B - 734 (Pages : 05) **SEM 1-3 (RC07-08)**

[Total No. of Questions : 8]

F.E. (Semester - I) (Revised in 2007-08 Course) Examination, Nov./Dec. - 2011

BASIC CIVIL ENGINEERING & ENGINEERING MECHANICS

Duration : 3 Hours **Total Marks : 100**

Instructions : 1) Attempt any five questions with at least one question from each Module.

2) Make suitable assumptions, if necessary.

MODULE - I

Q1) a) Explain the importance of the following in civil Engineering. **[10]**

i) Hydraulics.

ii) Environmental Engineering.

b) Write short notes on **[6]**

i) Aluminium as a building material.

ii) FRP in construction.

c) Briefly explain the components of a super-structure of a building. **[4]**

Q2) a) Give general classification of bridges. Draw a neat sketch of suspension bridge and label its components. **[10]**

b) Write short notes on: **[8]**

i) Grades of concrete

ii) Components of roads.

c) What is the function of sub-structure in a building. **[2]**

MODULE - II

Q3) a) Find the magnitude and direction of fourth force (F_4) completely so as to give the resultant of 800 N acting at 50° as shown. **[8]**

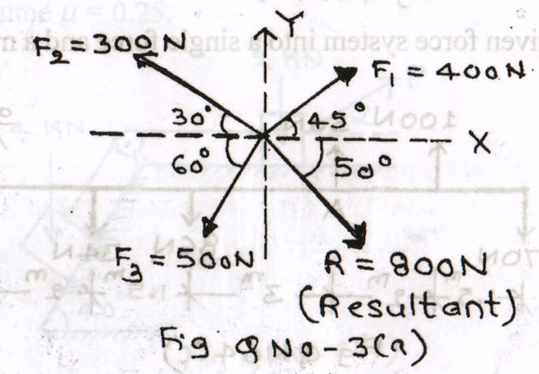

Fig Q No - 3(a)

P.T.O.

b) Two cylinders p and Q rest in a channel section as shown. The cylinder (p) has a diameter of 100 mm and weighs 200N where as cylinder (Q) has diameter of 180 mm and weighs 500 N. Determine reactions at all four points of contact. 1, 2, 3, & 4. **[12]**

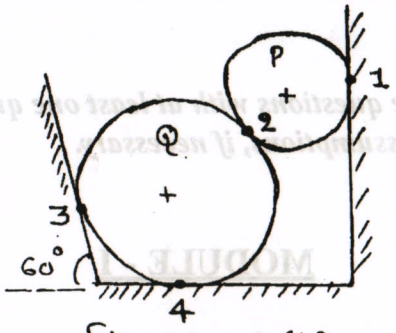

Fig Q No 3(b)

Q4) a) Determine support reactions for the beam shown. **[8]**

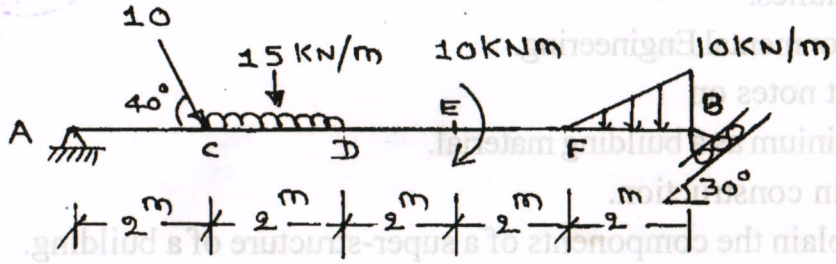

Fig Q No 4(a)

b) The lever ABC of a component of a machine is hinged at B and is subjected to a system of co-planar forces as shown. Find the magnitude of force (P) to keep the lever in equilibrium. Also determine reaction at B. **[8]**

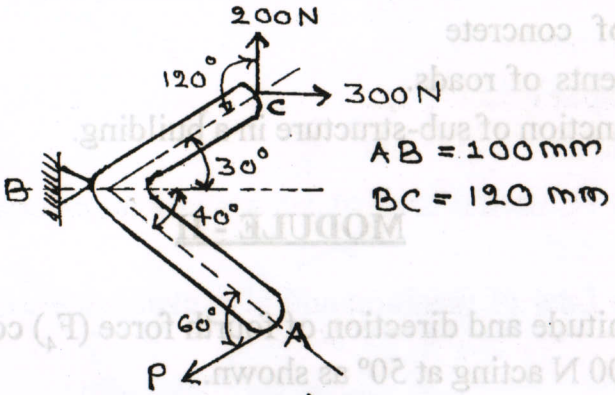

Fig Q No 4(b)

c) Replace the given force system into a single force and a moment acting at A. **[4]**

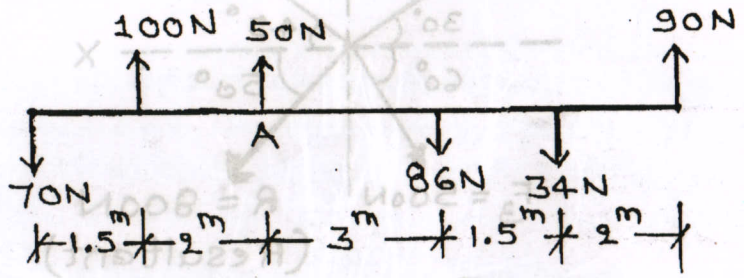

Fig Q No 4(c)

MODULE - III

Q5) a) Find the position of centroid of the shaded area shown. All the dimensions are in mms. **[10]**

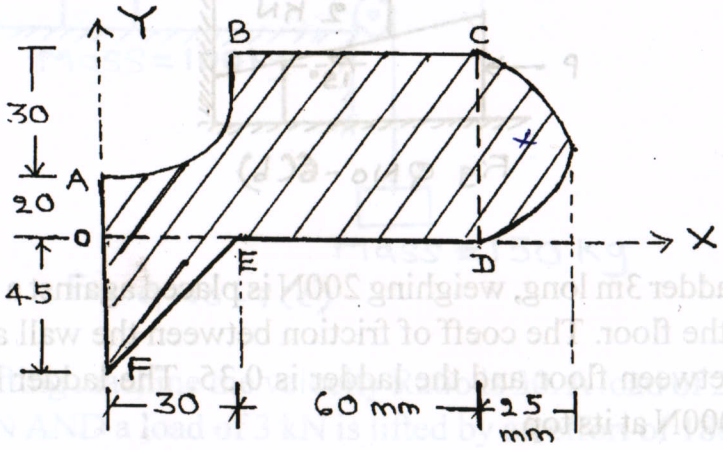

Fig No-5(a)

b) Find the moment of Inertia about the section ①① passing thro' Point 'A' for the plane lamina shown. **[10]**

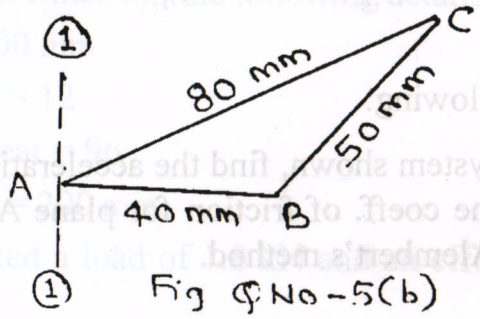

Fig No-5(b)

Q6) Solve any Two of the following:

a) What is the minimum value of force (P) for the system shown to cause motion to impend? Assume $\mu = 0.25$. **[10]**

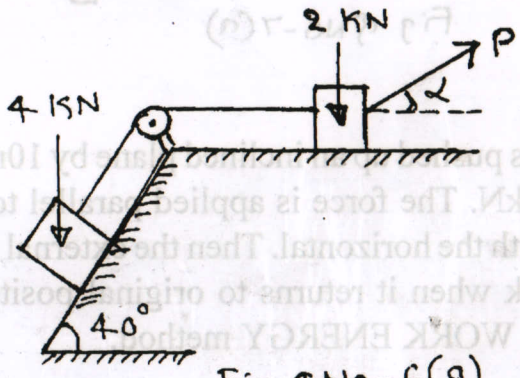

Fig No-6(a)

b) Determine the minimum horizontal force (P) required just to start the movement of the body. Assume the coeff. of friction = $\mu = 0.25$. The wedge angle is 15°. **[10]**

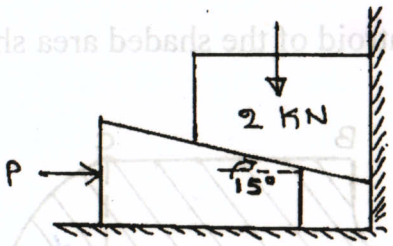

Fig QNo-6(b)

c) A uniform ladder 3m long, weighing 200N is placed against a wall making an angle of 60° with the floor. The coeff of friction between the wall and the ladder is 0.25 AND that between floor and the ladder is 0.35. The ladder has to support a man weighing 1000N at its top. **[10]**

What must be the minimum value of horizontal force (p) applied at floor level to prevent slipping.

MODULE - IV

Q7) Solve any Two of the following:

a) For the connected system shown, find the acceleration of the system and tension in the string. Assume coeff. of friction for plane AC = 0.20, and for the plane BC = 0.30. Use D' Alembert's method. **[10]**

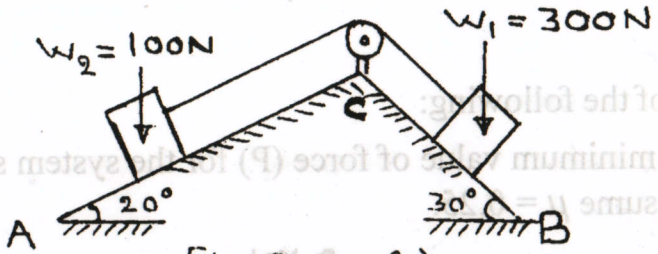

Fig QNo-7(a)

b) A block weighing 1 kN is pushed up an inclined plane by 10m starting from rest, by applying a force of 1.2 kN. The force is applied parallel to the plane. The plane makes an angle of 35° with the horizontal. Then the external force is removed. Find the velocity of the block when it returns to original position. Assume coeff. of friction = $\mu = 0.20$. Use WORK ENERGY method. **[10]**

c) Determine the time required for the system shown to attain a velocity of 5m/sec, starting from rest. What is tension in the string? How much distance will be covered by the system in that period. Assume coeff. of friction = μ = 0.20 and friction less pulley. USe "Impulse Momentum Equation". **[10]**

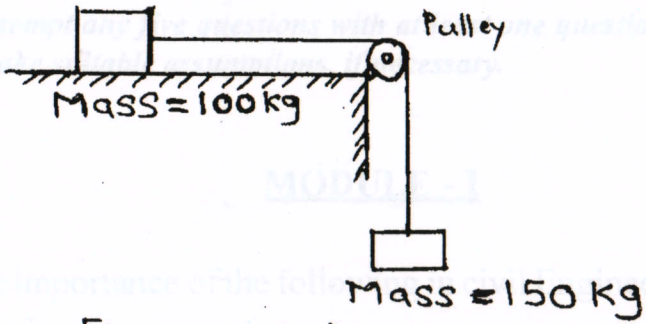

Fig Q No-7(c)

Q8) a) In a simple lifting machine the velocity Ratio is 30. A load of 2.4 kN is lifted by an effort of 150N AND a load of 3 kN is lifted by an effort of 180N. Find the Law of machine. Calculate the load lifted by an effort of 200 N. Also find out **[8]**

i) Amount of effort lost in frition.

ii) Mechanical Advantage.

iii) Efficiency.

b) A single purchase crab winch has the following details. **[12]**

Length of lever = 700 mm

No of teeth on pinion = 12

No of teeth on spur gear = 96

Diameter of load axle = 200 mm.

An effort of 60 N lifted a load of 1.8 kN and an effort of 120N lifted a load of 3960N.

Determine Law of machine and also efficiency of the machine in both the cases.

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