Hall Ticket No | | | | | | | | | | | Question Paper Code: AMEB03

INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)

B.Tech III Semester End Examinations (Regular), February – 2021

Regulation: IARE–R18

ENGIEERING MECHANICS

Time: 3 Hours   (ME | CE)   **Max Marks: 70**

Answer any Four Questions from Part A
Answer any Five Questions from Part B

PART – A

1. State and prove the Parallelogram law of forces?   **[5M]**

2. Distinguish between static friction and dynamic friction.   **[5M]**

3. Determine the equation for centroid of semi-circle.   **[5M]**

4. State the assumptions necessary for the analysis of a plane projectile motion.   **[5M]**

5. Write the equation of simple harmonic motion with notations.   **[5M]**

6. Distinguish between couple and moment.   **[5M]**

7. What are the assumptions of a perfect truss?   **[5M]**

8. Give the location of centroids of rectangle, right angled triangle, parabola, semi-circle and quarter circle. **[5M]**

PART – B

9. Explain the procedure to find the resultant of several forces acting at a point.   **[10M]**

10. Two forces are applied at the point A of a hook support as shown in Figure 1. Determine the magnitude and direction of the resultant force by using i) Parallelogram law and ii) Triangle law   **[10M]**
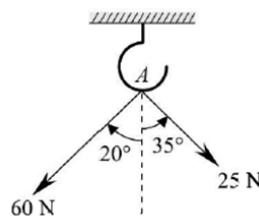

Figure 1

11. Describe how trusses are analyzed by the method of joints.   **[10M]**

12. A screw jack has mean diameter of 50 mm and pitch 10 mm. If the coefficient of friction between its screw and nut is 0.15, find the effort required at the end of 700 mm long handle to raise a load of 10kN   **[10M]**

13. Find the mass moment of inertia of a solid cylindrical body of radius 'r' and height 'H' about its centroidal axes.   **[10M]**

14. A beam AB of span 5m is carrying a point load of 2kN at a distance 2m from A as shown in Figure 2. Determine the beam reactions, by using the principle of the virtual work.   **[10M]**
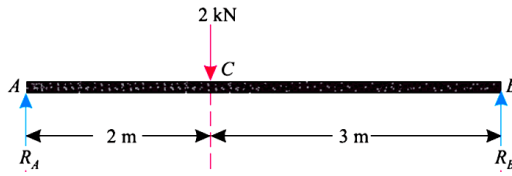
Figure 2

15. Determine the expression for range along an inclined plane. What is the necessary condition for obtaining maximum range along an inclined plane? **[10M]**

16. A block of mass 5kg resting a 30° inclined plane is released. The block after travelling a distance of 0.5m along inclined plane hits a spring of stiffness 15N/cm as shown in Figure 3 given below. Find the maximum compression of spring. Assume coefficient of friction between block and the inclined plane as 0.2. **[10M]**
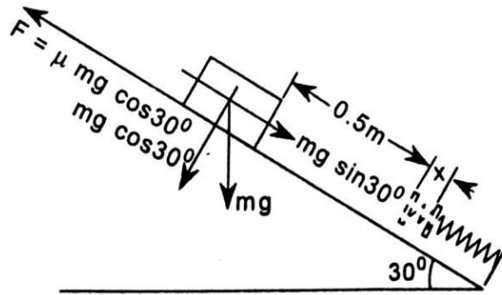

Figure 3

17. Determine the periodic time expression for a compound pendulum. **[10M]**

18. A particle, moving with simple harmonic motion, performs 10 complete oscillation per minute and its speed, is 60% of the maximum speed when it is at a distance of 8 cm from the centre of oscillation, . Find amplitude, maximum acceleration of the particle. Also find speed of the particle, when it is 6 cm far from the centre of oscillation **[10M]**

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