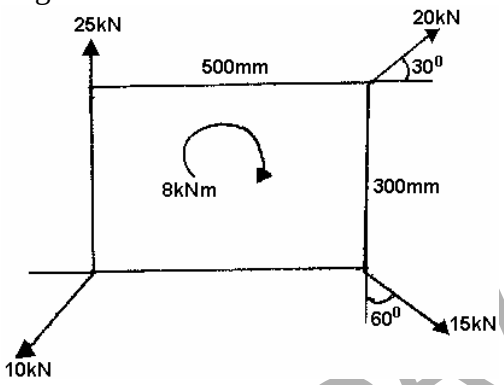
Code.No: R07A1EC09 | R07 | SET-1

I B.TECH – EXAMINATIONS, DECEMBER - 2010
ENGINEERING MECHANICS
(COMMON TO MMT & AE)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks
- - -

1.a) Determine the magnitude, direction and position of the resultant of the system of forces as shown in figure.

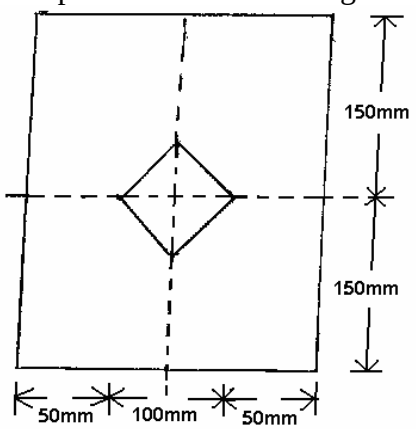


b) A ladder 6 m long and with 300N weight is resting against a wall at an angle of 60^0 to the ground. A man weighing 750N climbs the ladder. At what position along the ladder from the bottom does he induce slipping? The coefficient of friction for both the wall and the ground with the ladder is 0.2. [16]

2. An electric motor driven power screw moves a nut in a horizontal plane against a force of 75 kN at a speed of 300 mm/min. The screw has a single square thread of 6 mm pitch on a major diameter of 40 mm. The coefficient of friction at the screw threads is 0.1. Estimate the power of the motor. [16]

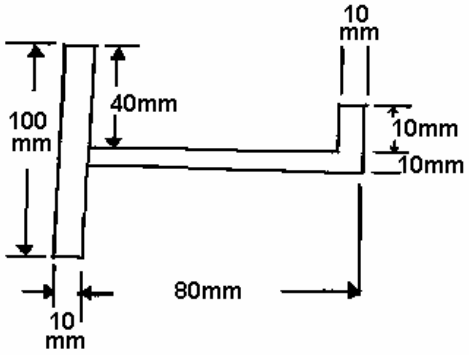
3. A flat belt 8 mm thick and 100 mm wide transmit two pulleys, running at 1600 m/min. The mass of the belt is 0.9 kg/m length. The angle of lap in the smaller pulley is 165^0 and the coefficient between pulley and the belt is 0.3. If the maximum permissible stress in the belt is 2 MN/m^2, find maximum power transmitted and initial tension in the belt. [16]

4.a) State and explain Pappu's theorem.
b) Locate the centroid of the plane area shown in figure. [6+10]



5.a) State and prove parallel axis theorem.

b) Compute the moment of inertia of the plane area shown in figure about its horizontal centroidal axis. [16]



6. A balloon is rising with a constant velocity of 5 m/s. A stone is released from with in it with an upward velocity of 10 m/s relative to that of the balloon. Determine:
   a) When the stone will return to the balloon
   b) The velocity of the stone when it returns to the balloon and
   c) The distance moved by the balloon during this time. [16]

7. A large fly wheel of mass 1800 kg has a radius of gyration of 0.75m. It is observed that 2500 revolutions are required for the fly wheel to coast from an angular velocity of 450 rpm to rest. Determine the average amount of the couple due to kinetic friction in the bearings. [16]

8. A shaft 1.5m long is supported in flexible bearings at the ends and carries two wheels each of 50 kg mass. One wheel is situated at the centre of the shaft and the other at a distance of 0.4m from the centre of the shaft towards right. The shaft is hollow having external diameter of 75 mm and inner diameter 37.5 mm. The density of the shaft material is 8000 kg/m^3. E = 200 GN/m^2. Find the frequency of transverse vibration. [16]

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Code.No: R07A1EC09 | R07 | SET-2

I B.TECH – EXAMINATIONS, DECEMBER - 2010
ENGINEERING MECHANICS
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Time: 3hours **Max.Marks:80**

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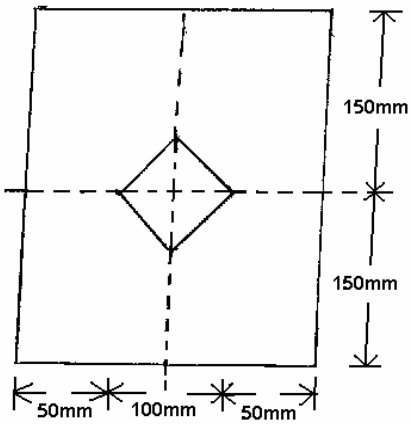

3.a) State and prove parallel axis theorem.
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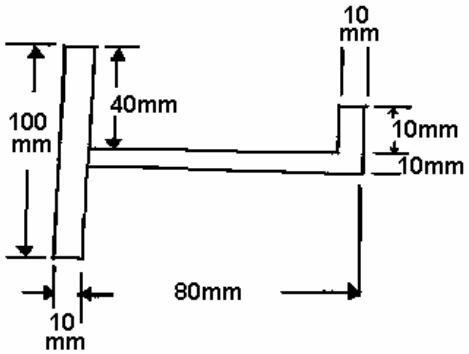

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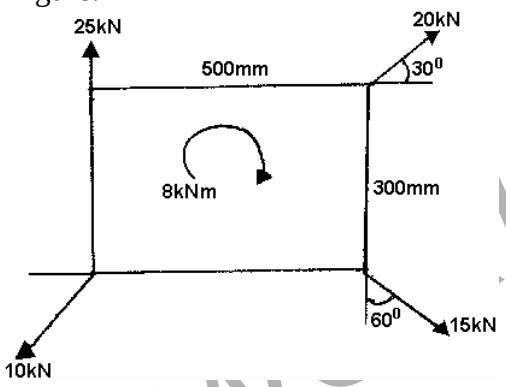

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I B.TECH – EXAMINATIONS, DECEMBER - 2010
ENGINEERING MECHANICS
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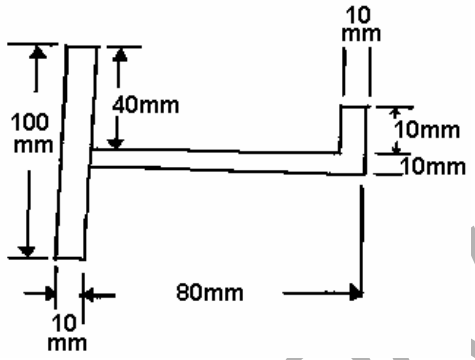

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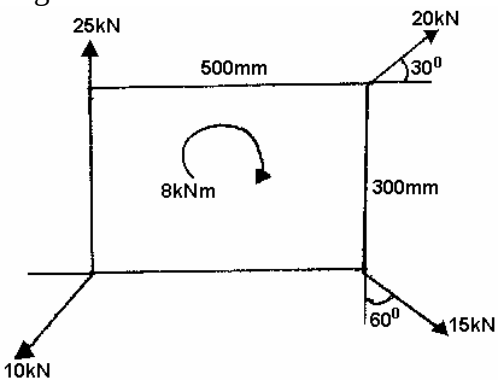

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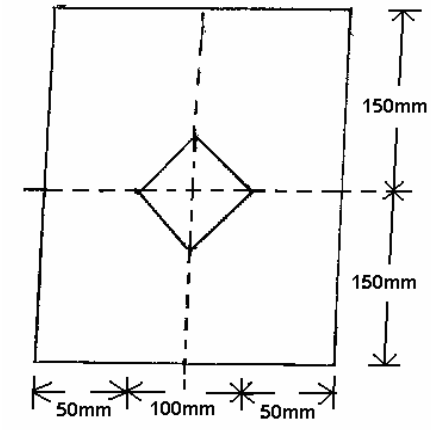

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Code.No: R07A1EC09 | R07 | SET-4

I B.TECH – EXAMINATIONS, DECEMBER - 2010
ENGINEERING MECHANICS
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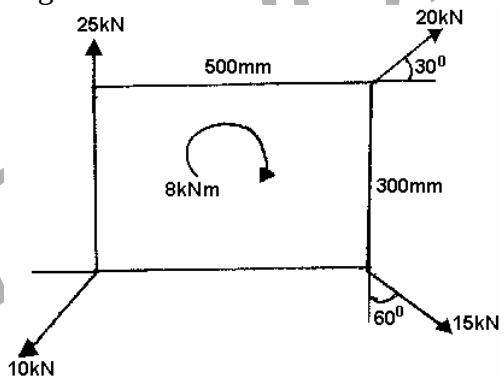

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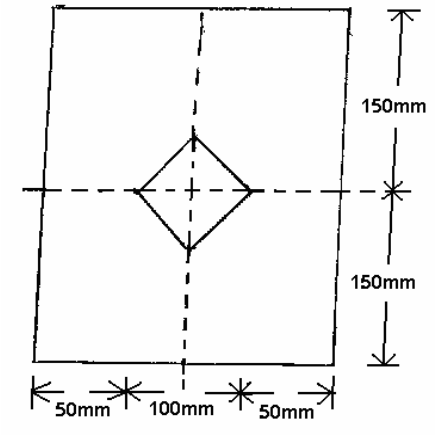

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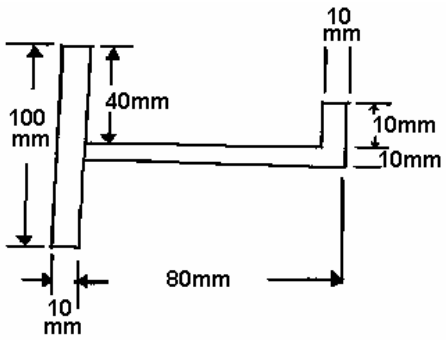

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