**GURU TEGH BAHADUR INSTITUTE OF TECHNOLOGY**

**G-8 AREA, RAJOURI GARDEN, NEW DELHI**

**B.Tech. (Common to all Branches) Semester: IInd**

 **Course: Engineering Mechanics Subject Code: ES114**

**Credit: 3, Period: 3**

**Course Outcomes (CO):**

**CO1:** Ability to solve problems pertaining to force systems, equilibrium and distribution systems.

**CO2:** Ability to solve problems of friction and engineering trusses.

**CO3**: Ability to deal with the problems of kinematics and kinetics of particle.

**CO4:** Ability to deal with the problems of kinematics and kinetics of rigid bodies.

**Programme outcomes (level)**

PO1: Engineering Knowledge

PO2: Problem Analysis

PO3: Design/Development of solutions

PO4: Conduct Investigations of complex problems

PO5: Modern Tool Usage

PO9: Individual and Team Work

PO10: Communication

PO11: Project Management and Finance

PO12: Lifelong learning

|  |
| --- |
| **Course outcomes to Programme outcomes mapping:** **Scale1: Low, Scale2: medium, Scale3: High.** |
| **CO/PO** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 2 |
| **CO2** | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 2 |
| **CO3** | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 2 |
| **CO4** | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 2 |

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**Lecture Plan**

**Course: Engineering Mechanics**

**B.Tech. (Common to all Branches)**

**Semester:IInd Subject Code: ES114**

**Credit: 3, Period: 3**

|  |  |  |
| --- | --- | --- |
| **Unit** | **Topic** | **No of Lectures** |
| **1** | **Force System:** **Introduction, force, principle of transmissibility of force, resultant of a force system, resolution of a force.****Moment of force about a line, Varigon’s theorem, couple, resolution of force into force and a couple, properties of couple and their application to engineering problems.** **Equilibrium: Force body diagram, equations of equilibrium and their applications to engineering problems, equilibrium of two force and three force members.** **Distributed Forces: Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies.****Mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, parallel axis theorem, polar moment of inertial.** | **02****02****02****02****02** |
| **2** | **Structure: Plane truss, perfect and imperfect truss, assumption in the truss analysis,** **Analysis of perfect plane trusses by the method of joints,** **Method of section** **Friction: Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction,** **frictional lock** **Friction in flat pivot and collar bearing,** **Friction in flat belts.**  | **01****02****02****01****01****01****01** |
| **3** | **Kinematics of Particles:** **Rectilinear motion, plane curvilinear motion, rectangular coordinates, normal and tangential coordinates.** **Kinetics of Particles: Equation of motion, rectilinear motion and curvilinear motion,** **work-energy equation, conservation of energy,** **Concept of impulse and momentum, conservation of momentum.** **Impact of bodies, co-efficient of restitution, loss of energy during impact.** | **02****02****02****02****02** |
| **4** | **Kinematics of Rigid Bodies: Concept of rigid body, types of rigid body motion, absolute motion, introduction to relative velocity.****Relative acceleration (Corioli’s component excluded) and instantaneous center of zero velocity, Velocity and acceleration.** **Kinetics of Rigid Bodies: Equation of motion, translatory motion and fixed axis rotation, Application of work energy principles to rigid bodies conservation of energy.** **Beam: Introduction, types of loading, methods for the reactions of a beam, space diagram, types of end supports, beams subjected to couple.** | **02****02****02****02****02** |

**Textbooks:**

1. Engineering Mechanics by A.K.Tayal, Umesh Publications.

**References:**

1. 'Engineering Mechanics' by K. L. Kumar, Tata Mc-Graw Hill

2. 'Engineering Mechanics' by S. Timoshenko, D. H. Young, J. V. Rao, Tata Mc-Graw Hill

3. 'Engineering Mechanics-Statics and Dynamics' by Irwing H. Shames, PHI.

4. 'Engineering Mechanics' by Basudev Bhattacharya, Oxford University Press.