

 IIPM SCHOOL OF ENGINEERIN AND TECHNOLOGY

**LESSON PLAN: 2022-2023**

 **THEORY OF MACHINES**

**Branch : Mechanical Semester: 4th**

**Duration : 60**

**Faculty name : Saritprava Sahoo**

**SYLLABUS**

|  |  |
| --- | --- |
| **Unit – I** |  **Simple mechanism**1.1 Link ,kinematic chain, mechanism, machine1.2 Inversion, four bar link mechanism and its inversion1.3 Lower pair and higher pair1.4 Cam and followers  |
| **Unit – II** | **Friction**2.1 Friction between nut and screw for square thread, screw jack2.2 Bearing and its classification, Description of roller, needle roller& ball bearings.2.3 Torque transmission in flat pivot& conical pivot bearings.2.4 Flat collar bearing of single and multiple types.2.5 Torque transmission for single and multiple clutches2.6 Working of simple frictional brakes.2.7 Working of Absorption type of dynamometer |
| **Unit – III** |  **Power Transmission**3.1 Concept of power transmission3.2 Type of drives, belt, gear and chain drive.3.3 Computation of velocity ratio, length of belts (open and cross) with and without slip.3.4 Ratio of belt tensions, centrifugal tension and initial tension.3.5 Power transmitted by the belt.3.6 Determine belt thickness and width for given permissible stress for open and crossed belt considering centrifugal tension.3.7 V-belts and V-belts pulleys.3.8 Concept of crowning of pulleys.3.9 Gear drives and its terminology.3.10 Gear trains, working principle of simple, compound, reverted and epicyclic gear trains. |
| **Unit – IV** | **Governors and Flywheel**4.1 Function of governor4.2 Classification of governor4.3 Working of Watt, Porter, Proel and Hartnell governors.4.4 Conceptual explanation of sensitivity, stability and isochronisms.4.5 Function of flywheel.4.6 Comparison between flywheel &governor.4.7 Fluctuation of energy and coefficient of fluctuation of speed. |
| **Unit – V** | **Balancing of Machine**5.1 Concept of static and dynamic balancing.5.2 Static balancing of rotating parts.5.3 Principles of balancing of reciprocating parts.5.4 Causes and effect of unbalance.5.5 Difference between static and dynamic balancing |
| **Unit-VI** | **Vibration of machine parts**6.1 Introduction to Vibration and related terms (Amplitude, time period andfrequency, cycle)6.2 Classification of vibration.6.3 Basic concept of natural, forced & damped vibration6.4 Torsional and Longitudinal vibration.6.5 Causes & remedies of vibration. |
|  |

**TEXT BOOKS& OTHER REFERENCES BOOKS**



**Objective :** Mechanical and Automobile engineering is involved with design, manufacturing and use of various types of machines. Each machine consists of a large number static and moving parts called mechanisms. Theory of machines is study of such different kind of mechanisms.

**Learning Outcome :** Understanding effectiveness of

* machine system consisting of different link assemblies as components
* Working principle of machine components such as clutch, brakes bearings based on friction
* Working principles related to power transmission systems and predicting the work involved and efficiency.
* working principle in speed and torque regulating devices such as governor and flywheels
* amount and position of masses required towards static and dynamic balancing
* types and causes of vibration in machines and predicting remedial measures

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Sl.No** | **Chapter**  | **Proposed Week for Teaching** | **Period****No.** | **Subject Name** | **Important Teaching Points** | **Content Source** |
| 1 | **I** | 1st | 1 | Simple mechanism | * Definition of Theory of Machines
* Classification of Theory of Machines
 | **Theory of Machine**  **R.S Khurmi**  |
| 2 | 2 | * Link ,kinematic chain
 |
| 3 | 3 | * Inversion, four bar link mechanism and its inversion
 |
| 4 | 4 | * Lower pair and higher pair
* mechanism, machine
 |
| 5 | 2nd | 1 | * Cam and followers
 |
| 6 | 2 | * Solved Simple Numerical
 |
| 7 | 3 | * ASSIGNMENT
 |
| 8 | 4 | * CLASS TEST
 |
| 9 | 3rd | 1 | **Friction** | * Friction between nut and screw for square thread,
 | **Theory of Machine**  **R.S Khurmi**  |
| 10 | 2 | * screw jack
 |
| 11 | 3 | * Bearing and its classification, Description of roller
 |
| 12 | 4 | * Needle roller& ball bearings.
 |
| 13 | **II** | 4th  | 1 | * Torque transmission in flat pivot bearings
 |
| 14 | 2 | * Torque transmission in conical pivot bearings.
 |
| 15 |  |  | 3 |  | * Flat collar bearing of single and multiple types.
 |  |
| 16 | 4 | * Torque transmission for single and multiple clutches
 |
| 17 | 5th  | 1 | * Working of simple frictional brakes.
 |
| 18 | 2 | * Working of Absorption type of dynamometer
 |
| 19 | 3 | * ASSIGNMENT
 |
| 20 | 4 | * CLASS TEST
 |
| 21 | **III** | 4th | 1 | Power Transmission | * Concept of power transmission
* Type of drives, belt, gear and chain drive.
 | **Theory of Machine**  **R.S Khurmi**  |
| 22 | 2 |
| 23 | 3 |
| 24 | 4 | * Computations of velocity ratio, Computation of velocity ratio,
 |
| 25 | 5th | 1 | * Lengths of belts open with and without slip.
 |
| 26 | 2 | * Lengths of belts cross with and without slip.
 |
| 27 | 3 | * Ratio of belt tensions, centrifugal tension and initial tension.
 |
| 28 | 4 | * Power transmitted by the belt.
* Determine belt thickness and width for given permissible
 |
| 29 | 6th | 1 | * Stress for open and crossed belt considering centrifugal tension.
 |
| 30 | 2 | * V-belts and V-belts pulleys. Concept of crowning of pulleys.
 |
| 31 | 3 | * Gear drives and its terminology.
 |
| 32 | 4 | * Gear trains, working principle of simple, compound
 |
| 33 | 7th  | 1 | * Working principle, reverted and epicyclic gear trains.
 |
| 34 | 2 | * Solved Simple Numerical
 |
| 35 | 3 | * ASSIGNMENT
 |
| 36 | 4 | * CLASS TEST
 |
| 37 | **IV** | 8th  | 1 |  | * Function of governor
* Classification of governor
 |
| 38 | 2 |  |
| 39 | 3 | * Working of Watt, Porter governors
 |
| 40 | 4 | * Working of Proel and

Hartnell governors. |
| 41 |  | 9th  | 1 | Governors and Flywheel | * Conceptual explanation of sensitivity, stability and isochronisms.
 | **Theory of Machine**  **R.S Khurmi**  |
| 42 | 2 | * Function of flywheel
 |
| 43 | 3 | * Comparison between flywheel &governor. 4
 |
| 44 | 4 | * Fluctuation of energy and
 |
|  | 10th  | 1 | * Coefficient of fluctuation of speed.
 |
| 45 | 2 | * Solved Simple Numerical
 |
| 46 | 3 | * ASSIGNMENT
 |
| 47 | 4 | * CLASS TEST
 |
| 48 | **V** | 11th  | 1 | Balancing of Machine | * Concept of static and dynamic balancing.
 | **Theory of Machine**  **R.S Khurmi**  |
| 49 |
| 50 | 2 | * Static balancing of rotating parts.
 |
| 51 | 3 | * Principles of balancing of reciprocating parts.
 |
| 52 |
| 4 | * Causes and effect of unbalance.
 |
| 53 |
| 54 | 12th | 1 | * Difference between static and dynamic balancing
 |
| 55 | 2 | * ASSIGNMENT
 |
| 56 | 3 | * CLASS TEST
 |
| 57 | 4 | * ASSIGNMENT
 |
| 58 | VI | 13th  | 1 | Vibration of machine parts | * Introduction to Vibration and related terms (Amplitude, time period and frequency, cycle)
 | **Theory of Machine**  **R.S Khurmi**  |
| 59 | 2 |
| 60 | 3 | * Classification of vibration.
 |
| 61 | 4 | * Basic concept of natural, forced & damped vibration
 |
| 62 | 14th  | 1 | * Torsional and Longitudinal vibration.
 |
| 2 | * Causes & remedies of vibration.
 |
| 63 |
| 3 | * ASSIGNMENT
 |
| 64 | 4 | * CLASS TEST
 |

Signature of Faculty Member HOD Principal/ Director