

I B. Tech II Semester Supplementary Examinations, December - 2020
ENGINEERING MECHANICS

(Com. to ECE, EEE, EIE, Bio-Tech, E Com E, Agri E)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question paper consists of two parts (**Part-A** and **Part-B**)
 2. Answering the question in **Part-A** is Compulsory
 3. Answer any **THREE** Questions from **Part-B**

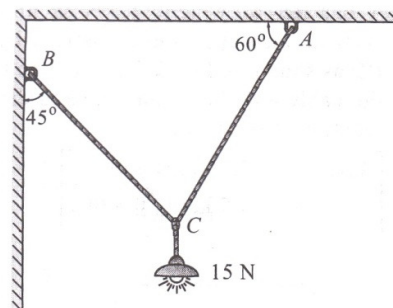
PART -A

1. a) Explain Coulomb's law of dry friction. (4M)
- b) Discuss the law of converse of the polygon of forces. (4M)
- c) What is the centroid of a right angle triangle of base 90cm and height 120cm? (3M)
- d) State transfer theorem for area moment of inertia. (3M)
- e) Discuss the differences between curvilinear and rectilinear motions. (4M)
- f) Write the work-energy equation in case of (4M)
 - (i) fixed axis rotation;
 - (ii) Translation.

PART -B

2. a) How will you prove that a body will not be in equilibrium when the body is (7M)
 subjected to two forces which are equal and opposite but are parallel?
- b) A pull of 60 N inclined at 25° to the horizontal plane, is required just to move a (9M)
 body placed on a rough horizontal plane. But the push required to move the body
 is 75N. If the push is inclined at 25° to the horizontal, find the weight of the body
 and coefficient of friction.
3. a) The resultant of two concurrent forces is 2500N and the angle between the forces (7M)
 is 90° . The resultant makes an angle of 46° with one of the forces. Find the
 magnitude of each force.

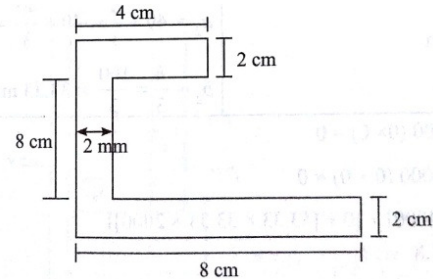
- b) An electric light weighing 15N hangs (9M)
 from a point C by the two strings AC
 and BC as shown in the figure. AC is
 inclined at 60° to the horizontal and BC
 at 45° to the vertical as shown. Find the
 forces in the strings AC and BC.



4. a) State and prove Pappus theorems. (7M)
- b) Determine the centre of gravity of a solid right circular cone of radius 'R' and (9M)
 height 'h'.

5. a) Derive an equation for moment of inertia of a Quarter circles. (7M)

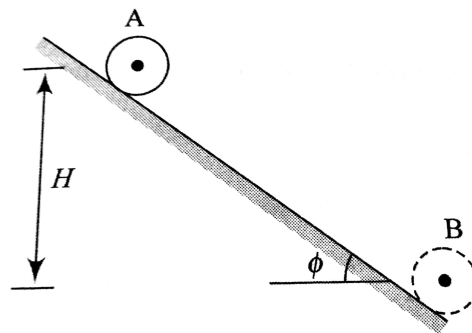
- b) Determine the Moment of Inertia of the following section about the centroidal XX-axis. (9M)



6. a) A wheel has an initial clock wise angular velocity of 8 rad/s and a constant angular acceleration of 2 rad/s². Determine the number of revolutions the wheel must undergo to acquire a clockwise angular velocity of 15 rad/s. What is the time required. (7M)

- b) Two trains P and Q leave the same station on parallel lines. Train P starts at rest with uniform acceleration of 0.2 rad/s² attains a speed of 10 m/s. Further the speed is kept constant. Train Q leaves 30 seconds later with uniform acceleration of 0.5 m/s² from rest and attains a maximum speed of 20 m/s, when will train Q overtake train P. (9M)

7. a) A ball of mass M starts sliding from position A, at a height H from the datum. Determine the expression of velocity V_B , when the ball reaches B, using the principle of energy, and prove that this is invariant to the mass of the body. (9M)



- b) A body of weight 2000N moves on a level horizontal rough road for a distance of 200m. The resistance of the road is 10N per 1000N weight of the body. Find the work done by the resistance on the body. (7M)