



R20 Regulation *Subject code:3E2AD*
TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous, Accredited by NAAC with 'A+' Grade)

B. Tech II Semester Supplementary Examinations, January 2026

ENGINEERING MECHANICS
(Common to CE & ME)

Maximum Marks: 70

Date: 24.01.2026

Duration: 3 hours

- Note:**
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

| All the following questions carry equal marks (10X2M=20 Marks) | | Marks | CO | BTL |
|--|---|-------|----|-----|
| 1 | Define (a) coplanar force and (b) concurrent force system | 2M | 1 | L1 |
| 2 | Define couple. | 2M | 1 | L1 |
| 3 | State the Pappu's theorem – II. | 2M | 2 | L1 |
| 4 | Define the cone of friction. | 2M | 2 | L1 |
| 5 | State Perpendicular axis theorem. | 2M | 3 | L1 |
| 6 | Explain the transfer formula for mass moment of inertia. | 2M | 3 | L1 |
| 7 | Derive the Work energy equation for Translation motion. | 2M | 4 | L1 |
| 8 | What are the different types of motions of a body? | 2M | 4 | L1 |
| 9 | Write classifications of vibrations. | 2M | 5 | L1 |
| 10 | Define amplitude of simple pendulum. | 2M | 5 | L1 |

Part-B

| Answer All the following questions. (5X10M=50Marks) | | Marks | CO | BTL |
|---|--|-------|----|-----|
| 11 | Explain about various system of forces. | 10M | 1 | L2 |
| OR | | | | |
| 12 | Five strings are tied at a point and are pulled in all directions, equally spaced, from one another. If the magnitude of the pulls on three consecutive strings is 70N, 40N and 55N respectively, find graphically the magnitude of the pulls on two other strings, if the system is in equilibrium. | 10M | 1 | L2 |
| 13 | A ladder 6 m long and with 300N weight is resting against a wall at an angle of 60° to the ground. A man weighing 750N climbs the ladder. At what position along the ladder from the bottom does he induce slipping? The coefficient of friction for both the wall and the ground with the ladder is 0.2. | 10M | 2 | L2 |
| OR | | | | |
| 14 | A block weighing 100 N is resting on a rough plane inclined 20° to the horizontal. It is acted upon by a force of 50N directed upward at angle of | 10M | 2 | L2 |

| | | | | |
|----|--|----------|---|----|
| | 14° above the plane. Calculate the friction. If the block is about to move up the plane, Calculate the co-efficient of friction. | | | |
| 15 | Derive the expression for the moment of inertia of a solid cone about its axis of rotation. | 10M | 3 | L2 |
| OR | | | | |
| 16 | Find the moment of inertia of given section shown in figure. | 10M | 3 | L2 |
| | | | | |
| 17 | a) Derive work energy equation for translation. b) State the law of conservation of momentum. | 5M 5M | 4 | L2 |
| OR | | | | |
| 18 | A 20 Kg block starting from rest slides up a 300 inclined plane under the action of a 175 N force directed along the inclined plane. The coefficient of kinetic friction between the block and the plane is 0.2. Determine the (i) speed of the block after it slides 4.5 m and (ii) the distance travelled by the block when its speed becomes 4.5 m/s. | 5M 5M | 4 | L2 |
| 19 | Differentiate Simple and Compound Pendulums. | 10M | 5 | L2 |
| OR | | | | |
| 20 | a) A body moving with simple harmonic motion has amplitude of 1 m and a period of oscillation of 2 seconds. What will be its velocity and acceleration 0.4 seconds after passing an extreme position? b) Mention the forces which are generally omitted while applying the principle of virtual work. | 5M 5M | 5 | L2 |