I B. Tech II Semester Supplementary Examinations Dec - 2016
ENGINEERING MECHANICS
(Com. to ECE, EEE, EIE, BOT, E Com E, AGE)

**Time: 3 hours** **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

PART-A

1. a) Two forces 15N and 12N are acting at a point. The angle between the forces is 60^0. Find the magnitude and direction of the resultant. [4]
   b) Explain Lami's Theorem. [3]
   c) Differentiate between Centroid and Center of gravity. [3]
   d) Define the terms Moment of inertia and polar moment of inertia. [4]
   e) A car is travelling along a circular curve that has a radius of 50m. If its speed is 16 m/s and is increasing uniformly at 8 m/s^2, determine the magnitude of its acceleration at this instant. [4]
   f) Discuss when you would prefer work-energy, impulse-momentum formulations. [4]

PART-B

2. a) What do you understand by Limiting friction? [4]
   b) Find the sum of moment about center O of the force and couple acting on the rectangle plate as shown in the figure. [12]
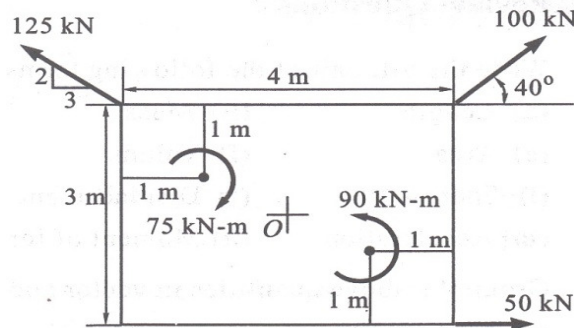

3. a) Explain free body diagram? [4]
   b) An electric light weighing 15N hangs from a point C by the two strings AC and BC as shown in the figure. AC is inclined at 60^0 to the horizontal and BC at 45^0 to the vertical as shown. Using Lami's theorem find the forces in the strings AC and BC. [12]

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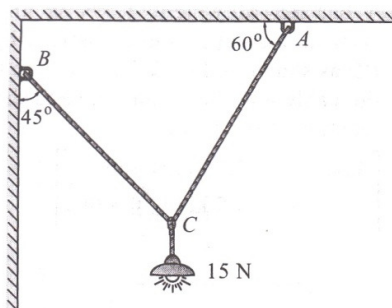
4. a) Determine the centroid of the quarter circle whose radius is R. [8]
   b) Determine the centroid of the shaded portion given in the figure (All dimensions in mm). [8]
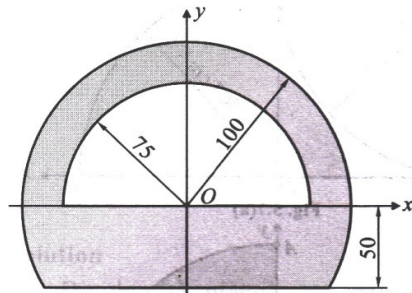
5. a) Determine the product of inertia for right angle triangle of base 'b' and altitude 'h'. [8]
   b) Determine the polar Moment of Inertia of the shaded area with respect to and axis through the origin (All dimensions in mm). [8]
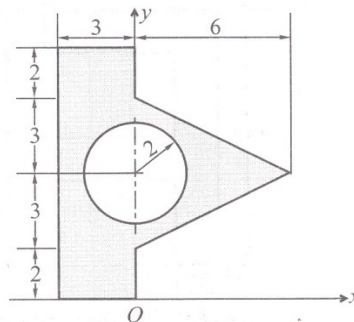
6. a) When the angular velocity of a 1.2 m diameter pulley is 3 rad/s, the total acceleration of a point on its rim is 9 m/s^2, determine angular acceleration of the pulley at this instance. [6]
   b) A ball projected vertically upwards attains a maximum height of 440m. Calculate the velocity of projection and compute the time of flight of air. At what altitude will this ball meet a second ball projected vertically upwards 4 seconds later with a speed of 120 m/s. [10]

7. a) A flywheel having weight 50kN and having radius of gyration is 1m and its speed varies from 400 rpm to 280 rpm in 2 min. Calculate the (i) change in kinetic energy and (ii) change in angular momentum. [6]
   b) The 10 kg slider A moves with negligible friction up the inclined guide. The attached spring has stiffness of 60 N/m and is stretched 0.6 m in position A where the slider is released from rest. The 250 N is constant and the pulley offers negligible resistance to the motion of the cord as shown in the figure. Determine the velocity of the slider as it moves from A to B. [10]

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