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F.E. Semester-I (Revised Course 2007-08)  
EXAMINATION Aug/Sept 2019  
Basic Civil Engineering & Engineering Mechanics

[Duration : Three Hours]

[Max. Marks : 100]

Instructions:

- 1) Answer any 5 question, minimum one question from each Module.
- 2) Assume additional data if required and state them clearly.
- 3) Draw neat sketches wherever necessary.

Module I

- |   |  |    |
|---|--|----|
| 1 | a. Explain the importance of the following.<br>i. Geotechnical Engineering<br>ii. Structural Engineering | 10 |
|   | b. Write a note on components of roads.  | 5  |
|   | c. distinguishes between load bearing structures and framed structures.                                  | 5  |
| 2 | a. Describe combined footing and also explain when we use this type of footing                           | 5  |
|   | b. Explain what are the various components of a super structure of a building?                           | 5  |
|   | c. Write a note on<br>i. Ready mix concrete<br>ii. Workability of concrete                               | 10 |

Module – II

- |    |  |    |
|----|--|----|
| a. | Three cylinders are placed in a ditch determine the reaction between cylinder A and the vertical wall the weight of the cylinders A, B, C are as follows 75N,200N,100N and the radii is 100mm, 150mm and 125mm | 10 |
|----|--|----|

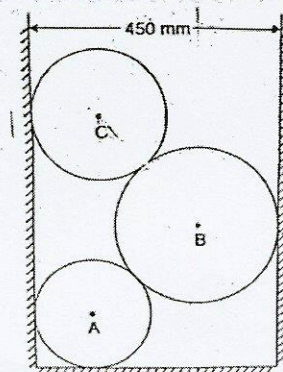


Fig 1 (3a)





- b. Find the resultant of the force acting the member?

10

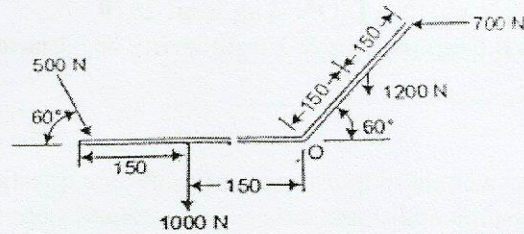


Fig 2 ( 3b)

4

- a. Determine the forces in various segments of the cable loaded?

10

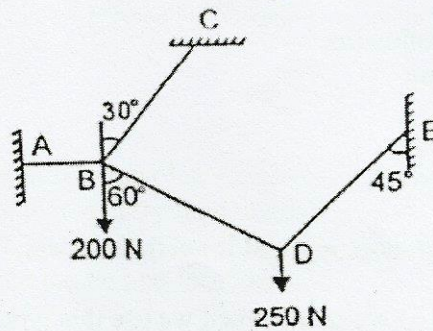


Fig 3.( 4a)

- b. Find the magnitude and direction of reactions at support of the beam?

10

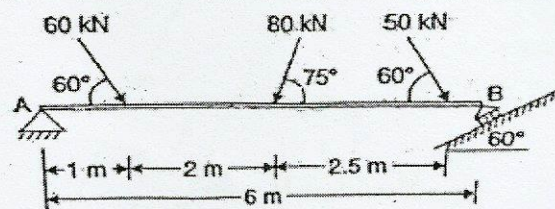


Fig 4 (4b)



MODULE III

5

- a. Determine the moment of inertia of section about axis AD.

10

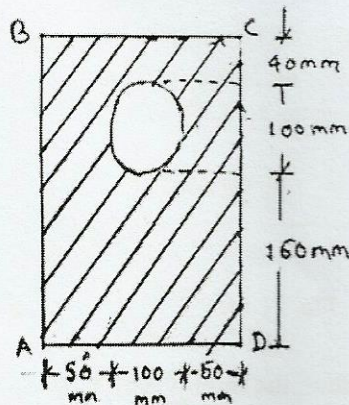


fig 5 (5a)

- b. Find the position of the centroid of the shaded area shown. Take  $x=15\text{mm}$

10

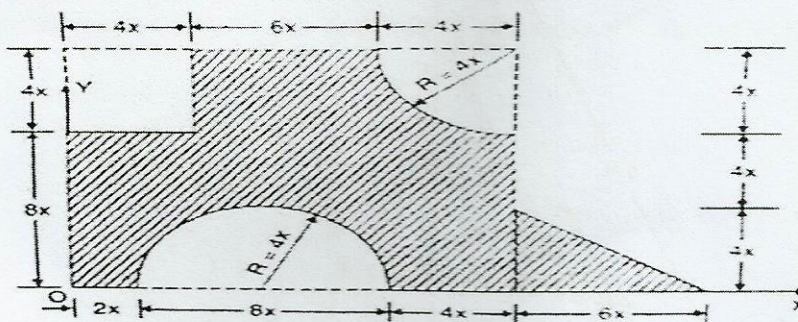


Fig 6 ( 5b)



- 6 a. The system of bodies will impend at an application of force  $P$ . find the force  $P$ ?  
Coefficient of friction is 0.2. Assume pulley to be smooth 10

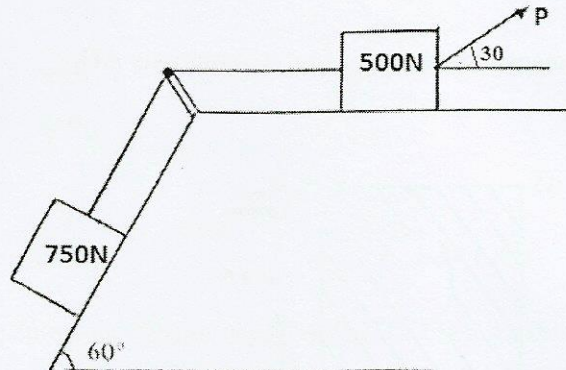


Fig 7 ( 6a)

- b. Determine the least value of  $\alpha$  which the ladder may be placed at without slipping, the ladder is carrying a vertical weight of 900N at a distance of 1m from the wall? The coefficient of friction is 0.4 between the ladder and the wall, and 0.3 between ladder and the floor. 10

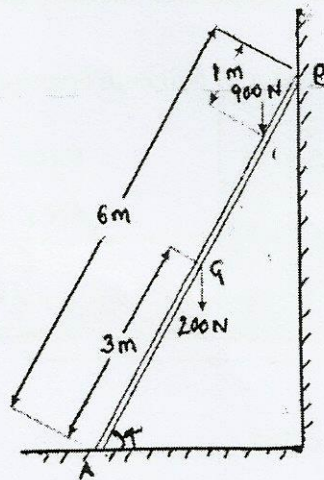
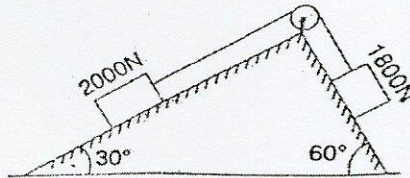


Fig 8( 6b)



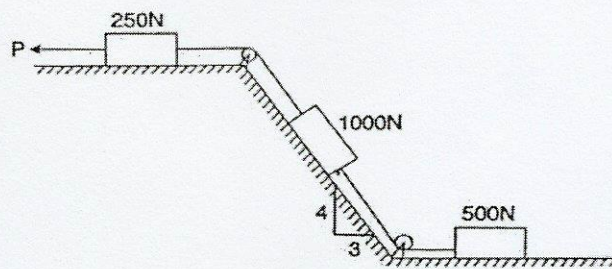
**MODULE IV**

- 7 a. Two blocks A and B are placed on incline planes at  $30^\circ$  and  $60^\circ$  to the horizontal the blocks weigh 2000N and 1800N. find the tension in the string and the time required to attain a velocity of 9.81 m/s  $\mu = 0.2$  assume pulleys to be frictionless. 10



**Fig 9(7a)**

- b. Determine the force P required for a system shown below to attain a velocity of 3 m/s after moving 4.5m from rest. What is the tension in the string? Assume coef of friction  $\mu = 0.20$  and friction less pulley. Use work energy equation 10



**Fig8(7b)**

- 8 a) In a simple lifting machine an effort of 500N is to be moved by a distance of 20m to raise a load of 10000N by a distance of 0.8m, Determine the velocity ratio mechanical Advantage and efficiency of the machine. Also determine the ideal effort, effort lost in friction, ideal load and frictional resistance. 10
- b) A Double purchase crab has the following details: 10
- No. of teeth on pinion = 15 and 20
  - No. of teeth on spur wheel = 45 and 40
  - Diameter of load axle = 150mm
  - Efficiency = 40%
- What load will be lifted by an effort of 250N applied at the end of the handle?