP) Composites, Laminar Composites, Particulate Composites.

2.3 Comparison with Metals, Advantages & limitations of Composites.

3.0 Mechanical Properties of Composites:

3.1 Geometrical aspects – volume and weight fraction.

3.2 Unidirectional continuous fiber, discontinuous fibers, Short fiber systems, woven

reinforcements – Mechanical Testing.

3.3 Determination of stiffness and strengths of unidirectional composites; tension, compression, flexure and shear.

4.0 Laminates:

4.1 Plate Stiffness and Compliance, Assumptions, Strains, Stress Resultants, Computation of Stresses.

4.2 Types of Laminates - Symmetric Laminates, Antisymmetric Laminate, Balanced Laminate, Quasi-isotropic Laminates, Cross-ply Laminate, Angle ply Laminate. Orthotropic Laminate.

4.3 Laminate Moduli, Hydrothermal Stresses.

5.0 Joining Methods and Failure Theories:

5.1 Joining –Advantages and disadvantages of adhesive and mechanically fastened joints.

5.2 Typical bond strengths and test procedures.

Syllabus covered up to I.A-Chapters 1, 2 & 3

E.LEARNING RESOURCES:			
Sl. No.	***Name of Authors***	***Title of the Book***	***Name of the Publisher***
1	A.K Bhargava	Engineering Materials: Polymers, Ceramics and Composites	Prentice Hall India
2	G. Dieter	Mechanical Metallurgy	Mc-Graw Hill
3	R.F. Speyer	Thermal Analysis of Materials	Marcel Decker

TH 4b ADVANCE MANUFACTURING PROCESSES

Theory	**4 Periods per week**	**Internal Assessment**	**20 Marks**
Total Periods	**60 Periods**	**End Sem Exam**	**80 Marks**
Examination	**3hours**	**Total Marks**	**100Marks**

RATIONALE:
Advance manufacturing processes is the field of production by advance nontraditional methods which give the conversion of raw materials into finished product..

COURSE OBJECTIVES:
At the end of the course the students will be able to:

- Understand the working principle of modern machining processes.
- Understand the Plastic Processing
- Understand the additive manufacturing process
- Understand the Special Purpose Machines
- Understand the Maintenance of Machine Tools

Topic Wise Distribution of Periods

Sl No.	Topic	Periods
1	Modern Machining Processes	20
2	Plastic Processing	10
3	Additive Manufacturing Process	15
4	Special Purpose Machines	7
5	Maintenance of Machine Tools	8

DETAILED CONTENTS

1.0 Modern Machining Processes:

1.1 Introduction – comparison with traditional machining.
1.2 Ultrasonic Machining: principle, Description of equipment, applications.
1.3 Electric Discharge Machining: Principle, Description of equipment, Dielectric fluid, tools (electrodes), Process parameters, Output characteristics, applications.
1.4 Wire cut EDM: Principle, Description of equipment, controlling parameters; applications.
1.5 Abrasive Jet Machining: principle, description of equipment, Material removal rate, application.
1.5 Laser Beam Machining: principle, description of equipment, Material removal rate, application.
1.6 Electro Chemical Machining: principle, description of equipment, Material removal rate, application.
1.7 Plasma Arc Machining – principle, description of equipment, Material removal rate, Process parameters, performance characterization, Applications.
1.8 Electron Beam Machining - principle, description of equipment, Material removal rate, Process parameters, performance characterization, Applications.

2.0 Plastic Processing:

2.1 Processing of plastics.
2.2 Moulding processes: Injection moulding, Compression moulding, Transfer moulding.
2.3 Extruding; Casting; Calendering.
2.4 Fabrication methods-Sheet forming, Blow moulding, Laminating plastics (sheets, rods & tubes), Reinforcing.
2.5 Applications of Plastics.

3.0 Additive Manufacturing Process:

3.1 Introduction, Need for Additive Manufacturing

3.2 Fundamentals of Additive Manufacturing, AM Process Chain

3.3 Advantages and Limitations of AM, Commonly used Terms

3.4 Classification of AM process, Fundamental Automated Processes, Distinction between AM and CNC, other related technologies.

3.5 Application –Application in Design, Aerospace Industry, Automotive Industry, Jewelry Industry, Arts and Architecture. RP Medical and Bioengineering Applications.

3.6 Web Based Rapid Prototyping Systems.

3.7 Concept of Flexible manufacturing process, concurrent engineering, production tools like capstan and turret lathes, rapid prototyping processes.

4.0 Special Purpose Machines (SPM):

4.1 Concept, General elements of SPM, Productivity improvement by SPM, Principles of SPM design.

5.0 Maintenance of Machine Tools:

5.1 Types of maintenance, Repair cycle analysis, Repair complexity, Maintenance manual, Maintenance records, Housekeeping. Introduction to Total Productive Maintenance (TPM).

Syllabus covered up to I.A-Chapters 1,2 &3

E.LEARNING RESOURCES:			
Sl. No.	***Name of Authors***	***Title of the Book***	***Name of the Publisher***
1	O.P.KHANNA	Production technology –Vol-II	Dhanpat Rai Publication
2	B.S. Raghuwanshi	Workshop Technology, Vol – II	Dhanpat Rai Publication
3	HMT, Bangalore	Production Technology	Tata Mc-Graw Hill
4	1. Chua C.K., Leong K.F. and LIM C.S,	Rapid prototyping: Principles and Applications	WORLD SCIENTIFIC PUBLICATION,THIRD EDITION,2010
5	Stephen F. Krar & Arthur Gil	Exploring Advanced Manufacturing Technologies	1. Industrial Press

TH.4(c) INDUSTRIAL ROBOTICS & AUTOMATION (Elective)

Name of the Course: Diploma in MECHANICAL ENGINEERING			
Course code:		Semester	6th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Internal assessment	20
Maximum marks:	100	End Semester Examination:	80

A. RATIONALE:

Today's manufacturing units are using robots as substitute for workers working in hazardous atmosphere. Any automation found are using robots which are known as industrial robots and helps in mass production and assembling parts to make a finished product. So to meet the need of the day this Subject should be included in the syllabus of mechanical engineering of diploma stream.

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COURSE OBJECTIVES:

At the end of the course the students will be able to:

- Understand the basic concepts, parts of robots and types of robots.
- Understand the various drive systems for robot, sensors and their applications in robots and programming of robots.
- Understand the robots according to its usage.
- Understand the various applications of robots, justification and implementation of robot.
- Conceptualize automation and understand applications of robots in various industries.

Topic Wise Distribution of Periods

Sl No.	Topic	Periods
1	Fundamentals of Robotics	10
2	Robotic Drive System and Controller	12
3	Sensors	8
4	Introduction to Machine Vision	10
5	Robot kinematics and Robot Programming	15
6	Automation & Industrial Applications	5

CHAPTERS

1.0 Fundamentals of Robotics:

1.1 Definition; Robot anatomy (parts) and its working.
1.2 Robot Components: Manipulator, End effectors; Construction of links, Types of joints.
1.3 Classification of robots; Cartesian, Cylindrical, Spherical, Scara, Vertical articulated.
1.4 Structural Characteristics of robots; Mechanical rigidity; Effects of structure on control work envelope and work Volume.
1.5 Robot work Volumes, comparison.
1.6 Advantages and disadvantages of robots.

2.0 Robotic Drive System and Controller:

2.1 Actuators; Hydraulic, Pneumatic and Electrical drives; Linear actuator; Rotary drives.
2.2 AC servo motor; DC servo motors and Stepper motors; Conversion between linear and rotary motion.
2.3 Feedback devices; Potentiometers; Optical encoders; DC tachometers.

2.4 Robot controller; Level of Controller; Open loop and Closed loop controller.
2.5 Microprocessor based control system; Robot path control: Point to point, Continuous path control and Sensor based path control; Controller programming.

3.0 Sensors:

3.1 Requirements of a sensor.
3.2 Principles and Applications of the following types of sensors: Position sensors (Encoders, Resolvers, Piezo Electric); Range sensors (Triangulation Principle, Structured lighting approach).
3.3 Proximity sensing; Force and torque sensing.

4.0 Introduction to Machine Vision:

4.1 Robot vision system (scanning and digitizing image data); Image processing and analysis.
4.2 Cameras (Acquisition of images); Videocon camera (Working principle & construction).
4.3 Applications of Robot vision system: Inspection, Identification, Navigation & serving.

5.0 Robot kinematics and Robot Programming:

5.1 Forward Kinematics; Inverse Kinematics and Differences.
5.2 Forward Kinematics and Reverse Kinematics of Manipulators with Two Degrees of Freedom (In 2 Dimensional); Deviations and Problems.
5.3 Teach Pendant Programming; Lead through programming; Robot programming Languages; VAL Programming.
5.4 Motion Commands; Sensor Commands; End effecter commands; and Simple programs.

6.0 Automation & Industrial Applications:

6.1 Basic elements of automated system, advanced automation functions, levels of automation.
6.2 Application of robots in machining; welding; assembly and material handling.

Syllabus covered up to I.A-Chapters 1, 2 & 3

E.LEARNING RESOURCES:			
Sl. No.	***Name of Authors***	***Title of the Book***	***Name of the Publisher***
1	Saeed B. Niku	Introduction to Robotics: Analysis, Systems, Applications	Pearson Education Inc.New DELHI 2006
2	M.P. Groover	Industrial Robotics: Technology, Programming and Applications	Tata Mc Graw Hill Co,2001
3	Fu K S Gonzalz R Cand Lee C S G	Robotics control,sensing,visionand intelligence	1. Mc-Graw Hill Book Co, 1987.
4	Ganesh S. Hedge	A Text book on Industrial Robotics	1. , Laxmi Publications Pvt. Ltd., New Delhi
5	S.R. Deb & Sankha Deb	Robotics Technology and Flexible Automation Robot	1. Tata McGraw-Hill, 2010.

Pr.1 AUTOMOBILE ENGINEERING LAB

Name of the Course: Diploma in MECHANICAL ENGINEERING			
Course code:		Semester	6th
Total Period:	60	Examination	3 hrs
Practical periods:	4 P/W	Sessional	50
Maximum marks:	100	End Semester Examination:	50

COURSE OBJECTIVES

At the end of the course the students will be able to

List of Practical .

1. Study of Automobile chassis.
2. Study the differential mechanism of the Tractor.
3. Study the hydraulic braking system of automobile.
4. Study Study the cut section model of carburetor solex type and maruti car type.
5. Study the fuel pump cut section model.
6. Study the actual cut section of gear box.
7. Study of actual car engine.

Pr 2. POWER STATION ENGINEERING LAB

Name of the Course: Diploma in MECHANICAL ENGINEERING			
Course code:		Semester	6th
Total Period:	60	Examination	3 hrs
Practical periods:	4 P/W	Sessional	25
Maximum marks:	75	End Semester Examination:	50

COURSE OBJECTIVES

At the end of the course the students will be able to

List of Practical

Experiment 01-To study the modern steam power plant with model.
Experiment 02-To determine the various efficiencies of steam turbine.
Experiment 03-To study the cooling tower.
Experiment 04-Study of jet condenser.
Experiment 05-Study of De-lavel turbine.
Experiment 06-To study the spring loaded safety valve.
Experiment 07-To study the following steam generators (boilers)models.

a) Lancashire boiler.

b) Cornish boiler.

c)Babcock & Wilcox Boiler.

d)Vertical water tube boiler.

Pr3. PROJECT Phase - II

Name of the Course: Diploma in Mechanical Engineering			
Course code:		Semester	6th
Total Period:	150	Examination	3 hrs
Lab. periods:	10 P / week	Sessional	50
Maximum marks:	150	End Sem Examination	100

RATIONALE

Students' Project Work aims at developing innovative skills in the students whereby they apply the knowledge and skills gained through the course covered in many subjects and Labs, by undertaking a project. The prime emphasis of the project work is to understand and apply the basic knowledge of the principles of Mechanical engineering and practices in real life situations, so as to participate and manage a large Mechanical engineering projects, in future. Entire Project spreads over 5th and 6th Semester. Part of the Project covered in 5th Semester was named as *Project Phase-I* and balance portion to be covered in 6th Semester shall be named as *Project Phase-II*.

OBJECTIVES

After undergoing the Project Work, the student will be able to:

- Implement the theoretical and practical knowledge and skills gained through various subjects/courses into an application suitable for a real practical working environment, preferably in an industrial environment.
- Develop software packages or applications and implement these for the actual needs of the community/industry.
- Identify and contrast gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional knowledge as required.
- Carry out cooperative learning through synchronous guided discussions within the class in key areas, asynchronous document sharing and discussions, as well as prepare collaborative edition of the final project report.
- To achieve real life experience in Project design.
- To develop the skill of writing Project Report

Project Phase-I and Phase-II

The Project work duration covers 2 semesters(5th and 6th sem). The Grouping of students, selection of Project, assignment of Project Guide to the Group was done in the beginning of 5th semester under Project Phase-I. The students were allowed to study literature, any existing system and then define the Problem/objective of the Project. Preliminary work and Design of the system also have to be complete in Phase-I. Development may also begin in this phase. Project Milestones are to be set so that progress can be tracked .

In Phase-II Development, Testing, Documentation and Implementation have to be complete. Project Report have to be prepared and complete in Phase-II. All Project reports should be organized uniformly in proper order, irrespective of group. Teacher Guides can make suitable alteration in the components of Task and schedule.

At the end of Project Phase-II in 6th semester there shall be one presentation by each group on whole Project work undertaken by them.

A suggestive criterion for assessing student performance by the external (preferably person from industry) and internal (teacher) examiner is given in table below:

Sl. No.	Performance Criteria
1.	Selection of project assignment
2.	Planning and execution of considerations
3.	Quality of performance
4.	Providing solution of the problems or production of final product
5.	Sense of responsibility
6.	Self expression/ communication/ Presentation skills
7.	Interpersonal skills/human relations
8.	Report writing skills
9	Viva voce

The teachers are free to evolve other criteria of assessment, depending upon the type of project work.
It is proposed that the institute may organize an annual exhibition of the project work done by the students and invite leading Industrial organisations to such an exhibition.

The Project Report need to be prepared as per standard format and following is the indicative format. The Teacher Guide may make minor alteration keeping the sense in tact.

Organization of Project Report

1. Cover page:
   It should contain the following (in order)
   (i) Title of the Project
   (ii) "Submitted in partial fulfillment of the requirements for the Diploma in <Branch Name>"
   (iii) By Name of the Student(s)
   (iv) Logo of the Institution
   (v) Branch Name/Depart Name and Institution Name with Address
   (vi) Academic Year
2. 1st Inner page
   Certificate:
   It should contain he following
   "This is to certify that the work in this Project Report entitled <Project Title> by <Name of student(s)> has been carried out under my supervision in partial fulfillment of the requirements for the Diploma in <Branch Name>" during session <session > in <Branch /Department Name> of <Institute name> and this work is the original work of the above student(s).

   Seal and signature of the Supervisor/Guide with date
3. 2nd Inner Page
   Acknowledgement by the Student(s)
4. Contents.
5. Chapter wise arrangement of Reports
6. Last Chapter: Conclusion
   It should contain
   (i) Conclusion
   (ii) Limitations
   (iii) Scope for further Improvement
7. References

Pr-4 LIFE SKILL

(Common to All Branches)

Practical	**2 Periods per week**	**Sessional**	**25 Marks**
Total Periods	**30 Periods**	**Total Marks**	**25 Marks**

Objective: After completion of this course the student will be able to**:**

- Develop team spirit i.e. concept of working in team
- Apply problem solving skills for a given situation
- Use effective presentation techniques
- Apply task management techniques for given projects
- Enhance leadership traits
- Resolve conflict by appropriate method
- Survive self in today's competitive world
- Face interview without fear

DETAIL CONTENTS:

1. SOCIAL SKILL

Society, Social Structure, Develop Sympathy and Empathy
Swot Analysis – Concept, How to make use of SWOT
Inter personal Relation**:** Sources of conflict, Resolution of conflict ,
Ways to enhance interpersonal relation

2. PROBLEM SOLVING

Steps of Problem solving**:**

- Identify and clarify the problem,
- Information gathering related to problem,
- Evaluate the evidence,
- Consider alternative solutions and their implications,
- Choose and implement the best alternative,
- Review
- Problem solving techniques:

1) Trial and error, 2) Brain storming, 3) Lateral (Out of Box) thinking

3. PRESENTATION SKILL

Body language , Dress like the audience
Posture, Gestures, Eye contact and facial expression. STAGE FRIGHT,
Voice and language – Volume, Pitch, Inflection, Speed, Pause
Pronunciation, Articulation, Language, Practice of speech.
Use of AV aids such as Laptop with LCD projector, white board etc.

4. GROUP DISCUSSION AND INTERVIEW TECHNIQUES

Group Discussion:
Introduction to group discussion, Ways to carry out group discussion,
Parameters— Contact, body language, analytical and logical thinking,
decision making
Interview Technique :
Dress, Posture, Gestures, facial expression, Approach
Tips for handling common questions.

5. WORKING IN TEAM

Understand and work within the dynamics of a groups.
Tips to work effectively in teams,
Establish good rapport, interest with others and work effectively with them
to meet common objectives,
Tips to provide and accept feedback in a constructive and considerate way ,
Leadership in teams, Handling frustrations in group.

6. TASK MANAGEMENT

Introduction, Task identification, Task planning ,
organizing and execution, Closing the task

PRACTICAL

List of Assignment: *(Any Five to be performed including Mock Interview)*

1. **SWOT analysis:-**
   Analyse yourself with respect to your strength and weaknesses, opportunities and threats. Following points will be useful for doing SWOT.

a) Your past experiences,
b) Achievements,
c) Failures,
d) Feedback from others etc.

2. **Solve the True life problem assigned by the Teacher.**

3. **Working in a Team**

Form a group of 5-10 students and do a work for social cause e.g. tree plantation, blood donation, environment protection, camps on awareness like importance of cleanliness in slum area, social activities like giving cloths to poor etc.(One activity per group where Team work shall be exhibited)

4. **Mock Interview**
5. **Discuss a topic in a group and prepare minutes of discussion.**
6. **Deliver a seminar for 5 minutes using presentation aids on the topic given by your teacher.**
7. **Task Management**

Decide any task to be completed in a stipulated time with the help of teacher. Write a report considering various steps in task management (with Break up into sub tasks and their interdependencies and Time)

Note: -1. Please note that these are the suggested assignments on given contents/topic. These assignments are the guide lines to the subject teachers. However the subject teachers are free to design any assignment relevant to the topic.

Note: -2. The following Topics may be considered for Seminar/GD in addition to other Topics at the discretion of the Teacher.

(Comparison with developed countries, Occupational Safety, Health Hazard, Accident & Safety, First-Aid, Traffic Rules, Global Warming, Pollution, Environment, Labour Welfare Legislation, Labour Welfare Acts, Child Labour Issues, Gender Sensitisation ,Harassment of Women at Workplace)

METHODOLOGY:

The Teacher is to explain the concepts prescribed in the contents of the syllabus and then assign different Exercises under Practical to the students to perform.

Books Recommended:-

Sl.No	Name of Authors	Title of the Book	Name of the Publisher
01	E.H. Mc Grath , S.J	Basic Managerial Skills for All	PHI
02	Lowe and Phil	Creativity and problem solving	Kogan Page (I) P Ltd
03	Adair, J	Decision making & Problem Solving	Orient Longman
04	Bishop , Sue	Develop Your Assertiveness	Kogan Page India
05	Allen Pease	Body Language	Sudha Publications Pvt. Ltd.

EQUIPMENT LIST

AUTOMOBILE ENGINEERING LAB

SL.NO	NAME OF THE EQUIPMENTS	QUANTITY
01	Chassis of a car	01 no
02	Differential of a Tractor	01 no
03	Hydraulic brake system of a car working model	01 no
04	Solex carburetor	01 no
05	Maruty car type carburetor	01 no
06	Cut section of a fuel pump	01no
07	New car engine	01 no
08	Gear box	01no

POWER STATION ENGINEERING LAB

SL.NO	NAME OF THE EQUIPMENTS	QUANTITY
01	Stainless steel steam turbine test rig 01Kw 3000RPM	01no
02	Cooling Tower Apparatus or model	01no
03	Jet Condenser apparatus or model	01no
04	De Lavel turbine	01no
05	Spring loaded safety valve	02nos
06	Lancashire boiler model	01no
07	Babcock and Wilcox boiler model	01nos
08	Cornish boiler model	01no
09	Vertical water steam boiler model	01no

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA

TEACHING AND EVALUATION SCHEME FOR 6TH SEMESTER MINING ENGINEERING(wef 2020-21)

Subject Number	Subject Code	Subject	Periods/week			Evaluation Scheme			
			L	T	P	Internal Assessment/ Sessional	End Sem Exams	Exams (Hours)	Total
		Theory							
Th.1		Mine Machinery -II	4			20	80	3	100
Th.2		Mine Geology -II	4			20	80	3	100
Th.3		Mine Legislation & General Safety - II	4			20	80	3	100
Th.4 Elective (Any One)		(a)Mineral Dressing (b)Advanced Mine Survey (c) Material handling & Logistics	4			20	80	3	100
		Total	*16*			*80*	*320*		*400*
		Practical							
Pr.1		Mine Geology -II Lab			6	25	50	3	75
Pr.2		Mine Machinery -II Lab			6	50	50	3	100
Pr.3		Project Phase -II			6	50	100	3	150
Pr.4		Life Skill			2	25	-	-	25
		Student Centred Activities(SCA)			3				
		Total			*23*	*150*	*200*		*350*
		Grand Total	**16**		**23**	**230**	**520**		**750**

Abbreviations: L-Lecturer, T-Tutorial, P-Practical. Each class is of minimum 55 minutes duration

Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%

SCA shall comprise of Extension Lectures/ Personality Development/ Environmental issues /Quiz /Hobbies/ Field visits/ cultural activities/Library studies/Classes on MOOCS/SWAYAM/Idea Tinkering and Innovation Lab Practice etc., Seminar and SCA shall be conducted in a section.

There shall be 1 Internal Assessment done for each of the Theory Subject. Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester

CURRICULLUM OF 6TH SEMESTER

For

DIPLOMA IN MINING ENGINEERING

(Effective FROM 2020-21 Sessions)

STATE COUNCIL FOR TECHNICAL EDUCATION & VOCATIONAL TRAINING, ODISHA, BHUBANESWAR

Th.1. MINE MACHINERY – II

Name of the Course: Diploma in Mining Engineering			
Course Code	:	Semester	: 6th
Theory Periods	: 4 Periods/week	Internal Assessment	: 20
Total Periods	: 60	End Semester Examination	: 80
Examination	: 3 Hours	Maximum Marks	: 100

RATIONALE

It is imperative that a Mining Engineer should be thoroughly conversant with various types of machine used in mining operations.

OBJECTIVES

On completion of the subject, students will be able to:

- Describe various underground face machineries & its applicability.
- Describe various opencast machineries & its applicability.
- Describe various types of pump & its applicability.
- Describe various types of Bore hole pumps & its application.
- Elaborate details about pipes and valves used in mine.

Topic- wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Underground face machineries	15
2	Opencast machineries	15
3	Mine Pumps	20
4	Bore hole pump	5
5	Pipes and valves	5
	Total	60

COURSE CONTENTS (Based on specific objectives)

1. Underground face machineries.

- Electric coal drill
- Describe constructional features, operation, principle & use of electric coal drill.
- State types of drill rods & drill bits used in electric coal drill.
- Describe basic constructional features of gathering arm loader, scraper loader, side discharge loader & load & haul loader.
- Describe basic constructional features & operation principle of jack hammer drill & air leg rock drill.
- Describe basic constructional features & operation principle of road header & Shearer loader.

2. Opencast machineries

- Describe basic constructional features of surface miner, dragline, shovel & backhoe, bucket wheel excavator.
- Describe basic constructional features of dumper, dozer, scraper & road grader.

3. Mine Pumps.

- Classify mine pumps.
- Describe constructional features, working & use of ram pumps.
- Centrifugal & turbine pumps.
- Describe constructional features of centrifugal & turbine pumps.
- State principle of centrifugal & turbine pumps & its applicability.
- Explain balancing the axial thrust of turbine pumps.
- Draw characteristic curves for turbine pumps.
- Solve numerical problems on centrifugal & turbine pumps.
- Describe constructional features and working principle & use of roto pump (screw pump)
- Describe constructional features & working principle of sinking pump.
- State procedure of suspension in shaft.

4. Bore hole pump

- Describe constructional features & working of bore hole pump.
- State installation of bore hole pump.

5. Pipes and valves

- State types of pipe & valves used in Mines.
- Describe constructional features of various type of valves.
- State & describe different types of pipe joints.
- Describe support of laying main pipe in shaft.
- Discuss the Pipe line layout.

SYLLABUS COVERAGE UP TO I.A.

Chapter 1,2,3

RECOMMENDED BOOKS

- Electrical equipment in Mine – H. Cotton
- Winning and Working of Iron Ore – Desmukh & Desmukh
- E.M.T. Vol.-III – D.J.Desmukh

Th.2. MINING GEOLOGY-II

Name of the Course: Diploma in Mining Engineering			
Course Code	:	Semester	: 6th
Theory Periods	: 4 Periods/week	Internal Assessment	: 20
Total Periods	: 60	End Semester Examination	: 80
Examination	: 3 Hours	Maximum Marks	: 100

RATIONALE

In majority of the cases, materials that need to be explored comprise rocks & minerals. It is therefore, essential for an engineer to have basic knowledge of mining geology.

OBJECTIVES

On completion of the paper, students will be able to:

- Outline the importance of Stratigraphy & Geological time Scale in the study of geology.
- The major Groups & economic minerals associated with them that form the basis for the study of stratigraphy.
- Describe the use, origin mode of occurrence & distribution of fossil fuels & where to look for them.
- Explain the fundamental principles that underline the search for economic minerals. He will achieve a certain amount of clarity in using geological, geophysical & geochemical methods for looking for important mineral deposits.
- Develop a comprehensive idea regarding mineralogy mode of occurrence, uses & distribution of ores.
- Undertake sampling work according to BIS specification.

Topic- wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Stratigraphy	12
2	Fossil Fuels	12
3	Prospecting & Exploration	12
4	Economic Geology	12
5	Sampling	12
	Total	60

COURSE CONTENTS (Based on specific objectives)

1. Stratigraphy

- Describe the principles of stratigraphy.
- Describe the geological time Scale.
- Describe the stratigraphic sequence, lithology, distribution & economic mineral deposits of Iron Ore series, Cuddpah Supergroup, Vindhyan super group & gondwana super group.

2. Fossil fuels

- Coal
  - Describe the different ranks of coal.
  - Describe different grades of coal like A,B,C,D.
  - Describe the various theories accounting for the origin of coal.
  - Describe various important lower gondwana Coalfields of India.
- Petroleum
  - Describe the organic & inorganic theories accounting for the origin of petroleum.
  - Define oil pool & oil trap.
  - Describe process of accumulation of oil.
  - Describe favorable conditions for accumulation of oil.
  - Describe different important oil fields in India.

3. Prospecting & exploration.

- Define prospecting.
- Differentiate between prospecting & exploration.
- Use of multi shot camera for borehole direction test.
- Enumerate & describe various criteria for geological exploration.
- Describe various methods of Geophysical prospecting.
- Explain Geochemical prospecting.
- Differentiate between biogeochemical & geo botanical prospecting.

4. Economic Geology

- Define ore & gangue.
- Define tenor & grade.
- Describe the mineralogy, mode of occurrence, distribution & use of iron ore deposits in India.
- Describe the mineralogy, mode of occurrence, & description of Chromites deposits in India & its uses.
- Describe the mineralogy, mode of occurrence & distribution of copper deposits in India & uses of this metal.
- Describe the mineralogy, mode of occurrence, distribution of lead & zinc deposits in India & the uses of these metals.
- UNFC (United Nation Framework of Classification) code of classification of reserves.

5. Sampling

- Define sampling, outline the method of preparation of samples for assay.
- Explain sampling
- Describe the different methods of sampling as outlined by Bureau of
- Indian Standards. (BIS)

SYLLABUS COVERAGE UP TO I.A.

Chapter 1,2,3.

RECOMMENDED BOOKS

- Geology of India & Burma – M.S. Krishnan
- An Introduction to geology of Coal & coalfields of India – N.L.Sharma, K.S.V.Ram
- Geology of petroleum – A.I.Levorsen
- Geological prospecting & Exploration – V.K.Kreiter
- A Hand Book of economic geology – A.K.Sen, P.K.Guha
- Mineral Economics – R.K. Sinha, N.L.Sharma

Th.3. MINE LEGISLATION & GENERAL SAFETY-II

Name of the Course: Diploma in Mining Engineering			
Course Code	:	Semester	: 6th
Theory Periods	: 4 Periods/week	Internal Assessment	: 20
Total Periods	: 60	End Semester Examination	: 80
Examination	: 3 Hours	Maximum Marks	: 100

CHAPTER	TOPIC	PERIODS
1	M.M.R. 1961	15
2	Mines V.T.Rules 1966	4
3	Mines Creche Rules	4
4	Maternity Benefit Act	4
5	Mines Accident & Safety	15
6	Forest Conservation Act (FCA) 1980	3
7	Environmental Protection Act 1986	5
8	MMRD & MCR	5
9	Classified circulars (DGMS)	5
	Total	60

RATIONALE

Since Mining operations involve frequent accidents, it is very important for a mining engineer to be thoroughly conversant with various acts & rules framed for providing safety to workers.

OBJECTIVES

On completion of the above topics, students will be able to :

- Describe various aspects of M.M.R. 1961.
- Describe various aspects of Mines Vocational Training Rules 1966.
- Describe various aspects of Mines Creche Rules 1966.
- Describe various aspects of Maternity Benefit Act.
- Describe various aspects of Mines Accident & Safety.
- Describe various aspects of Forest Conservation Act (FCA) 1980.
- Describe various aspects of Environmental Protection Act 1986.

COURSE CONTENTS (Based on specific objectives)

1. **Metalliferous Mines Regulations 1961**
   - Discuss various provisions of Metalliferous Mines Regulations 1961.

2. **Mines V.T. Rules 1966**
   - Discuss various provisions of Mines V.T. Rules 1966.

3. **Mines Creche Rules 1966**
   - Discuss various provisions of Mines Creche Rules 1966.

4. **Maternity Benefit Act**
   - Discuss various provisions of Maternity Benefit Act.

5. **Mines Accident & Safety**
   - Discuss their classification, causes & prevention.
   - Develop concept about accident cost, accident report, procedure for conducting an enquiry to ascertain the causes of accidents.
   - Discuss procedure for investigation & reporting Mine accident, accident proneness, fatality rate, frequency rate & severity rate.
   - Explain role of supervision in accident prevention, accident due to opencast workings, statistical analysis of accidents, accident statistics, its head & method of data processing.
   - Develop basis concepts of safety, safety & productivity, safety consciousness & safety campaign, safety organization, safety audit.
   - Describe rules of safety committee.
   - Explain the role of workmen inspectors.
   - Discuss terms like industrial fatigue, preventive maintenance, productive equipments & duties of Safety Officer.

6. **Forest Conservation Act (FCA) 1980.**
   - Discuss various provisions of Forest Conservation Act (FCA) 1980.

7. **Environmental Protection Act 1986**
   - Discuss various provisions of Environmental Protection Act 1986.

8. **MMRD Act & MCR Rules**
   - Various provisions of Mineral conservation & exploitation.
   - National Mineral policy.

9. **Classified Circulars (DGMS)**
   - As amended up-to-date.

SYLLABUS COVERAGE UP TO I.A.

Chapter 1,2,3,4.

RECOMMENDED BOOKS

- M.M.R.- 1961
- Mines V.T.Rules- 1966
- Mines Creche Rules- 1966
- Maternity Benefit Act
- Pit Head bath Rules
- Worker's compassion Act
- Environmental Protection Act-1986
- DGMS Circulars

Th.4 (a). MINERAL DRESSING (ELECTIVE)

Name of the Course: Diploma in Mining Engineering			
Course Code	:	Semester	: 6th
Theory Periods	: 4 Periods/week	Internal Assessment	: 20
Total Periods	: 60	End Semester Examination	: 80
Examination	: 3 Hours	Maximum Marks	: 100

CHAPTER	TOPIC	PERIODS
1	Introduction	2
2	Unit Operations	6
3	Grinding	6
4	Lab. Sizing	6
5	Industrial Screening	6
6	Gravity Concentration	6
7	Heavy Media Separation	8
8	Floatation	10
9	Magnetic & Electrostatic Separators	10
	Total	60

RATIONALE

In case of metalliferous mines, the ultimate goal is the extraction of metals. Prior to sending ores into the process of extraction, it requires dressing for removal of desirable gangue minerals as far as possible. So a Mining Engineer, specially attached to metalliferous mines should have some basic concepts about mineral dressing.

OBJECTIVES

On completion of the subject, students will be able to:

- Comprehend physical & chemical properties of ores, know the application in mineral dressing.
- Explain the principle of operation of Blake & Dodge jaw crushers, Gyratory Cone crushers, roll crushers.
- Explain the principle of ball mill, open circuit & close circuit Grinding.
- Explain the principle of lab.sizing.
- Explain the principle of operation of industrial screening. Comprehend the principle of operation of classifiers & their application in the field.
- Comprehend elementary idea about gravity concentration.
- Explain the principle of operation of heavy media separation.
- Comprehend elementary principle of floatation process.
- Explain the principle & application of magnetic separators.

COURSE CONTENTS (Based on specific objectives)

1. Introduction

- Describe the objective & scope of application of mineral dressing in surface & u/g mines.

2. Unit operations

- Explain the principle of Blake & dodge jaw crushers, gyratory & cone crushers, roll crusher.

3. Grinding

- Explain the principle of ball mill operation, open circuit grinding, close circuit grinding, dry & wet grinding.

4. Explain the procedure for size analysis & use of standard screen as also screening techniques employed.

5. Industrial screening

- Explain the principle of industrial screening, type of screening (without calculation)
- Explain the operation of classifier & their application.

6. Gravity concentration

- Explain the general principles of wilfly table & its operation.
- Develop elementary idea regarding the operation jigs.

7. Heavy media separation

- Explain the fundamental principle of heavy media separation – Chance process.

8. Floatation

- Comprehend elementary principle of froth floatation, practical utility of frother, collection, modifiers & depressants.
- Describe & illustrate floatation cell.

9. Magnetic & Electrostatic Separators

- Explain the principle of operation of magnetic & electrostatic separators.
- Describe the application of separators in mineral dressing.

<u>SYLLABUS COVERAGE UP TO I.A.</u>

Chapter 1,2,3,4.

RECOMMENDED BOOKS

- Principles of Mineral Dressing- Gaudin A.M.
- Hand Book of Mineral Dressing Ores & Minerals – A.E.Taggart
- Mineral Processing Technology – B.A.Wills.

Th.4. (b). ADVANCED MINES SURVEY (ELECTIVE)

Name of the Course: Diploma in Mining Engineering			
Course Code	:	Semester	: 6th
Theory Periods	: 4 Periods/week	Internal Assessment	: 20
Total Periods	: 60	End Semester Examination	: 80
Examination	: 3 Hours	Maximum Marks	: 100

Topic wise distribution of periods

CHAPTER	TOPIC	PERIODS
1	Spherical Trigonometry	15
2	Field Astronomy	12
3	Elements of Photogrametry	12
4	Global Positioning System	11
5	Total Station	10
	Total	60

RATIONALE

A Mining engineer entrusted with the responsibility of supervising mine survey works should be through conversant with the latest developments techniques employed in mine surveying.

OBJECTIVES

After the completion of the subject, students will develop the fundamental concepts about
:

- Spherical Trigonometry.
- File Astronomy.
- Elements of Photogrametry.
- Global Positioning System.
- Total Station

COURSE CONTENTS (Based on specific objectives)

1. Spherical Trigonometry.

- Define some common terms used in Spherical Trigonometry like Sphere. Great circle , Small circle, Side of a triangle , Angle of a Triangle, Spherical axes, Spherical Triangle, Right Angled Triangle.
- Convert rectangular to Sperical coordinates.
- Define convergence of meridian and parallel of latitude.

2. Field Astronomy.

- Define some terms used in field astronomy like, Celestial Sphere, Celestial Latitude, Celestial Longitude, Azimuth, Hour angle, Declination , Altitude, Zenith, Nadir, Right Ascension, Celestial Meridian, Celestial Equator, Zenith Distance, Vertical Circle, Celestial Horizon.
- Astronomical Triangle etc. Discuss different astronomical coordinates for heavenly bodies.
- Determine apparent time , Meantime, Sidereal time, Standard Time, Relation between different types of time.
- Determine latitude , Longitude, Time and azimuth of a place .

3. Element of Photogrammetry.

- Know the Photo theodolite.
- Define camera axis, Picture Plane, Principal points, Focal Length, Nodal Point, Prospective centre, Principal Distance, Principal Plane, Print, Isocentre in terrestrial Photogrammetry.
- Explain fundamental principles behind stereo phtogrammetry.
- Define vertical photograph , Tilted Photograph, Oblique photograph, Prospective projection, Explosure station, Flying height focal length, Principal Point, Nadir Point, Ground Nadir Point, Till, Principle plane, Principle Line, Isocentre, Azimuth of Principle Plane, Horizontal Point .Find out the scale of Photography.

4. Global Positioning System.

- Define Global Positioning System. Explain the Principle of working of the system in brief.
- Outline the application of GPS in Mining Engineering.

5. Total Station.

- Identify different components of Total Station.
- Describe the applications of Total Station in Mines.

<u>SYLLABUS COVERAGE UP TO I.A.</u>

Chapter 1,2.

RECOMMENDED BOOKS

- Surveying VOL.-III by Dr. B. C. Punmia
- Modern concept of Mine Surveying by Prof. Alam Chand.

Th.4. (c). MATERIAL HANDLING AND LOGISTICS (ELECTIVE)

Name of the Course: Diploma in Mining Engineering			
Course Code	:	Semester	: 6th
Theory Periods	: 4 Periods/week	Internal Assessment	: 20
Total Periods	: 60	End Semester Examination	: 80
Examination	: 3 Hours	Maximum Marks	: 100

CHAPTER	TOPIC	PERIODS
1	Introduction to surface & Underground haulage system	10
2	Conveyors	8
3	Locomotive haulage	12
4	Aerial ropeways	5
5	Introduction of hydraulic transportation	10
6	Man riding haulage	5
7	Spiral chutes	5
8	Flow of materials in bins, bunkers	5
	Total	60

RATIONALE

A Mining Engineer entrusted with the responsibility of supervising material handling in a mine should have specialized knowledge in this area including transportation in mines.

OBJECTIVES

On completion of the subject, students will be able to:

- Classify underground & surface transportation system in mines.
- Describe various types of conveyor & its design.
- Explain various types of locomotive haulage used in underground mines.
- Describe aerial ropeway & its applicability.
- Describe hydraulic transportation in mines.
- Explain man riding haulage system.
- Explain spiral chute.
- Describe flow of materials in bins & bunkers.

COURSE CONTENTS (Based on specific objectives)

1. **Introduction to surface & underground haulage system**
   - Classify underground & surface haulage system.
   - State factors affecting design of a haulage system.
   - Find out the capacity of a haulage system in a given production.

2. **Conveyors**
   - Classification of Conveyors.
   - State factors affecting design of belt conveyor, cable belt conveyor and steel cord conveyors.
   - Find out carrying capacity of belt conveyor, cable belt conveyor & steel cord conveyor.
   - Describe constructional features of belt conveyor & cable belt conveyor.
   - Describe formula to calculate drive capacity of belt conveyor & cable belt conveyor.
3. **Locomotive haulage**
   - State different types of locomotive haulage.
   - Describe basic constructional features of trolley wire, compressed air , diesel & battery locomotives.
   - State applicability, merits & demerits of locomotives.
   - Describe safety devices of diesel locomotive including flame trap around exhaust conditioner box.
   - Solve numerical problems.
4. **Aerial ropeways**
   - Classify aerial ropeways.
   - State applicability of aerial ropeways.
   - Describe constructional features of bicable and twin cable ropeways.
   - Describe loading, unloading & angle stations bicable & thin cable ropeways.
5. **Hydraulic transportation of solids**
   - Define hydraulic transportation.
   - Discuss theory of hydraulic transportation of solids in mines (without derivation)
   - Design the hydraulic transportation system.
   - State applicability, advantages & disadvantages of hydraulic transportation in Mines.
6. **Man riding haulage**
   - State different types of man riding system.
   - Describe constructional features of monorail, deorail & flight chairs & conveyor system.
7. **Spiral Chutes**
   - State capability of spiral chutes.
   - Explain working principle of spiral chutes.
   - Describe constructional features of spiral chutes.
8. **Flow of materials in bins, bunkers**

   - Describe bins & bunkers.
   - Explain flow of materials in bins & bunkers.
   - Design bunkers & bins for a given production.

SYLLABUS COVERAGE UP TO I.A.

Chapter 1,2,3,4.

RECOMMENDED BOOKS

- Mining Machinery – T. Bryson
- Material Handling in Mines IIT Kharagpur journal
- Mine Transport – N.T.Kerlin
- EMT Vol.-III – D.J.Desmukh
- S.M.E. Mining Engineering Hand Book

Pr.1 . MINING GEOLOGY-II LAB

Name of the Course: Diploma in Mining Engineering			
Course Code	:	Semester	: 6th
Lab Periods	: 6 Periods/week	Sessional	: 25
Total Periods	: 90	End Semester Examination	: 50
Examination	: 3 Hours	Maximum Marks	: 75

Topic wise Distribution of Periods

CHAPTER	TOPIC	PERIODS
1	Megascopic identification of Igneous rocks	15
2	Megascopic identification of Sedimentary rocks	15
3	Megascopic identification of Metamorphic rocks	15
4	Interpretation of contour maps	15
5	Interpretation of geological maps	15
6	Describe the specific gravity of small specimen	15
	Total	90

- Megascopic identification of Igneous rocks in hand specimens.
- Megascopic identification of Sedimentary rocks in hand specimens.
- Megascopic identification of Metamorphic rocks in hand specimens.
- Interpretation of contour maps and preparation of the profile section for it.
- Interpretation of geological maps and preparation of the profile Section for it.
- Describe the specific gravity of small specimen by Joley's spring balance.

Pr.2. MINE MACHINERY – II LAB.

Name of the Course: Diploma in Mining Engineering			
Course Code	:	Semester	: 6th
Lab Periods	: 6 Periods/week	Sessional	: 50
Total Periods	: 90	End Semester Examination	: 50
Examination	: 3 Hours	Maximum Marks	: 100

Topic wise Distribution of Periods

CHAPTER	TOPIC	PERIODS
1	Study of Centrifugal Pumps.	9
2	Study of Turbine Pumps.	9
3	Study of Roto Pump.	9
4	Study of Sinking Pump.	9
5	Study of electric coal drills & its accessories.	9
6	Study of Jack Hammer Drill with air leg.	9
7	Study of scrapper & shaker conveyor	9
8	Study of scrapper loader.	9
9	Model Development of Gathering arm loader.	9
10	Study of Electric Coal Drill.	9
	Total	90

- Study of Centrifugal Pumps.
- Study of Turbine Pumps.
- Study of Roto Pump.
- Study of Sinking Pump.
- Study of electric coal drills & its accessories.
- Study of Jack Hammer Drill with air leg.
- Study of scrapper & shaker conveyor.
- Study of scrapper loader.
- Model Development of Gathering arm loader.
- Study of Electric Coal Drill.

Pr3. PROJECT PHASE - II

Name of the Course: Diploma in Mining Engineering			
Course Code	:	Semester	: 6th
Lab Periods	: 6 Periods/week	Sessional	: 50
Total Periods	: 90	End Semester Examination	: 100
Examination	: 3Hours	Maximum Marks	: 150

RATIONALE

Students' Project Work aims at developing innovative skills in the students whereby they apply the knowledge and skills gained through the course covered in many subjects and Labs, by undertaking a project. The prime emphasis of the project work is to understand and apply the basic knowledge of the principles of Mechanical engineering and practices in real life situations, so as to participate and manage a large Mechanical engineering projects, in future. Entire Project spreads over 5th and 6th Semester. Part of the Project covered in 5th Semester was named as *Project Phase-I* and balance portion to be covered in 6th Semester shall be named as *Project Phase-II*.

OBJECTIVES

After undergoing the Project Work, the student will be able to:

- Implement the theoretical and practical knowledge and skills gained through various subjects/courses into an application suitable for a real practical working environment, preferably in an industrial environment.
- Develop software packages or applications and implement these for the actual needs of the community/industry.
- Identify and contrast gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional knowledge as required.
- Carry out cooperative learning through synchronous guided discussions within the class in key areas, asynchronous document sharing and discussions, as well as prepare collaborative edition of the final project report.
- To achieve real life experience in Project design.
- To develop the skill of writing Project Report

Project Phase-I and Phase-II

The Project work duration covers 2 semesters(5th and 6th sem). The Grouping of students, selection of Project, assignment of Project Guide to the Group was done in the beginning of

5th semester under Project Phase-I. The students were allowed to study literature, any existing system and then define the Problem/objective of the Project. Preliminary work and Design of the system also have to be complete in Phase-I. Development may also begin in this phase. Project Milestones are to be set so that progress can be tracked .

In Phase-II Development, Testing, Documentation and Implementation have to be complete. Project Report have to be prepared and complete in Phase-II. All Project reports should be organized uniformly in proper order, irrespective of group. Teacher Guides can make suitable alteration in the components of Task and schedule.

At the end of Project Phase-II in 6th semester there shall be one presentation by each group on whole Project work undertaken by them.

A suggestive criterion for assessing student performance by the external (preferably person from industry) and internal (teacher) examiner is given in table below:

Sl. No.	**Performance Criteria**
1.	Selection of project assignment
2.	Planning and execution of considerations
3.	Quality of performance
4.	Providing solution of the problems or production of final product
5.	Sense of responsibility
6.	Self expression/ communication/ Presentation skills
7.	Interpersonal skills/human relations
8.	Report writing skills
9	Viva voce

The teachers are free to evolve other criteria of assessment, depending upon the type of project work.

It is proposed that the institute may organize an annual exhibition of the project work done by the students and invite leading Industrial organisations to such an exhibition.

The Project Report need to be prepared as per standard format and following is the indicative format. The Teacher Guide may make minor alteration keeping the sense in tact.

Organization of Project Report

1. Cover page:

   It should contain the following (in order)

   (i) Title of the Project

   (ii) “Submitted in partial fulfillment of the requirements for the Diploma in

<Branch Name>”

(iii) By Name of the Student(s)

(iv) Logo of the Institution

(v) Branch Name/Depart Name and Institution Name with Address

(vi) Academic Year

2. 1st Inner page

   Certificate:

   It should contain he following

   “This is to certify that the work in this Project Report entitled <Project Title> by <Name of student(s)> has been carried out under my supervision in partial fulfillment of the requirements for the Diploma in <Branch Name>” during session <session > in <Branch /Department Name> of <Institute name> and this work is the original work of the above student(s).

   Seal and signature of the Supervisor/Guide with date

3. 2nd Inner Page

   Acknowledgement by the Student(s)

4. Contents.

5. Chapter wise arrangement of Reports

6. Last Chapter: Conclusion

   It should contain

   (i) Conclusion

   (ii) Limitations

   (iii) Scope for further Improvement

7. References

Pr-4 LIFE SKILL

(Common to All Branches)

Practical	**2 Periods per week**	**Sessional**	**25 Marks**
Total Periods	**30 Periods**	**Total Marks**	**25 Marks**

Objective: After completion of this course the student will be able to**:**

- Develop team spirit i.e. concept of working in team
- Apply problem solving skills for a given situation
- Use effective presentation techniques
- Apply task management techniques for given projects
- Enhance leadership traits
- Resolve conflict by appropriate method
- Survive self in today's competitive world
- Face interview without fear

DETAIL CONTENTS:

1. SOCIAL SKILL

Society, Social Structure, Develop Sympathy and Empathy
Swot Analysis – Concept, How to make use of SWOT
Inter personal Relation**:** Sources of conflict, Resolution of conflict ,
Ways to enhance interpersonal relation

2. PROBLEM SOLVING

Steps of Problem solving**:**

- Identify and clarify the problem,
- Information gathering related to problem,
- Evaluate the evidence,
- Consider alternative solutions and their implications,
- Choose and implement the best alternative,
- Review
- Problem solving techniques:

1) Trial and error, 2) Brain storming, 3) Lateral (Out of Box) thinking

3. PRESENTATION SKILL

Body language , Dress like the audience
Posture, Gestures, Eye contact and facial expression. STAGE FRIGHT,
Voice and language – Volume, Pitch, Inflection, Speed, Pause
Pronunciation, Articulation, Language, Practice of speech.
Use of AV aids such as Laptop with LCD projector, white board etc.

4. GROUP DISCUSSION AND INTERVIEW TECHNIQUES

Group Discussion:
Introduction to group discussion, Ways to carry out group discussion,
Parameters— Contact, body language, analytical and logical thinking,
decision making
Interview Technique :
Dress, Posture, Gestures, facial expression, Approach

Tips for handling common questions.

5. **WORKING IN TEAM**

Understand and work within the dynamics of a groups.
Tips to work effectively in teams,
Establish good rapport, interest with others and work effectively with them to meet common objectives,
Tips to provide and accept feedback in a constructive and considerate way ,
Leadership in teams, Handling frustrations in group.

6. **TASK MANAGEMENT**

Introduction, Task identification, Task planning , organizing and execution, Closing the task

PRACTICAL

List of Assignment: *(Any Five to be performed including Mock Interview)*

a. SWOT analysis:-

Analyse yourself with respect to your strength and weaknesses, opportunities and threats. Following points will be useful for doing SWOT.

a) Your past experiences,
b) Achievements,
c) Failures,
d) Feedback from others etc.

b. Solve the True life problem assigned by the Teacher.

3. Working in a Team

Form a group of 5-10 students and do a work for social cause e.g. tree plantation, blood donation, environment protection, camps on awareness like importance of cleanliness in slum area, social activities like giving cloths to poor etc.(One activity per group where Team work shall be exhibited)

4. Mock Interview

5. Discuss a topic in a group and prepare minutes of discussion.

6. Deliver a seminar for 5 minutes using presentation aids on the topic given by your teacher.

7. Task Management

Decide any task to be completed in a stipulated time with the help of teacher. Write a report considering various steps in task management (with Break up into sub tasks and their interdependencies and Time)

Note: -1. Please note that these are the suggested assignments on given contents/topic. These assignments are the guide lines to the subject teachers. However the subject teachers are free to design any assignment relevant to the topic.

Note: -2. The following Topics may be considered for Seminar/GD in addition to other Topics at the discretion of the Teacher.

(Comparison with developed countries, Occupational Safety, Health Hazard, Accident & Safety, First-Aid, Traffic Rules, Global Warming, Pollution, Environment, Labour Welfare Legislation, Labour Welfare Acts, Child Labour Issues, Gender Sensitisation ,Harassment of Women at Workplace)

METHODOLOGY:

The Teacher is to explain the concepts prescribed in the contents of the syllabus and then assign different Exercises under Practical to the students to perform.

Books Recommended:-

Sl.No	Name of Authors	Title of the Book	Name of the Publisher
01	E.H. Mc Grath , S.J	Basic Managerial Skills for All	PHI
02	Lowe and Phil	Creativity and problem solving	Kogan Page (I) P Ltd
03	Adair, J	Decision making & Problem Solving	Orient Longman
04	Bishop , Sue	Develop Your Assertiveness	Kogan Page India
05	Allen Pease	Body Language	Sudha Publications Pvt. Ltd.

EQUIPMENT LIST

DETAILS OF INSTRUMENTS / SAMPLES/ SPECIMENS - GEOLOGY LABORATORY

SUBJECT NO / SUBJECT CODE -PR.1. MINING GEOLOGY-II LAB

The following instruments / samples/ specimens are required for Geology laboratory based on the **6th Semester Mining Engineering Syllabus.**

CHAPTER	TOPIC	ITEM	SPECIFICATION	QUANTITY
1	Megascopic identification of Igneous rocks	Igneous rocks in hand specimen	Common Igneous Rocks in hand specimen along with specimen trey and primary information about the rock specimen.	30 Nos of different Igneous rock specimen
2	Megascopic identification of Sedimentary rocks	Sedimentary rocks in hand specimen	Common Sedimentary Rocks in hand specimen along with specimen trey and primary information about the rock specimen.	30 Nos of different Sedimentary rock specimen
3	Megascopic identification of Metamorphic rocks	Metamorphic rocks in hand specimen	Common Metamorphic Rocks in hand specimen along with specimen trey and primary information about the rock specimen.	30 Nos of different Metamorphic rock specimen
4	Interpretation of contour maps	Contour maps	Different topographic map worksheet with scale for Interpretation and preparation of the profile section for it.	10 nos of different topographic/contour map
5	Interpretation of geological maps	Geological Maps	Different geological map worksheet with scale for Interpretation and preparation of the profile section for it.	10 nos of different geological map
6	Describe the specific gravity of small specimen	Joley's spring balance	The Jolly balance consists essentially of a spring fastened at the top to a movable arm. At the lower end, the spring is provided with two small pans, one suspended beneath the other. The lower pan is kept always immersed to the same depth in water, while the other one hangs in the air. On the upright standard behind the spiral is a mirror on which is engraved or painted a scale of equal parts. The specific gravity of an object, typically a solid, is determined by noting the amount of lengthening of the spring when the object is resting	01 no

			in the upper pan in air (w), and the amount when it is in the lower pan and immersed in water (w'). The specific gravity is then w / (w - w').	

Pr.2. MINE MACHINERY – II LAB.

SL NO.	EQUIPMENT	NO. OF EQUIPMENT/15 STUDENTS
1	Centrifugal Pump.	1
2	Turbine Pump.	1
3	Roto Pump./Screw pump	1
4	Sinking Pump./Submersible pump	1
5	electric coal drills & its accessories.	1
6	Jack Hammer Drill with air leg.	1
7	Working model of scrapper & shaker conveyor	1
8	Working model of scrapper loader.	1
9	Working model of Gathering arm loader.	1
10	Electric Coal Drill.	1

All India Council for Technical Education

(A Statutory body under Ministry of HRD, Govt. of India)

Nelson Mandela MargVasant Kunj, New Delhi-110067
PHONE: 23724151/52/53/54/55/56/57 FAX: 011-23724183 www.aicte-India.org

F.No. Eastern/2017/1-3394807991 Date: 30-Apr-2017

To,
The Commissioner cum Secretary,
Deptt. Of Higher & Technical Education,
Govt. of Orissa, Orisas Sectt.
Bhubaneshwar-751001

Sub: Letter of Approval for New Institute 2017-18

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2016 notified by the Council vide notification number F.No.AB/AICTE/REG/2016 dated 30/11/2016 and other notifications, as applicable and published from time to time, I am directed to convey the approval to

Permanent Id	1-3394807991	Application Id	1-3394807991
Name of the Institute	IIPM SCHOOL OF ENGINEERING & TECHNOLOGY	Institute Address	AT /PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034, KANSBAHAL, SUNDERGARH, Odisha, 770034
Name of the Society/Trust	INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT	Society/Trust Address	AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034,KANSBAHAL,SUNDERGARH,Odisha,770034
Institute Type	Unaided - Private	Region	Eastern

to conduct following courses with the intake indicated below for the academic year 2017-2018

	Application Id : 1-3394807991								
S. No.	Programme	Shift	Level	Course	Full/Part Time	Affiliating Body	Intake approved for 2017-18	PIO/FN/Gulf Quota	NRI
1	ENGINEERING AND TECHNOLOGY	1st Shift	DIPLOMA	MINING ENGINEERING	FULL TIME	Directorate of Technical Education , Odisha	60	NA	NA
2	ENGINEERING AND TECHNOLOGY	1st Shift	DIPLOMA	MECHANICAL ENGINEERING	FULL TIME	Directorate of Technical Education , Odisha	60	NA	NA

Note: The approval is valid for two years from the date of issue of this letter only for getting affiliation with respective University/ Board of Technical Education (BTE)/ Board of Technical Education & Training (BTET) (as applicable) and fulfilling State Govt. requirements for admission. If institution is unable to start in the academic session 2017-18 due to reason mentioned above, the institution will have to apply On-line on AICTE web portal in next academic session for continuation of approval.

The Society/Trust/Institution shall obtain necessary affiliation / permission from the concerned affiliating University**/** Board of Technical Education (BTE)/ Board of Technical Education & Training (BTET)(as applicable) as per the prescribed schedule of the University/ Board of Technical Education (BTE)/ Board of Technical Education & Training (BTET)(as applicable) Admission authority etc. The Applicant Society/Trust/Institution shall send information about commencement of the above courses to AICTE. In case the Institution is not in a position to commence the above mentioned courses for whatever reason during the two years period from the date of issue of this letter, the approval

becomes invalid and the applicant Society/Trust/Institution shall make fresh application to AICTE for grant of approval as per the norms prevailing at that time.

All Institutions shall fulfill the following general conditions:

1. The management shall provide adequate funds for development of land and for providing related infrastructural, instructional and other facilities as per norms and standards laid down by the Council from time to time and for meeting recurring expenditure.

2. The admission shall be made only after adequate infrastructure and all other facilities, including the availability / recruitment of the required faculty are provided as per norms and guidelines of the AICTE.

3. The admissions shall be made in accordance with the regulations notified by the Council from time to time.

4. The curriculum of the course, the procedure for evaluation / assessment of students shall be in accordance with the norms prescribed by the AICTE and concerned affiliating university/ Board of Technical Education (BTE)/ Board of Technical Education & Training (BTET) (as applicable) wherever applicable.

5. The management of the Institution shall not close the Institution or the institution shall not discontinue any course(s) or start any new course(s) or alter intake capacity of seats without the prior approval of the Council.

6. No excess admission shall be made by the Institution over and above the approved intake under any circumstances. In case any excess admission is reported to the Council, appropriate action as per the notified regulations shall be initiated against the Institution.

7. The institutions shall not have any collaborative arrangements with any Indian and / or Foreign Universities for conduct of technical courses other than those approved by AICTE without obtaining prior approval from AICTE. In case any violation is reported to the Council, appropriate action as per the notified regulations shall be initiated against the Institution.

8. The Institution shall not conduct any course(s) in the field of technical education in the same premises / campus and / or in the name of the Institution without prior permission / approval of AICTE. If found so, appropriate action as per the notified regulations shall be initiated against the Institution.

9. The institution shall not conduct any non-technical course (s) in the same premises under any circumstances. In case any violation is reported to the Council, appropriate action as per the notified regulations shall be initiated against the Institution.

10. The institution shall operate only from the approved location, and that the institution shall not open any off campus study centers / extension centers directly or in collaboration with any other institution / university / organization for the purpose of imparting technical education without obtaining prior approval from the AICTE. If found so, appropriate action as per the notified regulations shall be initiated against the Institution.

11. The tuition and other fees shall be charged as prescribed by the Competent Authority within the overall criteria prescribed by the Council from time to time. No capitation fee shall be charged from the students / guardians of students in any form. If found so, appropriate action as per the notified regulations shall be initiated against the Institution.

12. The accounts of the Institution shall be audited annually by a certified Chartered Accountant and shall be open for inspection by the Council or anybody or persons authorized by it.

13. The Director / Principal and the teaching and other staff shall be appointed in given time frame and selection shall be done according to procedures, qualifications and experience prescribed by the Council from time to time and pay scales are as per the norms prescribed by the Council from time to time.

14. The technical institution shall publish an information booklet before commencement of the academic year giving details regarding the institution and courses / programs being conducted and details of infrastructural facilities including faculty etc. in the form of mandatory disclosure. The information booklet may be made available to the stakeholders of the technical education. The mandatory disclosure information, as per directions in the AICTE website / Approval Process Handbook, shall be put on the Institution Website. The information shall be revised every year with updated information about all aspects of the institution.

15. It shall be mandatory for the technical institution to maintain a Website providing the prescribed information. The Website information must be continuously updated as and when changes take place.

16. If a technical Institution fails to disclose the information or suppress and / or misrepresent the information, appropriate action as per the notified regulations shall be initiated against the Institution.

17. AICTE may carry out random inspections round the year for verifying the status of the Institutions to ensure maintenance of norms and standards.

18. AICTE may also conduct inspections with or without notifying the dates to verify specific complaints, to verify adherence to AICTE norms & standards, and to verify any mis-representation, violation of norms & standards, mal-practices etc.

19. The Institution by virtue of the approval given by Council shall not automatically become claimant to any grant-in-aid from the Central or State Government.

20. In the event of a student / candidate withdrawing before the starting of the course, the wait listed candidates should be given admission against the vacant seat. The entire fee collected from the student, after a deduction of the processing fee of not more than Rs. 1000/- (Rupees one thousand only) shall be refunded and returned by the Institution / University/ Board of Technical Education (BTE)/ Board of Technical Education & Training (BTET)(as applicable) to the student / candidate withdrawing from the program. It would not be permissible for Institutions and Universities to retain the School / Institution Leaving Certificates in original to force retention of admitted students.

21. The Institute shall take appropriate measures for prevention of ragging in any form, in the light of AICTE regulation "Prevention and Prohibition of Ragging in Technical Institutions, Universities including Deemed to Universities imparting technical education" Regulation 2009 (F.No. 37-3/Legal/AICTE/2009 dated 01/07/2009). In case of failure to prevent the instances of ragging by the Institutions, the Council shall take appropriate action as per the notified regulations.

The Management of the Institute shall strictly follow further conditions as may be specified by the Council from time to time. The Council may withdraw the approval, in case it observe any violation of the above conditions and / or non-adherence to the norms and standards prescribed by the Council, mis-representation of facts and submitting factually in correct information to it.

Prof. Alok Prakash Mittal
Member Secretary, AICTE

Copy to:

1. **The Regional Officer,**

All India Council for Technical Education
College of Leather Technology Campus
Block LB, Sector III, Salt Lake City
Kolkata - 700 098, West Bengal

2. **The Director Of Technical Education**,**
   Odisha

3. **The Registrar**,**
   Directorate of Technical Education , Odisha

4. **The Principal / Director,**
   IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
   AT /PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034,
   KANSBAHAL,SUNDERGARH,
   Odisha,770034

5. **The Secretary / Chairman,**
   INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
   AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034,
   KANSBAHAL,SUNDERGARH,
   Odisha,770034

6. **Guard File(AICTE)**

Note: ** - Approval letter copy will not be communicated through post/email. However, provision is made in the portal for downloading Approval letter through Authorized login credentials allotted to concerned DTE/Registrar.

All India Council for Technical Education

(A Statutory body under Ministry of Education, Govt. of India)

Nelson Mandela Marg,Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org

APPROVAL PROCESS 2025-26

Extension of Approval (EoA)

F.No. Eastern/1-44638867505/2025/EOA

Date of Approval: 03-Jan-2025

To,

Sub: Extension of Approval for the Academic Year 2025-26

Ref: Online application of the Institution submitted for Extension of Approval for the Academic Year 2025-26

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Education), Powers delegated in AICTE ACT 1987, (No 52 of 1987) chapter II - u/s 2(g) to regulate Technical and subsequent Regulations of AICTE, I am directed to convey the approval to:

Permanent Id	1-3394807991	**Application Id**	1-44638867505
Name of the Institution	IIPM SCHOOL OF ENGINEERING & TECHNOLOGY	**Name of the Society/Trust**	INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
Institution Address	AT /PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034, KANSBAHAL, SUNDERGARH, Odisha, 770034	**Society/Trust Address**	AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034,KANSBAHAL,SUNDERGARH,Odisha,770034
Institution Type	Private-Self Financing	**Region**	Eastern
Year of Establishment	2017		

To conduct following Programs/Courses with the Intake indicated below for the Academic Year 2025-26

Level	Program	Course	Affiliating Body (University /Body)	Intake Approved for 2024-25	Intake Approved for 2025-26	NRI Approval Status	FN / Gulf quota/ OCI/ Approval Status
DIPLOMA	ENGINEERING AND TECHNOLOGY	MECHANICAL ENGINEERING	Directorate of Technical Education , Odisha	60	60	No	No
DIPLOMA	ENGINEERING AND TECHNOLOGY	MINING ENGINEERING	Directorate of Technical Education , Odisha	60	60	No	No

All AICTE approved Institutions are empowered to nurture ecosystems for Skilling (through Vocational courses) via making effective use of existing infrastructure facilities and human resources.

It is mandatory to comply with all the essential requirements as given in APH 2024-27 (Chapter-VI)

Important Instructions

1. As per mandatory Disclosure of APH 2024-27(Annexure-18, page180) Institutions must disclose the following information submitted to Council at the Prominent location on its website.
   i. Department wise availability of Infrastructure along with approved courses and intake approved by the Council.
   ii. Faculty details: Department wise: Name& Designation of the faculty members/teaching staff along with their qualification, tenure of service in your organization, total experience, Institution should also disclose Student Faculty Ratio, Cadre Ratio.
   iii. Additionally Audited Financial Statements for last 3 Financial years.
2. Reservation Policy of the Central Government (Including EWS) / Respective State Government/ UT as the case shall be applicable to all the Programmes. The concerned State Government/ UT Admission authority shall decide Modalities of Admission.
3. The Institution offering courses earlier in the Regular Shift, First Shift, Second Shift/Part Time are now amalgamated as total intake and shall have to fulfil all facilities such as Infrastructure, Faculty and other requirements as per the norms specified in the Approval Process Handbook 2024-25 to 2027 for the Total Approved Intake.
4. In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the **Executive Council / General Council as available on the record of AICTE shall be final and binding.**
5. All AICTE institutions are highly encouraged to get NBA/NAAC accreditation. All eligible AICTE institutions are thoroughly encouraged to participate in NIRF ranking process.
6. Deemed to be University: Institutions Deemed to be Universities (Running Technical Education Programmes), it is mandatory to have AICTE approval from the Academic Year 2018-19 in compliance of the Hon'ble Supreme Court Order dated 03-11-2017 passed in CA No.17869- 17870 /2017.
7. AICTE Approved Institutes are encouraged to utilize SWAYAM PLUS Courses up-to 40%
8. Internship is mandatory for all admitted students.
9. AICTE Approved Institutes are encouraged to make efficient use of the flagship schemes like:
   a. Parakh: Student Gap analysis portal bases services.
   b. Students Scholarship schemes like Pragati, Saksham, Swanath, ADF, etc.
   c. Course in Indian Languages.
   d. ATAL FDPs: Faculty training for Emerging areas and cutting edge Technologies.
   e. Augmenting Utilization of Research Assets (AURA).
   f. Smart India Hackathon: World's largest Open Innovation Platform.

Prof.Rajive Kumar
Member Secretary, AICTE

Copy to:

1. **The Director Of Technical Education**, Odisha**

2. **The Principal / Director,**
   IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
   At /Po. Kansbahal, Dt.Sundargarh, Odisha 770034,
   Kansbahal,Sundergarh,
   Odisha,770034

3. **The Secretary / Chairman,**
   AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034
   KANSBAHAL,SUNDERGARH
   Odisha,770034

4. **Guard File(AICTE)**

Note: Validity of the Course details may be verified at http://www.aicte-india.org/

** Individual Approval letter copy will not be communicated through Post/Email. However, a consolidated list of Approved Institutions(bulk) may be downloaded from the respective login id's.

This is a computer generated Statement. No signature Required

All India Council for Technical Education

(A Statutory body under Ministry of Education, Govt. of India)

Nelson Mandela Marg,Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org

APPROVAL PROCESS 2024-25

Extension of Approval (EoA)

F.No. Eastern/1-43664972842/2024/EOA

Date of Approval: 23-Mar-2024

To,

Sub: Extension of Approval for the Academic Year 2024-25

Ref: Online application of the Institution submitted for Extension of Approval for the Academic Year 2024-25

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Education), Powers delegated in AICTE ACT 1987, (No 52 of 1987) chapter II - u/s 2(g) to regulate Technical and subsequent Regulations of AICTE, I am directed to convey the approval to:

Permanent Id	1-3394807991	**Application Id**	1-43664972842
Name of the Institution	IIPM SCHOOL OF ENGINEERING & TECHNOLOGY	**Name of the Society/Trust**	INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
Institution Address	AT /PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034, KANSBAHAL, SUNDERGARH, Odisha, 770034	**Society/Trust Address**	AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034,KANSBAHAL,SUNDERGARH,Odisha,770034
Institution Type	Private-Self Financing	**Region**	Eastern
Year of Establishment	2017		

To conduct following Programs/Courses with the Intake indicated below for the Academic Year 2024-25

Level	Program	Course	Affiliating Body (University /Body)	Intake Approved for 2023-24	Intake Approved for 2024-25	NRI Approval Status	FN / Gulf quota/ OCI/ Approval Status
DIPLOMA	ENGINEERING AND TECHNOLOGY	MECHANICAL ENGINEERING	Directorate of Technical Education , Odisha	60	60	No	No
DIPLOMA	ENGINEERING AND TECHNOLOGY	MINING ENGINEERING	Directorate of Technical Education , Odisha	60	60	No	No

All AICTE approved Institutions are empowered to nurture ecosystems for Skilling (through Vocational courses) via making effective use of existing infrastructure facilities and human resources.

It is mandatory to comply with all the essential requirements as given in APH 2024-25 to 2027 (Chapter-VI)

Important Instructions

1. As per mandatory Disclosure of APH 2024-27(Annexure-18, page180) Institutions must disclose the following information submitted to Council at the Prominent location on its website.
   i. Department wise availability of Infrastructure along with approved courses and intake approved by the Council.
   ii. Faculty details: Department wise: Name& Designation of the faculty members/teaching staff along with their qualification, tenure of service in your organization, total experience, Institution should also disclose Student Faculty Ratio, Cadre Ratio.
   iii. Additionally Audited Financial Statements for last 3 Financial years.
2. Reservation Policy of the Central Government (Including EWS) / Respective State Government/ UT as the case shall be applicable to all the Programmes. The concerned State Government/ UT Admission authority shall decide Modalities of Admission.
3. The Institution offering courses earlier in the Regular Shift, First Shift, Second Shift/Part Time are now amalgamated as total intake and shall have to fulfil all facilities such as Infrastructure, Faculty and other requirements as per the norms specified in the Approval Process Handbook 2024-25 to 2027 for the Total Approved Intake.
4. In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the **Executive Council / General Council as available on the record of AICTE shall be final and binding.**
5. All AICTE institutions are highly encouraged to get NBA/NAAC accreditation. All eligible AICTE institutions are thoroughly encouraged to participate in NIRF ranking process.
6. Deemed to be University: Institutions Deemed to be Universities (Running Technical Education Programmes), it is mandatory to have AICTE approval from the Academic Year 2018-19 in compliance of the Hon'ble Supreme Court Order dated 03-11-2017 passed in CA No.17869- 17870 /2017.
7. AICTE Approved Institutes are encouraged to utilize SWAYAM PLUS Courses up-to 40%
8. Internship is mandatory for all admitted students.
9. AICTE Approved Institutes are encouraged to make efficient use of the flagship schemes like:
   a. Parakh: Student Gap analysis portal bases services.
   b. Students Scholarship schemes like Pragati, Saksham, Swanath, ADF, etc.
   c. Course in Indian Languages.
   d. ATAL FDPs: Faculty training for Emerging areas and cutting edge Technologies.
   e. Augmenting Utilization of Research Assets (AURA).
   f. Smart India Hackathon: World's largest Open Innovation Platform.

Prof.Rajive Kumar
Member Secretary, AICTE

Copy to:

1. **The Director Of Technical Education**, Odisha**

2. **The Principal / Director,**
IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
At /Po. Kansbahal, Dt.Sundargarh, Odisha 770034,
Kansbahal,Sundergarh,
Odisha,770034

3. **The Secretary / Chairman,**
AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034
KANSBAHAL,SUNDERGARH
Odisha,770034

4. **Guard File(AICTE)**

Note: Validity of the Course details may be verified at http://www.aicte-india.org/

** Individual Approval letter copy will not be communicated through Post/Email. However, a consolidated list of Approved Institutions(bulk) may be downloaded from the respective login id's.

This is a computer generated Statement. No signature Required

All India Council for Technical Education

(A Statutory body under Ministry of Education, Govt. of India)

Nelson Mandela Marg,Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org

APPROVAL PROCESS 2023-24

Extension of Approval (EoA)

F.No. Eastern/1-36947075777/2023/EOA

Date: 15-May-2023

To,

Sub: Extension of Approval for the Academic Year 2023-24

Ref: Online application of the Institution submitted for Extension of Approval for the Academic Year 2023-24

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Education) Regulations, 2020 notified on 4th February 2020 and amended on 24th February 2021 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to:

Permanent Id	1-3394807991	**Application Id**	1-36947075777
Name of the Institution	IIPM SCHOOL OF ENGINEERING & TECHNOLOGY	**Name of the Society/Trust**	INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
Institution Address	AT /PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034, KANSBAHAL, SUNDERGARH, Odisha, 770034	**Society/Trust Address**	AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034,KANSBAHAL,SUNDERGARH,Odisha,770034
Institution Type	Private-Self Financing	**Region**	Eastern
Year of Establishment	2017		

To conduct following Courses with the Intake indicated below for the Academic Year 2023-24

Level	Program	Course	Affiliating Body (University /Body)	Intake Approved for 2022-23	Intake Approved for 2023-24	NRI Approval Status	FN / Gulf quota/ OCI/ Approval Status
DIPLOMA	ENGINEERING AND TECHNOLOGY	MECHANICAL ENGINEERING	Directorate of Technical Education , Odisha	60	60	No	No
DIPLOMA	ENGINEERING AND TECHNOLOGY	MINING ENGINEERING	Directorate of Technical Education , Odisha	60	60	No	No

It is mandatory to comply with all the essential requirements as given in APH 2023-24 (Appendix 6)

Important Instructions

1. The State Government/ UT/ Directorate of Technical Education/ Directorate of Medical Education shall ensure that 10% of reservation for Economically Weaker Section (EWS) as per the reservation policy for admission, operational from the Academic year 2019-20 is implemented without affecting the reservation percentages of SC/ ST/ OBC(NCL) / General. However, this would not be applicable in the case of Minority Institutions referred to the Clause (1) of Article 30 of Constitution of India. Such Institution shall be permitted to increase in annual permitted strength over a maximum period of two years.

2. The Institution offering courses earlier in the Regular Shift, First Shift, Second Shift/Part Time are now amalgamated as total intake and shall have to fulfil all facilities such as Infrastructure, Faculty and other requirements as per the norms specified in the Approval Process Handbook 2023-24 for the Total Approved Intake. Further, the Institutions Deemed to be Universities/ Institutions having Accreditation/ Autonomy status shall have to maintain the Faculty: Student ratio as specified in the Approval Process Handbook.

3. Strict compliance of Anti-Ragging Regulation, Establishment of Committee for SC/ ST, Establishment of Internal Committee (IC), Establishment of Online Grievance Redressal Mechanism, Barrier Free Built Environment for disabled and elderly persons, Fire and Safety Certificate should be maintained as per the provisions made in Approval Process Handbook and AICTE Regulation notified from time to time.

4. In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

5. As per the AICTE Notification dated 29.01.2014 and amended thereto, it shall be mandatory for each Technical Education Institution, University Department and Institution Deemed to be University imparting Technical Education to get accreditation (NBA) for at least 60% of the eligible courses in the next ONE (1) Years' time, otherwise EoA for the subsequent Academic Year (A.Y. 2024-25) shall not be issued by the Council.

6. Deemed to be University**:** Institutions Deemed to be Universities (Running Technical Education Programmes), it is mandatory to have AICTE approval from the Academic Year 2018-19 in compliance of the Hon'ble Supreme Court Order dated 03-11-2017 passed in CA No.17869- 17870 /2017.

Prof.Rajive Kumar
Member Secretary, AICTE

Copy to:

1. **The Director Of Technical Education**, Odisha**

2. **The Principal / Director,**
   IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
   At /Po. Kansbahal, Dt.Sundargarh, Odisha 770034,
   Kansbahal,Sundergarh,
   Odisha,770034

3. **The Secretary / Chairman,**
   AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034
   KANSBAHAL,SUNDERGARH
   Odisha,770034

4. **Guard File(AICTE)**

Note: Validity of the Course details may be verified at http://www.aicte-india.org/

** Individual Approval letter copy will not be communicated through Post/Email. However, a consolidated list of Approved Institutions(bulk) may be downloaded from the respective login id's.

This is a computer generated Statement. No signature Required

All India Council for Technical Education

(A Statutory body under Ministry of Education, Govt. of India)

Nelson Mandela Marg,Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org

APPROVAL PROCESS 2022-23

Extension of Approval (EoA)

F.No. Eastern/1-10976127182/2022/EOA

Date: 03-Jul-2022

To,

Sub: Extension of Approval for the Academic Year 2022-23

Ref: Application of the Institution for Extension of Approval for the Academic Year 2022-23

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations, 2022 Notified on 4th February, 2022 and amended on 24th February 2022 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Permanent Id	1-3394807991	**Application Id**	1-10976127182
Name of the Institution	IIPM SCHOOL OF ENGINEERING & TECHNOLOGY	**Name of the Society/Trust**	INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
Institution Address	AT /PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034, KANSBAHAL, SUNDERGARH, Odisha, 770034	**Society/Trust Address**	AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034,KANSBAHAL,SUNDERGARH,Odisha,770034
Institution Type	Private-Self Financing	**Region**	Eastern
Year of Establishment	2017		

To conduct following Courses with the Intake indicated below for the Academic Year 2022-23

Level	Program	Course	Affiliating Body (University /Body)	Intake Approved for 2021-22	Intake Approved for 2022-23	NRI Approval Status	FN / Gulf quota/ OCI/ Approval Status
DIPLOMA	ENGINEERING AND TECHNOLOGY	MECHANICAL ENGINEERING	Directorate of Technical Education , Odisha	60	60	NA	NA
DIPLOMA	ENGINEERING AND TECHNOLOGY	MINING ENGINEERING	Directorate of Technical Education , Odisha	60	60	NA	NA

It is mandatory to comply with all the essential requirements as given in APH 2022-23 (Appendix 6)

Important Instructions

1. The State Government/ UT/ Directorate of Technical Education/ Directorate of Medical Education shall ensure that 10% of reservation for Economically Weaker Section (EWS) as per the reservation policy for admission, operational from the Academic year 2019-20 is implemented without affecting the reservation percentages of SC/ ST/ OBC (NCL)/ General. However, this would not be applicable in the case of Minority Institutions referred to the Clause (1) of Article 30 of Constitution of India. Such Institution shall be permitted to increase in annual permitted strength over a maximum period of two years.

2. The Institution offering courses earlier in the Regular Shift, First Shift, Second Shift/Part Time are now amalgamated as total intake and shall have to fulfil all facilities such as Infrastructure, Faculty and other requirements as per the norms specified in the Approval Process Handbook 2022-23 for the Total Approved Intake. Further, the Institutions Deemed to be Universities/ Institutions having Accreditation/ Autonomy status shall have to maintain the Faculty: Student ratio as specified in the Approval Process Handbook. All such Institutions/ Universities shall have to create the necessary Faculty, Infrastructure and other facilities WITHIN 2 YEARS to fulfil the norms based on the Affidavit submitted to AICTE beginning with the Academic Year 2022-23

3. Strict compliance of Anti-Ragging Regulation, Establishment of Committee for SC/ ST, Establishment of Internal Complaint Committee (ICC), Establishment of Online Grievance Redressal Mechanism, Barrier Free Built Environment for disabled and elderly persons, Fire and Safety Certificate should be maintained as Approval Process Handbook and provisions made in AICTE Regulation notified from time to time.

4. In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

Pharmacy Institute: In compliance with the order dated 05.03.2020 passed by the Hon'ble Supreme Court of India in Transferred Petitions (CIVIL) No 87-101 of 2014, for the existing institutions offering courses in Pharmacy Programme, approval of Pharmacy Council of India (PCI) is mandatory and AICTE approval is NOT required. The requirements for running the Programme (Diploma / UG / PG) such as Land & Build-up Area, Student-faculty ratio, Intake etc. will be as per the respective regulatory body (PCI).
In case of any inconsistency in the course name and intake for EoA issued by AICTE and the approval by PCI, the approval of PCI shall prevail.

Architecture Institute: In compliance with the order dated 08.11.2019 passed by the Hon'ble Supreme Court of Indian CA No.364/ 2005, for the existing Institutions offering Courses in Architecture Programme, approval by the Council of Architecture (CoA) is mandatory and AICTE approval is NOT required. The requirements for running the Programme (Diploma / UG / PG) such as Land & Build-up Area, Student-faculty ratio, Intake etc. will be as per respective regulatory body (CoA). In case of any inconsistency in the course name and intake for EoA issued by AICTE and the approval by CoA, the approval of CoA shall prevail.

Deemed to be University: Institutions Deemed to be Universities (Running Technical Education Programmes), it is mandatory to have AICTE approval from the Academic Year 2018-19 in compliance of the Hon'ble Supreme Court Order dated 03-11-2017 passed in CA No.17869- 17870 /2017.

Prof.Rajive Kumar
Member Secretary, AICTE

Copy to:

1. **The Director Of Technical Education**, Odisha**

2. **The Principal / Director,**
   IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
   At /Po. Kansbahal, Dt.Sundargarh, Odisha 770034,
   Kansbahal,Sundergarh,
   Odisha,770034

3. **The Secretary / Chairman,**
   AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034
   KANSBAHAL,SUNDERGARH
   Odisha,770034

4. **The Regional Officer,**
   All India Council for Technical Education

College of Leather Technology Campus
Block LB, Sector III, Salt Lake City
Kolkata - 700 098, West Bengal

5. Guard File(AICTE)

Note: Validity of the Course details may be verified at http://www.aicte-india.org/

****** Individual Approval letter copy will not be communicated through Post/Email. However, consolidated list of Approved Institutions(bulk) will be shared through official Email Address to the concerned Authorities mentioned above.

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All India Council for Technical Education

(A Statutory body under Ministry of Education, Govt. of India)

Nelson Mandela Marg,Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org

APPROVAL PROCESS 2021-22

Extension of Approval (EoA)

F.No. Eastern/1-9318290242/2021/EOA

Date: 25-Jun-2021

To,

The Commissioner cum Secretary,
Deptt. Of Higher & Technical Education,
Govt. of Orissa, Orisas Sectt.
Bhubaneshwar-751001

Sub: Extension of Approval for the Academic Year 2021-22

Ref: Application of the Institution for Extension of Approval for the Academic Year 2021-22

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations, 2021 Notified on 4th February, 2020 and amended on 24th February 2021 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to:

Permanent Id	1-3394807991	**Application Id**	1-9318290242
Name of the Institution /University	IIPM SCHOOL OF ENGINEERING & TECHNOLOGY	**Name of the Society/Trust**	INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
Institution /University Address	AT /PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034, KANSBAHAL, SUNDERGARH, Odisha, 770034	**Society/Trust Address**	AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034,KANSBAHAL,SUNDERGARH,Odisha,770034
Institution /University Type	Private-Self Financing	**Region**	Eastern

To conduct following Programs / Courses with the Intake indicated below for the Academic Year 2021-22

Program	Level	Course	Affiliating Body (University /Body)	Intake Approved for 2020-21	Intake Approved for 2021-22	NRI Approval Status	FN / Gulf quota/ OCI/ Approval Status
ENGINEERING AND TECHNOLOGY	DIPLOMA	MINING ENGINEERING	Directorate of Technical Education , Odisha	60	60	NA	NA
ENGINEERING AND TECHNOLOGY	DIPLOMA	MECHANICAL ENGINEERING	Directorate of Technical Education , Odisha	60	60	NA	NA

It is mandatory to comply with all the essential requirements as given in APH 2021-22 (Appendix 6)

Important Instructions

1. The State Government/ UT/ Directorate of Technical Education/ Directorate of Medical Education shall ensure that 10% of reservation for Economically Weaker Section (EWS) as per the reservation policy for admission, operational from the Academic year 2019-20 is implemented without affecting the reservation percentages of SC/ ST/ OBC/ General. However, this would not be applicable in the case of Minority Institutions referred to the Clause (1) of Article 30 of Constitution of India. Such Institution shall be permitted to increase in annual permitted strength over a maximum period of two years.

2. The Institution offering courses earlier in the Regular Shift, First Shift, Second Shift/Part Time now amalgamated as total intake shall have to fulfil all facilities such as Infrastructure, Faculty and other requirements as per the norms specified in the Approval Process Handbook 2021-22 for the Total Approved Intake. Further, the Institutions Deemed to be Universities/ Institutions having Accreditation/ Autonomy status shall have to maintain the Faculty: Student ratio as specified in the Approval Process Handbook.

3. Strict compliance of Anti-Ragging Regulation, Establishment of Committee for SC/ ST, Establishment of Internal Complaint Committee (ICC), Establishment of Online Grievance Redressal Mechanism, Barrier Free Built Environment for disabled and elderly persons, Fire and Safety Certificate should be maintained as per the provisions made in Approval Process Handbook and AICTE Regulation notified from time to time.

4. In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

Prof.Rajive Kumar
Member Secretary, AICTE

Copy ** to:

1. **The Director of Technical Education**, Odisha**

2. **The Principal / Director,**
   IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
   At /Po. Kansbahal, Dt.Sundargarh, Odisha 770034,
   Kansbahal,Sundergarh,
   Odisha,770034

3. **The Secretary / Chairman,**
   AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034
   KANSBAHAL,SUNDERGARH
   Odisha,770034

4. **The Regional Officer,**
   All India Council for Technical Education
   College of Leather Technology Campus
   Block LB, Sector III, Salt Lake City
   Kolkata - 700 098, West Bengal

5. **Guard File(AICTE)**

Note: Validity of the Course details may be verified at http://www.aicte-india.org/ .

****** Individual Approval letter copy will not be communicated through Post/Email. However, consolidated list of Approved Institutions(bulk) will be shared through official Email Address to the concerned Authorities mentioned above.

This is a computer generated Statement. No signature Required

All India Council for Technical Education

(A Statutory body under Ministry of HRD, Govt. of India)

Nelson Mandela Marg,Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org

APPROVAL PROCESS 2020-21

Extension of Approval (EoA)

F.No. Eastern/1-7014103254/2020/EOA

Date: 30-Apr-2020

To,

Sub: Extension of Approval for the Academic Year 2020-21

Ref: Application of the Institution for Extension of Approval for the Academic Year 2020-21

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2020 notified by the Council vide notification number F.No. AB/AICTE/REG/2020 dated 4th February 2020 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Permanent Id	1-3394807991	**Application Id**	1-7014103254
Name of the Institute	IIPM SCHOOL OF ENGINEERING & TECHNOLOGY	**Name of the Society/Trust**	INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
Institute Address	AT /PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034, KANSBAHAL, SUNDERGARH, Odisha, 770034	**Society/Trust Address**	AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034,KANSBAHAL,SUNDERGARH,,770034
Institute Type	Private-Self Financing	**Region**	Eastern

To conduct following Courses with the Intake indicated below for the Academic Year 2020-21

Program	Level	Course	Affiliating Body (University /Body)	Intake Approved for 2019-20	Intake Approved for 2020-21	NRI Approval Status	PIO / FN / Gulf quota/ OCI/ Approval Status
ENGINEERING AND TECHNOLOGY	DIPLOMA	MINING ENGINEERING	Directorate of Technical Education , Odisha	60	60	NA	No
ENGINEERING AND TECHNOLOGY	DIPLOMA	MECHANICAL ENGINEERING	Directorate of Technical Education , Odisha	60	60	NA	No

It is mandatory to comply with all the essential requirements as given in APH 2020-21 (Appendix 6)

Important Instructions

1. The State Government/ UT/ Directorate of Technical Education/ Directorate of Medical Education shall ensure that 10% of reservation for Economically Weaker Section (EWS) as per the reservation policy for admission, operational from the Academic year 2020-21 is implemented without affecting the reservation percentages of SC/ ST/ OBC/ General. However, this would not be applicable in the case of Minority Institutions referred to the Clause (1) of Article 30 of Constitution of India. Such Institution shall be permitted to increase in annual permitted strength over a maximum period of two years beginning with the Academic Year 2020-21

2. The Institution offering courses earlier in the Regular Shift, First Shift, Second Shift/Part Time now amalgamated as total intake shall have to fulfil all facilities such as Infrastructure, Faculty and other requirements as per the norms specified in the Approval Process Handbook 2020-21 for the Total Approved Intake. Further, the Institutions Deemed to be Universities/ Institutions having Accreditation/ Autonomy status shall have to maintain the Faculty: Student ratio as specified in the Approval Process Handbook. All such Institutions/ Universities shall have to create the necessary Faculty, Infrastructure and other facilities WITHIN 2 YEARS to fulfil the norms based on the Affidavit submitted to AICTE.

3. In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

4. Strict compliance of Anti-Ragging Regulation: - Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 373/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

Prof.Rajive Kumar
Member Secretary, AICTE

Copy to:

1. **The Director Of Technical Education**, Odisha**

2. **The Principal / Director,**
   IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
   At /Po. Kansbahal, Dt.Sundargarh, Odisha 770034,
   Kansbahal,Sundergarh,
   Odisha,770034

3. **The Secretary / Chairman,**
   AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034
   KANSBAHAL,SUNDERGARH
   ,770034

4. **The Regional Officer,**
   All India Council for Technical Education
   College of Leather Technology Campus
   Block LB, Sector III, Salt Lake City
   Kolkata - 700 098, West Bengal

5. **Guard File(AICTE)**

Note: Validity of the Course details may be verified at http://www.aicte-india.org/

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All India Council for Technical Education

(A Statutory body under Ministry of HRD, Govt. of India)

Nelson Mandela Marg,Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org

APPROVAL PROCESS 2019-20

Extension of Approval (EoA)

F.No. Eastern/1-4260070928/2019/EOA Date: 10-Apr-2019

To,

The Commissioner cum Secretary,
Deptt. Of Higher & Technical Education,
Govt. of Orissa, Orisas Sectt.
Bhubaneshwar-751001

Sub: Extension of Approval for the Academic Year 2019-20

Ref: Application of the Institution for Extension of approval for the Academic Year 2019-20

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2018 notified by the Council vide notification number F.No.AB/AICTE/REG/2018 dated 31/12/2018 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Permanent Id	1-3394807991	**Application Id**	1-4260070928
Name of the Institute	IIPM SCHOOL OF ENGINEERING & TECHNOLOGY	**Name of the Society/Trust**	INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
Institute Address	AT /PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034, KANSBAHAL, SUNDERGARH, Odisha, 770034	**Society/Trust Address**	AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034,KANSBAHAL,SUNDERGARH,Odisha,770034
Institute Type	Unaided - Private	**Region**	Eastern

Opted for Change from Women to Co-Ed and vice versa	No	**Change from Women to Co-Ed and vice versa Approved or Not**	NA
Opted for Change of Name	No	**Change of Name Approved or Not**	NA
Opted for Change of Site/Location	No	**Change of Site/Location Approved or Not**	NA
Opted for Conversion from Degree to Diploma or vice versa	No	**Conversion for Degree to Diploma or vice versa Approved or Not**	NA
Opted for Organization Name Change	No	**Change of Organization Name Approved or Not**	NA
Opted for Merger of Institution	No	**Merger of Institution Approved or Not**	NA
Opted for Introduction of New Program/Level	No	**Introduction of Program/Level Approved or Not**	NA

To conduct following Courses with the Intake indicated below for the Academic Year 2019-20

Program	Shift	Level	Course	FT/PT+	Affiliating Body (Univ/Body)	Intake Approved for 2019-20	NRI Approval Status	PIO / FN / Gulf quota/ OCI/ Approval Status
Engineering And Technology	1st	Diploma	Mining Engineering	FT	Directorate of Technical Education , Odisha	60	NA	NA
Engineering And Technology	1st	Diploma	Mechanical Engineering	FT	Directorate of Technical Education , Odisha	60	NA	NA

+FT –Full Time,PT-Part Time

Deficiencies Noted based on Self Disclosure	
Particulars	**Deficiency**
Other Facilities Deficiency	
Fire and Safety Certificate	*Yes*

***Please refer Deficiency Report for details

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY is hereby informed to submit the compliance of the deficiencies mentioned above to the Regional Office within a period of **6 months** from the date of issuance of this letter failing which the council shall initiate strict action as defined in Approval Process Handbook 2019-20 during the subsequent Academic Year.

In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

Strict compliance of Anti-Ragging Regulation: - Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 37-3/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

It is mandatory to comply all the essential requirements as given in APH 2019-20(appendix 6)

NOTE: If the State Government / UT / DTE / DME has a reservation policy for admission in Technical Education Institutes and the same is applicable to Private & Self-financing Technical Institutions, then the State Government / UT/ DTE / DME shall ensure that 10 % of Reservation for EWS would be operational from the Academic year 2019-20 without affecting the percentage reservations of SC/ST/OBC/General . However, this would not be applicable in the case of Minority Institutions referred to the clause (1) of Article 30 of Constitution of India.

Prof. A.P Mittal
Member Secretary, AICTE

Copy to:

1. **The Director Of Technical Education**, Odisha**

2. **The Registrar**,**
   Directorate Of Technical Education , Odisha

3. **The Principal / Director,**
   Iipm School Of Engineering & Technology
   At /Po. Kansbahal, Dt.Sundargarh, Odisha 770034,
   Kansbahal,Sundergarh,
   Odisha,770034

4. **The Secretary / Chairman,**
   Indian Institute For Production Management
   At / Po. Kansbahal, Dt.Sundargarh, Odisha 770034.
   Kansbahal,Sundergarh,
   Odisha,770034

5. **The Regional Officer,**
   All India Council for Technical Education
   College of Leather Technology Campus
   Block LB, Sector III, Salt Lake City
   Kolkata - 700 098, West Bengal

6. **Guard File(AICTE)**

Note: Validity of the Course details may be verified at http://www.aicte-india.org/

****** Individual Approval letter copy will not be communicated through Post/Email. However, consolidated list of Approved Institutions(bulk) will be shared through official Email Address to the concerned Authorities mentioned above.

All India Council for Technical Education

(A Statutory body under Ministry of HRD, Govt. of India)

Nelson Mandela Marg,Vasant Kunj, New Delhi-110070 Website: www.aicte-india.org

APPROVAL PROCESS 2018-19

Extension of Approval (EoA)

F.No. Eastern/1-3510694625/2018/EOA

Date: 04-Apr-2018

To,

The Commissioner cum Secretary,
Deptt. Of Higher & Technical Education,
Govt. of Orissa, Orisas Sectt.
Bhubaneshwar-751001

Sub: Extension of Approval for the Academic Year 2018-19

Ref: Application of the Institution for Extension of approval for the Academic Year 2018-19

Sir/Madam,

In terms of the provisions under the All India Council for Technical Education (Grant of Approvals for Technical Institutions) Regulations 2016 notified by the Council vide notification number F.No.AB/AICTE/REG/2016 dated 30/11/2016 and amended on December 5, 2017 and norms standards, procedures and conditions prescribed by the Council from time to time, I am directed to convey the approval to

Permanent Id	1-3394807991	**Application Id**	1-3510694625
Name of the Institute	IIPM SCHOOL OF ENGINEERING & TECHNOLOGY	**Name of the Society/Trust**	INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
Institute Address	AT /PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034, KANSBAHAL, SUNDERGARH, Odisha, 770034	**Society/Trust Address**	AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034,KANSBAHAL,SUNDERGARH,Odisha,770034
Institute Type	Unaided - Private	**Region**	Eastern

Opted for Change from Women to Co-Ed and vice versa	No	**Change from Women to Co-Ed and vice versa Approved or Not**	NA
Opted for Change of Name	No	**Change of Name Approved or Not**	NA
Opted for Change of Site	No	**Change of Site Approved or Not**	NA
Opted for Conversion from Degree to Diploma or vice versa	No	**Conversion for Degree to Diploma or vice versa Approved or Not**	NA
Opted for Organization Name Change	No	**Change of Organization Name Approved or Not**	NA

To conduct following Courses with the Intake indicated below for the Academic Year 2018-19

Program	Shift	Level	Course	FT/PT+	Affiliating Body (Univ/Body)	Intake Approved for 2018-19	NRI Approval Status	PIO / FN / Gulf quota/ OCI/ Approval Status	Foreign Collaboration /Twining Program Approval Status*
ENGINEERING AND TECHNOLOGY	1st	DIPLOMA	MINING ENGINEERING	FT	Directorate of Technical Education , Odisha	60	NA	NA	NA
ENGINEERING AND TECHNOLOGY	1st	DIPLOMA	MECHANICAL ENGINEERING	FT	Directorate of Technical Education , Odisha	60	NA	NA	NA

+FT –Full Time,PT-Part Time

In case of any differences in content in this Computer generated Extension of Approval Letter, the content/information as approved by the Executive Council / General Council as available on the record of AICTE shall be final and binding.

Strict compliance of Anti-Ragging Regulation: - Approval is subject to strict compliance of provisions made in AICTE Regulation notified vide F. No. 37-3/Legal/AICTE/2009 dated July 1, 2009 for Prevention and Prohibition of Ragging in Technical Institutions. In case Institution fails to take adequate steps to Prevent Ragging or fails to act in accordance with AICTE Regulation or fails to punish perpetrators or incidents of Ragging, it will be liable to take any action as defined under clause 9(4) of the said Regulation.

Prof. A.P Mittal
Member Secretary, AICTE

Copy to:

1. The Regional Officer,
   All India Council for Technical Education
   College of Leather Technology Campus
   Block LB, Sector III, Salt Lake City
   Kolkata - 700 098, West Bengal

2. The Director Of Technical Education**,
   Odisha

3. The Registrar**,
   Directorate of Technical Education , Odisha

4. The Principal / Director,
   IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
   AT /PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034,
   KANSBAHAL,SUNDERGARH,
   Odisha,770034

5. The Secretary / Chairman,
   INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
   AT / PO. KANSBAHAL, DT.SUNDARGARH, ODISHA 770034,
   KANSBAHAL,SUNDERGARH,
   Odisha,770034

6. Guard File(AICTE)

Note: Validity of the Course details may be verified at http://www.aicte-india.org/

****** Individual Approval letter copy will not be communicated through Post/Email. However, consolidated list of Approved Institutions(bulk) will be shared through official Email Address to the concerned Authorities mentioned above.

AUDITED FINANCIAL STATEMENTS

OF

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY

(UNIT OF INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT)

KANSBAHAL, ODISHA-770034

FOR THE FINANCIAL YEAR 2024-25

AUDITED BY:

GARG PANKAJ & CO

Chartered Accountants

G29, 2ND FLOOR, BUDHRAM ORAM MARKET,

BISRA DAHAR, ROURKELA-769012

Phone: 9861107344, 9438511557

Email: mail@gargpankajco.in, topperpankajgarg@rediffmail.com

Website: www.gargpankajco.com

Branches: 1) Sundargarh 2) Bonaigarh 3) Bhawanipatna

GARG PANKAJ & CO.
CHARTERED ACCOUNTANTS
INDIA

Head Office :
G-29, 2nd Floor, Budhram Oram Market Complex,
Kachery Road, Rourkela 769012, Odisha

INDEPENDENT AUDITORS REPORT

To the Members
IIPM School of Engineering & Technology
(Unit of Indian Institute for Production Management, Kansbahal)
Kansbahal 770034, Odisha.

We have audited the attached Balance Sheet of the **IIPM School of Engineering & Technology (Unit of Indian Institute for Production Management, Kansbahal)** as at 31-03-2025 and also the Income & Expenditure Account for the year ended on that date annexed thereto. These financial statements are the responsibility of the Governing body of the Society. Our responsibility is to express an opinion on these financial statements based on Our audit.

We conducted Our audit in accordance with auditing standards generally in India. Those Standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatements. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by the management, as well as evaluating the overall financial statement presentation. We believe that Our audit provides a reasonable basis for Our opinion.

Further to Our comments as before, we report that:

1. We have obtained all the information and explanations, which to the best of Our knowledge and belief were necessary for the purpose of Our audit;
2. In Our opinion, proper books of accounts as required by law have been kept by the society so far as appears from Our examination of those books;
3. The Balance Sheet and Income & Expenditure Account dealt with by this report are in agreement with the books of accounts:
4. In Our opinion and to the best of Our information and according to the explanations given to us, the said accounts give a true and fair view in conformity with the accounting

GARG PANKAJ & CO. ROURKELA CHARTERED ACCOUNTANTS

Branch 1 :
2B, 2nd Floor, Aamba Towers, Hospital Rd.,
Sundargarh 770001, Odisha

Branch 2 :
1A, 1st Floor, Above Kasim Cloth Store,
Main Road, Bonai 770038, Odisha

Mob. No. : 9861107344, 9438511557
E-mail : topperpankajgarg@rediffmail.com
Website : www.gargpankajco.com

principles generally accepted in India:

a) in the case of the Balance Sheet, of the state of affairs of the Society as at 31-03-2025 and

b) in the case of the Income & Expenditure Account, of the excess of income over expenditure for the year ended on that date.

Place : Rourkela
Date : 30-09-2025
Udin: 25301602BMOHBC9806

For GARG PANKAJ & CO.
Chartered Accountants
Firm Reg.No -328978E

CA PANKAJ GARG
Partner
M.No - 301602

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
UNIT OF: INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

BALANCE SHEET as at 31st March 2025

Particulars	Sch. No.	(Fig. in Rs.) 31.03.2025	(Fig. in Rs.) 31.03.2024
CAPITAL FUND & LIABILITIES			
Current Liabilities	VII	2,136,069	3,441,456
Excess of Income over Expenditure	VIII	18,252,472	16,832,857
		20,388,541	**20,274,313**
ASSETS & PROPERTIES			
Fixed Assets	III		
Gross Block		3,114,473	2,934,764
Less: Depreciation		1,262,231	1,030,834
Net Block		**1,852,242**	**1,903,930**
Current Assets			
Fees Receivable	IV	11,385,730	11,966,639
Loans, Deposits & Advances	V	6,955,212	6,329,801
Cash and Bank Balance	VI	195,357	73,943
		20,388,541	**20,274,313**
Notes to Accounts	IX		

Auditors'
As per our report of even date
For GARG PANKAJ & CO.
Chartered Accountants
Firm Registration No. 328978E

GARG PANKAJ & CO. ROURKELA CHARTERED ACCOUNTANTS

CA PANKAJ GARG, Partner
Membership No. 301602

DR KAPILESWAR MISHRA
Director

UDIN: 25301602BMOHBC9806

Date: 30/09/2025
Place: Rourkela

Manager (Accounts)

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
UNIT OF: INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31.03.2025

Particulars	Sch. No.	(Fig. in Rs.) 31.3.2025	(Fig. in Rs.) 31.3.2024
INCOME			
Course Fees- Mechanical Engg		4,963,375	4,863,410
Course Fees- Mining		4,802,575	4,893,810
Hostel Fees		3,420,000	2,460,000
Uniform Fees		435,000	438,000
Transportation Fees		194,200	179,800
Miscellaneous Receipts	I	702,139	451,928
Total		14,517,289	**13,286,948**
EXPENDITURE			
Staff Salaries/Gratuity/ Leave salaries		7,345,243	5,333,839
Traveling Expenses		226,603	198,055
Employers Contribution To PF		350,565	158,782
Employers Contribution To ESI		21,999	5,100
Employees Welfare		150,219	158,285
Leave Travel Assistance(LTA)		415,322	290,109
Electricity Expenses		361,133	391,080
Hostel Expenses		1,709,744	385,563
Printing & Stationery		161,204	167,267
Repair & Maintenance		106,974	180,524
Legal Matters		70,265	87,476
Depreciation	III	231,397	242,471
Other Revenue Expenses	II	1,947,006	1,820,544
		13,097,674	9,419,095
Net Excess of Income over Expenditure		**1,419,615**	3,867,853
Total		**14,517,289**	**13,286,948**

Auditors'
As per our report of even date
For GARG PANKAJ & CO.
Chartered Accountants
Firm Registration No. 328978E

GARG PANKAJ & CO. ROURKELA CHARTERED ACCOUNTANTS

CA PANKAJ GARG, Partner
Membership No. 301602

DR. KAPILESWAR MISHRA
Director

UDIN: 25301602BMOHBC9806

Date: 30/09/2025
Place: Rourkela

Manager (Accounts)

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
UNIT OF: INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

Schedule annexed to and forming part of accounts Particulars	(Fig. in Rs.) 31.03.2025	(Fig. in Rs.) 31.03.2024
I Miscellaneous Receipts		
Interest From SB Accounts	2,933	2,626
Other Receipts	650,206	401,302
House Rent	49,000	48,000
Total	**702,139**	**451,928**
II Other Revenue Expenses		
Audit Fees & Expenses	5,000	5,000
Advertisement Expenses	209,485	-
Bank Charges	484	425
Campus Drive Expenses	2,402	-
Estate Maintenance	204,904	286,379
Fees & Subscription	91,810	70,900
Festival & Function Expenses	87,779	176,308
General Expenses	9,787	26,023
Interest on Bus Loan A/c	71,100	-
Internet Expenses	5,900	69,970
Postage/Courier Expenses	5,649	4,772
Laboratory Expenses	-	42,319
Security Services/Contract Labour Expenses	360,545	254,296
Telephone/Fax/E-Mail Expenses	61,155	24,774
Transit House Expense	11,885	12,970
Uniform Expenses	249,900	249,900
Newspaper & Magazine	-	18,867
Hostel Services Staff Expenses	445,552	510,377
Water Charges	79,089	32,685
Insurance	29,634	30,079
Service Charges for Doctor	6,240	4,500
Dish Antina Service Charges	8,706	-
Total	**1,947,006**	**1,820,544**

DR KAPILESWAR MISHRA
Director

Manager (Accounts)

GARG PANKAJ & CO. CHARTERED ACCOUNTANTS ROURKELA

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
UNIT OF: INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

Schedule annexed to and forming part of accounts
Fixed Assets as on 31.03.2025

SCHEDULE - III

Particulars	Rate %	COST				DEPRECIATION					NET	NET
							For the Year					
		At Opening 01.04.24	Additions	Transfer	At Closing 31.03.25	At Opening 01.04.24	Additions	Adjustment (+) / (-)	Total	At Closing 31.03.2025	Value as on 31.03.2025	Value as on 31.03.2024
Furniture and Fixtures	3.39%	223,247	19,710		242,957	38,927	7,595	-	7,595	46,522	196,435	184,320
Office Equipment	5.28%	63,022			63,022	20,475	3,328	-	3,328	23,803	39,219	42,547
Laboratory Equipment	5.28%	1,746,916			1,746,916	466,598	92,237	-	92,237	558,835	1,188,081	1,280,318
Computer	16.21%	92,373			92,373	85,277	7,096	-	7,096	92,373	-	7,096
Library Books	20.00%	809,206	159,999		969,205	419,557	121,141	-	121,141	540,698	428,507	389,649
Total		**2,934,764**	**179,709**	**-**	**3,114,473**	**1,030,834**	**231,397**	**-**	**231,397**	**1,262,231**	**1,852,242**	**1,903,930**
Previous year figures		**2,665,054**	**269,710**	**-**	**2,934,764**	**788,363**	**242,471**	**-**	**242,471**	**1,030,834**	**1,903,930**	**1,902,577**

DR KAPILESWAR MISHRA
Director

Manager
(Accounts)

GARG PANKAJ & CO. ROURKELA CHARTERED ACCOUNTANTS

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
UNIT OF: INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

Schedules annexed to and forming part of accounts

Particulars	(Fig. in Rs.) 31.03.2025	(Fig. in Rs.) 31.03.2024
IV FEES RECEIVABLE		
Diploma in Mechanical Engineering	5,742,938	5,892,467
Diploma in Mining Engineering	5,642,792	6,074,172
Total	**11,385,730**	**11,966,639**
V LOANS, DEPOSITS & ADVANCES		
IIPM School of Management	6,067,506	6,254,801
Indian Institute For Production Management	838,439	
Fees and Subscription paid in advance to AICTE		40,000
Diploma affiliation fees paid in advance to SCTE & VT	44,000	15,000
Salary Advance to A K Sethi	5,267	20,000
Total	**6,955,212**	**6,329,801**
VI CASH AND BANK BALANCES		
State Bank of India, Kansbahal	171,693	3,893
Cash In Hand	23,664	70,050
Total	**195,357**	**73,943**
VII CURRENT LIABILITIES		
(A) Refundable to Students		
Caution Deposits	458,000	385,500
(B) Other Liabilities		
LTA Payable	650,065	491,043
Liabilities for Expenses		
Salary Payable	638,009	667,993
Indian Institute for Production Management		1,559,212
IIPM College	157,300	40,400
Diploma Fees Received in advance	90,950	61,750
DTET-Cuttack		223,000
Festival Function Expenses Payable	1,557	
New Rourkela Process	120,478	12,558
Shivshakti Enterprises	19,710	
	2,136,069	**3,441,456**
VIII Excess of Income over Expenditure		
Balance as per last year	16,832,857	12,965,004
Add: Excess of Income over Expenditure	1,419,615	3,867,853
	18,252,472	**16,832,857**

DR KAPILESWAR MISHRA
Director

Manager (Accounts)

GARG PANKAJ & CO. ROURKELA CHARTERED ACCOUNTANTS

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
UNIT OF :INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

NOTES TO ACCOUNTS **Schedule-IX**

1. Significant Accounting Policies

a. **Basis of Accounting**

The financial statements have been prepared on historical cost convention. The institution follows the mercantile system of accounting and recognises the expenditure and income on accrual basis.

b. **Fixed Assets**

Fixed assets are recorded at cost of acquisition or construction. Cost includes all expenditure incurred to bring the asset to its working condition for the intended use of the concerned assets.

d. **Depreciation**

Depreciation is being provided in Straight Line Method as per Society Policies.

e. **Retirement Benefits**

Provident Fund & ESI is a defined contribution scheme and the contributions as required by the statute made to the Recognized Provident Fund & ESI are charged to Income and Expenditure Account.

Gratuity is accounted for as and when paid.

2. Previous year figures have been rearranged / regrouped wherever necessary.

Dr. Kapileswar Mishra
Director

Manager (Accounts)

GARG PANKAJ & CO. ROURKELA

AUDITED FINANCIAL STATEMENTS

OF

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY

(UNIT OF INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT)

KANSBAHAL, ODISHA-770034

FOR THE FINANCIAL YEAR 2022-23

AUDITED BY:

GARG PANKAJ & CO

Chartered Accountants

G29, 2ND FLOOR, BUDHRAM ORAM MARKET,

BISRA DAHAR, ROURKELA-769012

Phone: 9861107344, 9438511557

Email: mail@gargpankajco.in, topperpankajgarg@rediffmail.com

Website: www.gargpankajco.com

BRANCH OFFICES: 1) SUNDARGARH 2) BONAIGARH

GARG PANKAJ & CO.
CHARTERED ACCOUNTANTS

Head Office :
G-29, 2nd Floor, Budhram Oram Market Complex,
Kachery Road, Rourkela 769012, Odisha

INDEPENDENT AUDITORS REPORT

To the Members
IIPM School of Engineering & Technology
(Unit of Indian Institute for Production Management, Kansbahal)
Kansbahal 770034, Odisha.

We have audited the attached Balance Sheet of the **IIPM School of Engineering & Technology (Unit of Indian Institute for Production Management, Kansbahal)** as at 31-03-2023 and also the Income & Expenditure Account for the year ended on that date annexed thereto. These financial statements are the responsibility of the Governing body of the Society. Our responsibility is to express an opinion on these financial statements based on Our audit.

We conducted Our audit in accordance with auditing standards generally in India. Those Standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatements. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by the management, as well as evaluating the overall financial statement presentation. We believe that Our audit provides a reasonable basis for Our opinion.

Further to Our comments as before, we report that:

1. We have obtained all the information and explanations, which to the best of Our knowledge and belief were necessary for the purpose of Our audit;
2. In Our opinion, proper books of accounts as required by law have been kept by the society so far as appears from Our examination of those books;
3. The Balance Sheet and Income & Expenditure Account dealt with by this report are in agreement with the books of accounts:
4. In Our opinion and to the best of Our information and according to the explanations given to us, the said accounts give a true and fair view in conformity with the accounting

GARG PANKAJ & CO. ROURKELA CHARTERED ACCOUNTANTS

Branch 1 :
2B, 2nd Floor, Aamba Towers, Hospital Rd.,
Sundargarh 770001, Odisha

Branch 2 :
1A, 1st Floor, Above Kasim Cloth Store,
Main Road, Bonai 770038, Odisha

Mob. No. : 9861107344, 9438511557
E-mail : topperpankajgarg@rediffmail.com
Website : www.gargpankajco.com

Head Office :
G-29, 2nd Floor, Budhram Oram Market Complex,
Kachery Road, Rourkela 769012, Odisha

principles generally accepted in India:

a) in the case of the Balance Sheet, of the state of affairs of the Society as at 31-03-2023 and

b) in the case of the Income & Expenditure Account, of the excess of income over expenditure for the year ended on that date.

Place : Rourkela
Date : 31-10-2023
Udin: 23301602BGZSRM3844

GARG PANKAJ & CO ROURKELA CHARTERED ACCOUNTANTS

For GARG PANKAJ & CO.
Chartered Accountants
Firm Reg.No -328978E

CA PANKAJ GARG
Partner
M.No - 301602

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
UNIT OF: INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

BALANCE SHEET as at 31st March 2023

Particulars	Sch. No.	(Fig. in Rs.) 31.03.2023	(Fig. in Rs.) 31.03.2022
CAPITAL FUND & LIABILITIES			
Current Liabilities	VII	56,71,832	53,57,888
Excess of Income over Expenditure	VIII	1,29,65,004	92,08,013
		1,86,36,836	**1,45,65,901**
ASSETS & PROPERTIES			
Fixed Assets	III		
Gross Block		26,65,054	24,86,354
Less: Depreciation		7,88,363	5,83,777
Net Block		**18,76,691**	**19,02,577**
Current Assets			
Fees Receivable	IV	1,27,02,194	94,64,895
Loans, Deposits & Advances	V	40,33,991	28,53,721
Cash and Bank Balance	VI	23,960	3,44,708
MISCELLANEOUS EXPENDITURE	VIII		
		1,86,36,836	**1,45,65,901**
Notes to Accounts	IX		

Auditors'
As per our report of even date
For GARG PANKAJ & CO.
Chartered Accountants
Firm Registration No. 328978E

CA PANKAJ GARG, Partner
Membership No. 301602

GARG PANKAJ & CO ★ CHARTERED ACCOUNTANTS ★ ROURKELA

UDIN: 23301602BGZSRM3844

Date: 31/10/23
Place: Rourkela

MEMBER
GOVERNING COUNCIL

PROF.(DR) S.K.GHOSE
Director

Manager (Accounts)

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
UNIT OF: INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31.03.2023

Particulars	Sch. No.	(Fig. in Rs.) 31.3.2023	(Fig. in Rs.) 31.3.2022
INCOME			
Course Fees- Mechanical Engg		47,24,670	44,71,800
Course Fees- Mining		45,35,400	34,57,800
Hostel Fees		24,00,000	8,82,000
Uniform Fees		4,26,000	3,10,200
Transportation Fees		1,58,400	1,29,600
Miscellaneous Receipts	I	3,00,036	55,932
Total		**1,25,44,506**	**93,07,332**
EXPENDITURE			
Salaries/Ex Gratia/PLP/Leave Salary/Gratuity		48,03,987	45,98,840
Honorarium To Guest Faculties		9,300	9,500
Traveling Expenses		2,37,296	1,42,460
Employers Contribution To PF		4,69,588	5,00,784
Employers Contribution To ESI		8,528	1,023
Employees Welfare		94,465	70,414
Electricity Expenses		3,22,083	1,15,631
Hostel Expenses		3,28,067	82,365
Printing & Stationery		1,86,546	48,974
Repair & Maintenance		1,52,672	1,02,147
Legal Matters		56,705	41,772
Depreciation	III	2,04,586	1,91,785
Other Revenue Expenses	II	19,13,692	24,08,138
		87,87,515	83,13,833
Net Excess of Income over Expenditure		37,56,991	9,93,499
Total		**1,25,44,506**	**93,07,332**

Auditors'
As per our report of even date
For GARG PANKAJ & CO.
Chartered Accountants
Firm Registration No. 328978E

CA PANKAJ GARG, Partner
Membership No. 301602

GARG PANKAJ & CO ROURKELA CHARTERED ACCOUNTANTS

UDIN: 23301602BGZSRM3844

Date: 31/10/23
Place: Rourkela

MEMBER
GOVERNING COUNCIL

PROF.(DR) S.K.GHOSE
Director

Manager (Accounts)

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
UNIT OF: INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

Schedule annexed to and forming part of accounts

Particulars	(Fig. in Rs.) 31.03.2023	(Fig. in Rs.) 31.03.2022
I Miscellaneous Receipts		
Interest From SB Accounts	8,730	3,628
Other Receipts	2,43,306	7,004
House Rent	48,000	45,300
Total	**3,00,036**	**55,932**
II Other Revenue Expenses		
Audit Fees & Expenses	5,000	5,000
Advertisement Expenses	8,171	20,845
Bank Charges	1,271	1,543
Campus Drive Expenses	16,425	79,162
Estate Maintenance	1,43,893	78,656
Fees & Subscription	45,895	44,313
Festival & Function Expenses	1,53,060	23,545
General Expenses	4,503	6,817
Internet Expenses	79,406	48,917
Postage/Courier Expenses	7,783	6,043
Laboratory Expenses		
Security Services	2,85,557	2,74,280
Telephone/Fax/E-Mail Expenses	10,760	23,828
Transit House Expense	10,080	8,137
Uniform Expenses	4,90,604	1,15,304
Newspaper & Magazine	18,751	18,639
Hostel Services Staff Expenses	5,59,955	3,16,778
Water Charges	30,459	30,459
Insurance	24,920	24,373
Service Charges for Doctor	4,299	4,299
Diploma fees written off (Mechanical)	12,900	3,48,300
Diploma fees written off (Mining)		9,28,900
Total	**19,13,692**	**24,08,138**

PROF.(DR) S.K.GHOSE
Director

MEMBER
GOVERNING COUNCIL

GARG PANKAJ & CO
ROURKELA
CHARTERED ACCOUNTANTS

Manager (Accounts)

ᴾM SCHOOL OF ENGINEERING & TECHNOLOGY
NIT OF: INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
ANSBAHAL

ıedule annexed to and forming part of accounts
ed Assets as on 31.03.2023

SCHEDULE - III

Particulars	Rate %	COST				DEPRECIATION					NET	NET
		At Opening 01.04.22	Additions	Transfer	At Closing 31.03.23	At Opening 01.04.22	For the Year Additions	Adjustment (+) / (-)	Total	At Closing 31.03.2023	Value as on 31.03.2023	Value as on 31.03.2022
niture and Fixtures	3.39%	2,14,102	9,145		2,23,247	23,842	7,517	-	7,517	31,359	1,91,888	1,90,260
ice Equipment	5.28%	63,022			63,022	13,819	3,328	-	3,328	17,147	45,875	49,203
oratory Equipment	5.28%	17,46,916			17,46,916	2,82,124	92,237	-	92,237	3,74,361	13,72,555	14,64,792
nputer	16.21%	92,373			92,373	55,329	14,974	-	14,974	70,303	22,070	37,044
ary Books	20.00%	3,69,941	1,69,555		5,39,496	2,08,663	86,530	-	86,530	2,95,193	2,44,303	1,61,278
Total		24,86,354	1,78,700	-	26,65,054	5,83,777	2,04,586	-	2,04,586	7,88,363	18,76,691	19,02,577
vious year figures		24,86,354		-	24,86,354	3,91,992	1,91,785	-	1,91,785	5,83,777	19,02,577	20,94,362

GARG PANKAJ & CO. CHARTERED ACCOUNTANTS ROURKELA

PROF.(DR) S.K.GHOSE
Director

MEMBER
GOVERNING COUNCIL

Manager
(Accounts)

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
UNIT OF: INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

Schedules annexed to and forming part of accounts

Particulars	(Fig. in Rs.) 31.03.2023	(Fig. in Rs.) 31.03.2022
IV FEES RECEIVABLE		
Diploma in Mechanical Engineering	64,31,618	50,16,499
Diploma in Mining Engineering	62,70,576	44,48,396
Total	**1,27,02,194**	**94,64,895**
V LOANS, DEPOSITS & ADVANCES		
IIPM School of Management	40,33,991	28,53,721
Total	**40,33,991**	**28,53,721**
VI CASH AND BANK BALANCES		
UCO Bank, Kansbahal	-	3,22,823
State Bank of India, Kansbahal	20,358	2,977
Cash In Hand	3,602	18,908
Total	**23,960**	**3,44,708**
VII CURRENT LIABILITIES		
(A) Refundable to Students		
Caution Deposits	3,13,500	2,44,000
(B) Other Liabilities		
LTA Payable	2,66,934	1,26,504
Liabilities for Expenses		-
Salary Payable	3,62,465	3,17,553
Indian Institute for Production Management	42,63,032	45,47,631
Diploma Fees Received in advance	47,650	32,500
DTET-Cuttack	88,700	88,700
Mr P Mohapatra	-	1,000
Festival Function Expenses Payable	35,296	-
New Rourkela Process	47,331	-
Prashant Kumar Dehury	2,889	-
Roxy Tailor	2,44,035	-
	56,71,832	**53,57,888**
VIII Excess of Income over Expenditure		
Balance as per last year	92,08,013	82,14,514
Add: Excess of Income over Expenditure	37,56,991	9,93,499
	1,29,65,004	**92,08,013**

PROF.(DR) S.K.GHOSE
Director

MEMBER
GOVERNING CONCIL

Manager (Accounts)

GARG PANKAJ & CO
ROURKELA
CHARTERED ACCOUNTANTS

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
UNIT OF: INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

NOTES TO ACCOUNTS **Schedule-IX**

1. Significant Accounting Policies

a. **Basis of Accounting**

The financial statements have been prepared on historical cost convention. The institution follows the mercantile system of accounting and recognises the expenditure and income on accrual basis.

b. **Fixed Assets**

Fixed assets are recorded at cost of acquisition or construction. Cost includes all expenditure incurred to bring the asset to its working condition for the intended use of the concerned assets.

d. **Depreciation**

Depreciation is being provided in Straight Line Method as per Society Policies.

e. **Retirement Benefits**

Provident Fund & ESI is a defined contribution scheme and the contributions as required by the statute made to the Recognized Provident Fund & ESI are charged to Income and Expenditure Account.

Gratuity is accounted for as and when paid.

f. **Income Tax**

The Society is registered with the Income Tax Authorities u/s 10(23C)(vi) of Income Tax Act, 1961 and hence the Income of the Society is exempt under Income Tax. The PAN of the society is AAAAI0103M.

2. Previous year figures have been rearranged / regrouped wherever necessary.

PROF.(DR) S.K.GHOSE
Director

MEMBER
GOVERNING COUNCIL

Manager
(Accounts))

GARG PANKAJ & CO
ROURKELA
CHARTERED ACCOUNTANTS

AUDITED FINANCIAL STATEMENTS

OF

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY

(UNIT OF INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT)

KANSBAHAL, ODISHA-770034

FOR THE FINANCIAL YEAR 2023-24

AUDITED BY:

GARG PANKAJ & CO

Chartered Accountants

G29, 2ND FLOOR, BUDHRAM ORAM MARKET,

BISRA DAHAR, ROURKELA-769012

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Branches: 1) Sundargarh 2) Bonaigarh 3) Bhawanipatna

GARG PANKAJ & CO.
CHARTERED ACCOUNTANTS

Head Office :
G-29, 2nd Floor, Budhram Oram Market Complex,
Kachery Road, Rourkela 769012, Odisha

INDEPENDENT AUDITORS REPORT

To the Members
IIPM School of Engineering & Technology
(Unit of Indian Institute for Production Management, Kansbahal)
Kansbahal 770034, Odisha.

We have audited the attached Balance Sheet of the **IIPM School of Engineering & Technology (Unit of Indian Institute for Production Management, Kansbahal)** as at 31-03-2024 and also the Income & Expenditure Account for the year ended on that date annexed thereto. These financial statements are the responsibility of the Governing body of the Society. Our responsibility is to express an opinion on these financial statements based on Our audit.

We conducted Our audit in accordance with auditing standards generally in India. Those Standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatements. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by the management, as well as evaluating the overall financial statement presentation. We believe that Our audit provides a reasonable basis for Our opinion.

Further to Our comments as before, we report that:

1. We have obtained all the information and explanations, which to the best of Our knowledge and belief were necessary for the purpose of Our audit;
2. In Our opinion, proper books of accounts as required by law have been kept by the society so far as appears from Our examination of those books;
3. The Balance Sheet and Income & Expenditure Account dealt with by this report are in agreement with the books of accounts:
4. In Our opinion and to the best of Our information and according to the explanations given to us, the said accounts give a true and fair view in conformity with the accounting

GARG PANKAJ & CO. ROURKELA CHARTERED ACCOUNTANTS

Branch 1 :
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principles generally accepted in India:

a) in the case of the Balance Sheet, of the state of affairs of the Society as at 31-03-2024 and

b) in the case of the Income & Expenditure Account, of the excess of income over expenditure for the year ended on that date.

Place : Rourkela
Date : 31-08-2024
Udin: 24301602BKEKUT9791

GARG PANKAJ & CO ROURKELA CHARTERED ACCOUNTANTS

For GARG PANKAJ & CO.
Chartered Accountants
Firm Reg.No -328978E

CA PANKAJ GARG
Partner
M.No - 301602

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
UNIT OF: INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

BALANCE SHEET as at 31st March 2024

Particulars	Sch. No.	(Fig. in Rs.) 31.03.2024	(Fig. in Rs.) 31.03.2023
CAPITAL FUND & LIABILITIES			
Current Liabilities	VII	34,41,456	56,71,832
Excess of Income over Expenditure	VIII	1,68,32,857	1,29,65,004
		2,02,74,313	**1,86,36,836**
ASSETS & PROPERTIES			
Fixed Assets	III		
Gross Block		29,34,764	26,65,054
Less: Depreciation		10,30,834	7,88,363
Net Block		**19,03,930**	**18,76,691**
Current Assets			
Fees Receivable	IV	1,19,66,639	1,27,02,194
Loans, Deposits & Advances	V	63,29,801	40,33,991
Cash and Bank Balance	VI	73,943	23,960
MISCELLANEOUS EXPENDITURE	VIII		
		2,02,74,313	**1,86,36,836**
Notes to Accounts	IX		

Auditors'
As per our report of even date
For GARG PANKAJ & CO.
Chartered Accountants
Firm Registration No. 328978E

GARG PANKAJ & CO. ROURKELA CHARTERED ACCOUNTANTS

CA PANKAJ GARG, Partner
Membership No. 301602

PROF.(DR) S.K.GHOSE
Director & Ex-Officio
Member of Governing Council

UDIN: 24301602BKEKUT9791

Date: 31/08/2024
Place: Rourkela

Manager (Accounts)

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
UNIT OF: INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31.03.2024

Particulars	Sch. No.	(Fig. in Rs.) 31.3.2024	(Fig. in Rs.) 31.3.2023
INCOME			
Course Fees- Mechanical Engg		48,63,410	47,24,670
Course Fees- Mining		48,93,810	45,35,400
Hostel Fees		24,60,000	24,00,000
Uniform Fees		4,38,000	4,26,000
Transportation Fees		1,79,800	1,58,400
Miscellaneous Receipts	I	4,51,928	3,00,036
Total		**1,32,86,948**	**1,25,44,506**
EXPENDITURE			
Staff Salaries		53,33,839	48,03,987
Honorarium To Guest Faculties		-	9,300
Traveling Expenses		1,98,055	2,37,296
Employers Contribution To PF		1,58,782	4,69,588
Employers Contribution To ESI		5,100	8,528
Employees Welfare		1,58,285	94,465
Leave Travel Assistance(LTA)		2,90,109	-
Electricity Expenses		3,91,080	3,22,083
Hostel Expenses		3,85,563	3,28,067
Printing & Stationery		1,67,267	1,86,546
Repair & Maintenance		1,80,524	1,52,672
Legal Matters		87,476	56,705
Depreciation	III	2,42,471	2,04,586
Other Revenue Expenses	II	18,20,544	19,13,692
		94,19,095	87,87,515
Net Excess of Income over Expenditure		38,67,853	37,56,991
Total		**1,32,86,948**	**1,25,44,506**

Auditors'
As per our report of even date
For GARG PANKAJ & CO.
Chartered Accountants
Firm Registration No. 328978E

GARG PANKAJ & CO. CA ROURKELA CHARTERED ACCOUNTANTS

CA PANKAJ GARG, Partner
Membership No. 301602

PROF.(DR) S.K.GHOSE
Director & Ex-Officio
Member of Governing Council

UDIN: 24301602BKEKUT9791

Date: 31/08/2024
Place: Rourkela

Manager (Accounts)

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
UNIT OF: INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

Schedule annexed to and forming part of accounts	(Fig. in Rs.)	(Fig. in Rs.)
Particulars	**31.03.2024**	**31.03.2023**
I Miscellaneous Receipts		
Interest From SB Accounts	2,626	8,730
Other Receipts	4,01,302	2,43,306
House Rent	48,000	48,000
Total	**4,51,928**	**3,00,036**
II Other Revenue Expenses		
Audit Fees & Expenses	5,000	5,000
Advertisement Expenses		8,171
Bank Charges	425	1,271
Campus Drive Expenses	-	16,425
Estate Maintenance	2,86,379	1,43,893
Fees & Subscription	70,900	45,895
Festival & Function Expenses	1,76,308	1,53,060
General Expenses	26,023	4,503
Internet Expenses	69,970	79,406
Postage/Courier Expenses	4,772	7,783
Laboratory Expenses	42,319	
Security Services	2,54,296	2,85,557
Telephone/Fax/E-Mail Expenses	24,774	10,760
Transit House Expense	12,970	10,080
Uniform Expenses	2,49,900	4,90,604
Newspaper & Magazine	18,867	18,751
Hostel Services Staff Expenses	5,10,377	5,59,955
Water Charges	32,685	30,459
Insurance	30,079	24,920
Service Charges for Doctor	4,500	4,299
Diploma fees written off (Mechanical)	-	12,900
Total	**18,20,544**	**19,13,692**

BARG PANKAJ & CO ROURKELA CHARTERED ACCOUNTANTS

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Director & Ex-Officio
Member of Governing Council

Manager (Accounts)

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
UNIT OF: INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

Schedule annexed to and forming part of accounts
Fixed Assets as on 31.03.2024

SCHEDULE - III

Particulars	Rate %	COST				DEPRECIATION					NET	NET
							For the Year					
		At Opening 01.04.23	Additions	Transfer	At Closing 31.03.24	At Opening 01.04.23	Additions	Adjustment (+) / (-)	Total	At Closing 31.03.2024	Value as on 31.03.2024	Value as on 31.03.2023
Furniture and Fixtures	3.39%	2,23,247			2,23,247	31,359	7,568	-	7,568	38,927	1,84,320	1,90,260
Office Equipment	5.28%	63,022			63,022	17,147	3,328	-	3,328	20,475	42,547	49,203
Laboratory Equipment	5.28%	17,46,916			17,46,916	3,74,361	92,237	-	92,237	4,66,598	12,80,318	14,64,792
Computer	16.21%	92,373			92,373	70,303	14,974	-	14,974	85,277	7,096	37,044
Library Books	20.00%	5,39,496	2,69,710		8,09,206	2,95,193	1,24,364	-	1,24,364	4,19,557	3,89,649	1,61,278
Total		**26,65,054**	**2,69,710**	**-**	**29,34,764**	**7,88,363**	**2,42,471**	**-**	**2,42,471**	**10,30,834**	**19,03,930**	**19,02,577**
Previous year figures		**24,86,354**	**1,78,700**	**-**	**26,65,054**	**5,83,777**	**2,04,586**	**-**	**2,04,586**	**7,88,363**	**18,76,691**	**19,02,577**

GARG PANKAJ & CO ROURKELA CHARTERED ACCOUNTANTS

PROF.(DR) S.K.GHOSE
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IIPM SCHOOL OF ENGINEERING & TECHNOLOGY
UNIT OF: INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT
KANSBAHAL

Schedules annexed to and forming part of accounts

Particulars	(Fig. in Rs.) 31.03.2024	(Fig. in Rs.) 31.03.2023
IV FEES RECEIVABLE		
Diploma in Mechanical Engineering	58,92,467	64,31,618
Diploma in Mining Engineering	60,74,172	62,70,576
Total	**1,19,66,639**	**1,27,02,194**
V LOANS, DEPOSITS & ADVANCES		
IIPM School of Management	62,54,801	40,33,991
Fees and Subscription paid in advance to AICTE	40,000	
Diploma affiliation fees paid in advance to SCTE & VT	15,000	
Salary Advance to A K Sethi	20,000	
Total	**63,29,801**	**40,33,991**
VI CASH AND BANK BALANCES		
UCO Bank, Kansbahal		-
State Bank of India, Kansbahal	3,893	20,358
Cash In Hand	70,050	3,602
Total	**73,943**	**23,960**
VII CURRENT LIABILITIES		
(A) Refundable to Students		
Caution Deposits	3,85,500	3,13,500
(B) Other Liabilities		
LTA Payable	4,91,043	2,66,934
Liabilities for Expenses		
Salary Payable	6,67,993	3,62,465
Indian Institute for Production Management	15,59,212	42,63,032
IIPM College	40,400	
Diploma Fees Received in advance	61,750	47,650
DTET-Cuttack	2,23,000	88,700
Festival Function Expenses Payable		35,296
New Rourkela Process	12,558	47,331
Prashant Kumar Dehury		2,889
Roxy Tailor		2,44,035
	34,41,456	**56,71,832**
VIII Excess of Income over Expenditure		
Balance as per last year	1,29,65,004	92,08,013
Add: Excess of Income over Expenditure	38,67,853	37,56,991
	1,68,32,857	**1,29,65,004**

BARG PANKAJ & CO. ROURKELA CHARTERED ACCOUNTANTS

PROF.(DR) S.K.GHOSE
Director & Ex-Officio
Member of Governing Council

Manager (Accounts)

IIPM SCHOOL OF ENGINEERING & TECHNOLOGY

UNIT OF :INDIAN INSTITUTE FOR PRODUCTION MANAGEMENT KANSBAHAL

NOTES TO ACCOUNTS **Schedule-IX**

1. Significant Accounting Policies

a. **Basis of Accounting**

The financial statements have been prepared on historical cost convention. The institution follows the mercantile system of accounting and recognises the expenditure and income on accrual basis.

b. **Fixed Assets**

Fixed assets are recorded at cost of acquisition or construction. Cost includes all expenditure incurred to bring the asset to its working condition for the intended use of the concerned assets.

c. **Depreciation**

Depreciation is being provided in Straight Line Method as per Society Policies.

d. **Retirement Benefits**

Provident Fund & ESI is a defined contribution scheme and the contributions as required by the statute made to the Recognized Provident Fund & ESI are charged to Income and Expenditure Account.

Gratuity is accounted for as and when paid.

e. **Income Tax**

The Society is registered with the Income Tax Authorities u/s 10(23C)(vi) of Income Tax Act, 1961 and hence the Income of the Society is exempt underIncome Tax. The PAN of the society is AAAAI0103M.

2. Previous year figures have been rearranged / regrouped wherever necessary.

PROF (DR) S.K.GHOSE
Director & Ex-Officio
Member of Governing Council

Manager(Accounts)

BARG PANKAJ & CO ROURKELA CHARTERED ACCOUNTANTS

STATE COUNCIL FOR TECHNICAL EDUCATION & VOCATIONAL TRAINING, ODISHA.

ରାଜ୍ୟ ବୈଷୟିକ ଶିକ୍ଷା ଏବଂ ଧନ୍ଦାମୂଳକ ତାଲିମ ପରିଷଦ, ଓଡିଶା

Letter No. 2143 /Date 16/12/25
SCTE (D)-95/2010

To,

The Principals of all Polytechnics &
PDIS Institutions.

Sub: - Revised academic Calendar for 2025-26.

Madam/Sir,

In partial modification to this Office letter No. 1334 dated 09.07.2025, I am to enclose herewith the Revised Academic Calendar for 2025-26 session for taking further necessary action at your end.

Yours faithfully,

16/12/25

Secretary.

Memo No. 2144 date 16/12/25

Copy submitted to DTE&T, Odisha, Cuttack for kind information.

16/12/25

Secretary.

Memo No. 2145 date 16/12/25

Copy submitted to the Additional secretary to Government, SD&TE Department, Government of Odisha for kind information.

16/12/25

Secretary

https://sctevt.odisha.gov.in, vcsctevt.odisha@gmail.com
Unit-VIII, Near Raj Bhawan, Bhubaneswar, ODISHA-751012, 0674-2392913

REVISED ACADEMIC CALENDAR OF DIPLOMA AND PDIS COURSE FOR THE SESSION 2025-26

Sl. No	ACTIVITY	1ST SEMESTER	3rd/ 5th SEMESTER
1.	Induction program for 1st Semester Diploma Course & Coverage of Bridge Course.	20.07.2025 to 05.08.2025	----------
2.	Last date for uploading of Lesson Plan subject wise by Individual Faculty in the Institutio0n Website.	31.07.2025	11.07.2025
3.	Commencement of Semester Classes.	06.08.2025	14.07.2025
4.	Readmission at Institute Level.	----------	14.07.2025 to 21.07.2025
5.	Reporting Readmission Data to SCTE&VT online.	----------	22.07.2025 to 25.07.2025
6.	Internal Assessment.	3rd week of October	4th week of Sept.
7.	Issue of SCTE&VT Registration Numbers.	25.09.2025	06.09.2025 (3rd Semester LE student)
8.	Semester Exams. Registration (Regular students).	2nd week of October	3rd week of Sept.
9.	2nd Internal Assessment.	3rd week of November	4th week of Oct. (Only for 3rd Semester)
10.	Closing of Attendance.	04.12.2025	15.11.2025
11.	Tentative date of Semester Examination.	15.12.2025	25.11.2025
12.	Tentative date of publication of results.	20.03.2026	25.02.2026
		2ND SEMESTER	**4th/ 6th SEMESTER**
1.	Last date for uploading of Lesson Plan subject wise by Individual Faculty in the Institution Website.	12.01.2026	24.12.2025
2.	Commencement of Classes.	09.01.2026	22.12.2025
3.	Readmission at Institution Level.	09.01.2026 to 13.01.2026	22.12.2025 to 29.12.2025
4.	Reporting Readmission Data to SCTEVT online.	15.01.2026 to 19.01.2026	30.12.2025 to 03.01.2026
5.	Semester Exams. Registration (Regular students).	3rd Week of February	3rd Week of February
6.	1st Internal Assessment.	2nd week of March	3rd week of February
7.	Branch Change of 2nd Sem. Students by Principals at Institute Level.	Up to 31.03.2026	----------
8.	Reporting Branch Change cases to SCTE&VT online.	02.04.2026 to 10.04.2026	----------
9.	2nd Internal Assessment.	4th week of April	4th week of March (Only for 4th semester)
10.	Closing of attendance.	08.05.2026	18.04.2026
11.	Tentative Date of Semester Examination	18.05.2026	29.04.2026
12.	Internship and Summer Break for Students	08.06.2026 to 30.06.2026	25.05.2026 to 30.06.2026
13.	Tentative Date of Publication of Results	30.08.2026	30.07.2026
14.	Tentative date for starting of next Session.	01.07.2026	01.07.2026

1. There shall be average 38 periods of class per week for 3rd year, 31 periods of class per week for 2nd year and 33 periods of class per week for 1st year. Each period is of one hour.
2. The remaining periods out of 7 periods per day on every working day will be utilized for imparting add on courses for enhancing Communication Skill, Digital Skill and Technical Skill of the students.
3. Principals are to arrange extra classes, during Holidays and off hours, wherever necessary, to complete the syllabus in time.
4. Annual Athletic Meet, Annual Cultural Meet may be conducted during even Semester.
5. The Internship Policy of AICTE is to be scrupulously followed and to be arranged at Institution level. Induction Program for 1st semester students is to implemented as per AICTE Guidelines.
6. Attendance Registers must be maintained in the prescribed cumulative manner by faculties in every class.
7. Monthly tests to be conducted every month apart from Internal Assessment.

16/12/25

Secretary
SCTE&VT (O)