



R20 Regulation

Subject code: 3B4BA

**TKR COLLEGE OF ENGINEERING AND TECHNOLOGY**

(Autonomous, Accredited by NAAC with 'A+' Grade)

**B.Tech IV Semester Supplementary Examinations, December 2025**

**ENGINEERING MECHANICS**

(EEE)

Maximum Marks: 70

Date: 16.12.2025

Duration: 3 hours

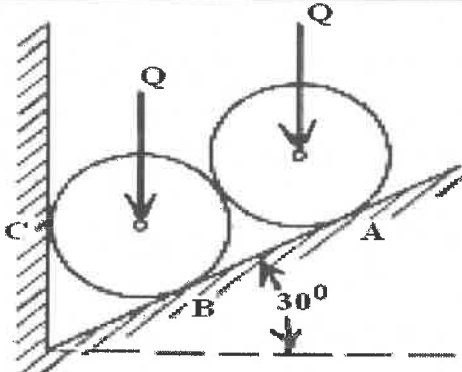
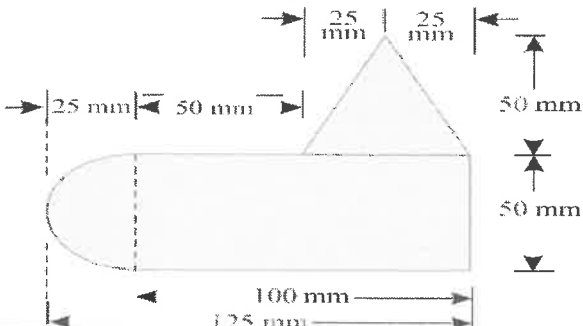
- Note:
1. This question paper contains two parts A and B.
  2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
  3. Part B consists of 5 Units. Answer any one full question from each unit.
  4. Each question carries 10 marks and may have a, b, c, d as sub questions.

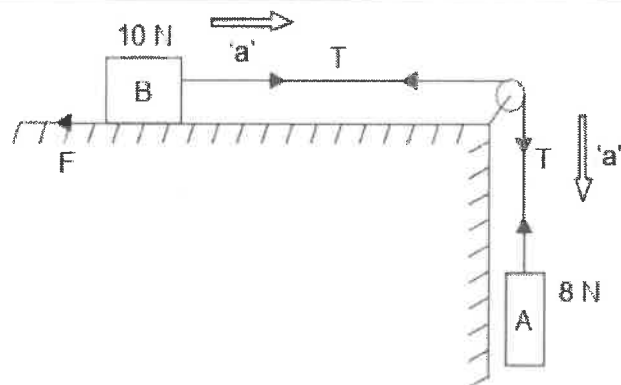
Part-A

| All the following questions carry equal marks (10X2M=20 Marks) |   | Marks | CO | BTL |
|--|---|-------|----|-----|
| 1  | State the Lami's theorem.   | 2M    | 1  | L1  |
| 2  | What is couple?   | 2M    | 1  | L1  |
| 3  | Define angle of repose.   | 2M    | 2  | L1  |
| 4  | Define centroid.  | 2M    | 2  | L1  |
| 5  | What is moment of inertia?  | 2M    | 3  | L1  |
| 6  | Derive an expression for a centroid of a triangle having base "b" and height "h". | 2M    | 3  | L1  |
| 7  | What is rotary motion and write the equations of rotary motion?                   | 2M    | 4  | L1  |
| 8  | Write about mass moment of inertia.   | 2M    | 4  | L1  |
| 9  | Define free vibration.  | 2M    | 5  | L1  |
| 10   | Define Time period and Amplitude.   | 2M    | 5  | L1  |

Part-B

| Answer All the following questions. (5X10M=50Marks) |   | Marks | CO | BTL |
|---|---|-------|----|-----|
| 11  | Determine the resultant of system of forces acting as shown in fig. <div style="text-align: center;"> </div>  | 10M   | 1  | L2  |
| OR  |   |       |    |     |
| 12  | Two identical rollers, each of weight 100 N, are supported by an inclined plane and a vertical wall as shown in the following figure. Assuming smooth surfaces, find the reactions induced at the points of support A, B and C. | 10M   | 1  | L2  |

|    |  |     |   |    |
|----|--|-----|---|----|
|    |   |     |   |    |
| 13 | <p>A uniform lamina shown in Fig. consists of a rectangle, a circle and a triangle. Determine the centre of gravity of the lamina. All dimensions are in mm.</p>  <p style="text-align: center;">OR</p>  | 10M | 2 | L2 |
| 14 | <p>A ladder 6 m long and with 300N weight is resting against a wall at an angle of <math>60^\circ</math> 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.</p>   | 10M | 2 | L2 |
| 15 | <p>Find the moment of inertia of a T-section with flange as 150 mm <math>\times</math> 50 mm and web as 150 mm <math>\times</math> 50 mm about X-X and Y-Y axes through the centre of gravity of the section.</p> <p style="text-align: center;">OR</p>  | 10M | 3 | L2 |
| 16 | <p>A hemisphere of 60 mm diameter is placed on the top of the cylinder having 60 mm diameter. Find the common centre of gravity of the body from the base of cylinder, if its height is 100 mm.</p>  | 10M | 3 | L2 |
| 17 | <p>Two blocks shown in Fig. have weights <math>A = 8\text{ N}</math> and <math>B = 10\text{ N}</math> and coefficient of friction between the block A and horizontal plane is 0.2. If the system is released, from rest and the block A falls through a vertical distance of 1.5 m, what is the velocity acquired by it? Neglect the friction in the pulley and extension of the string.</p> | 10M | 4 | L2 |



OR

|    |  |     |   |    |
|----|--|-----|---|----|
| 18 | Calculate the moment of inertia and radius of gyration of grinding stone 90cm in diameter and 10cm thickness with respect to its axis of rotation. Stone density is $0.0026 \text{ Kg/cm}^3$ . | 10M | 4 | L2 |
| 19 | State and prove equations of simple harmonic motion.   | 10M | 5 | L2 |
| OR |  |     |   |    |
| 20 | Define mechanical vibration. Explain in brief about the different types of vibrations?   | 10M | 5 | L2 |

