Total No. of Questions : 10] [Total No. of Printed Pages : 4

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BE–203

B. E. (First Semester) EXAMINATION, April, 2009

(Common for all Branches)

ENGINEERING MECHANICS

(BE – 203)

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt *one* question from each Unit. Total *five* questions are to be solved. Assume suitably any missing data and mention it in the answer book.

Unit – I

1. (a) What do you understand by the statement : "A body is in equilibrium" ? Mention various conditions of equilibrium. 6

   (b) The following forces act at a point : 14

   (i) 25 N inclined 30° towards North from East

   (ii) 20 N towards North

   (iii) 35 N towards North-West

   (iv) 45 N inclined 45° towards South from West

   Find the magnitude and direction of the resultant force.

Or

2. (a) State and explain Lami's theorem. 6

P. T. O.

(b) An object weighing 25 N hangs from a point A with the help of two strings BA and CA as shown in fig. 1. BA is inclined at 40° to the vertical while CA is inclined at 60° to the horizontal. Determine the forces in the strings BA and CA. 14

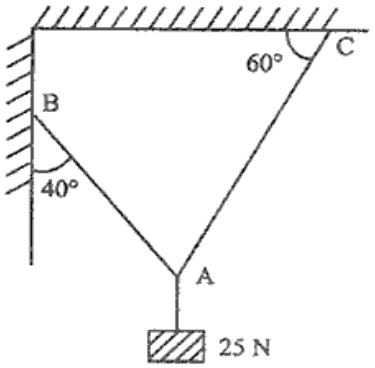

Fig. 1

Unit – II

3. (a) State and explain parallel axis theorem. 6

(b) Find the Moment of Inertia of a Tee section as shown in fig. 2. All dimensions are in mm. 14

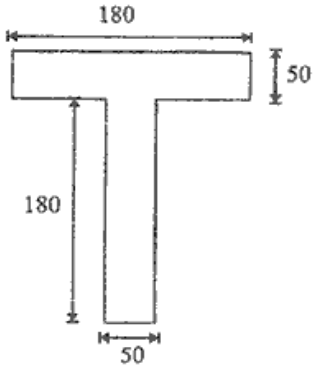

Fig. 2

Or

4. (a) What do you understand by the following ? 6

(i) Static friction (ii) Limiting friction

(iii) Kinetic friction

(b) A ladder 5 m long, weighing 250 N is resting against a wall at an angle of 60° with the horizontal floor. A man weighing 750 N climbs the ladder. At what position

along the ladder from the bottom does he induce slipping ? The coefficient of friction between wall ladder as well as floor and ladder both, is 0·3. 14

Unit – III

5. (a) Explain the following terms related with lifting machines : 6

(i) Mechanical advantage (ii) Velocity ratio

(iii) Efficiency

(b) In a lifting machine an effort of 98·2 N raised a load of 1000 N and an effort of 498·2 N raised a load of 6000 N. Find the law of the machine. What effort is required to lift a load of 10000 N ? Find also the maximum mechanical advantage. 14

Or

6. A belt 100 mm wide and 8 mm thick is transmitting power at a belt speed of 26·67 metres/second. The angle of lap for the smaller pully is 165° and the coefficient of friction is 0·3. The maximum permissible stress in the belt is 2·0 N/mm^2 and the mass of the belt is 0·9 kg/m. Find the power transmitted and the initial tension in the belt. Find also the maximum power that can be transmitted and the corresponding belt speed. 20

Unit – IV

7. (a) Explain the following terms : 10

(i) Shear force (ii) Bending moment

(iii) Point of contraflexure (iv) Overhanging beam

(b) Draw the shear force and bending moment diagrams for the beam show in fig. 3 : 10

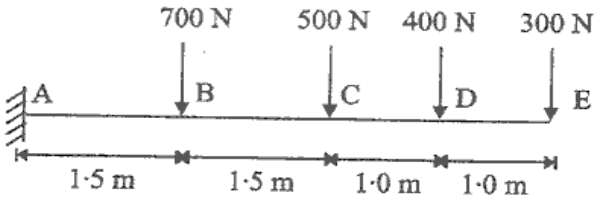

Fig. 3

P. T. O.

Or

8. Draw the shear force and bending moment diagrams for the beam shown in fig. 4. Find the value of maximum B. M. and mark the point of contraflexure, if any. 20

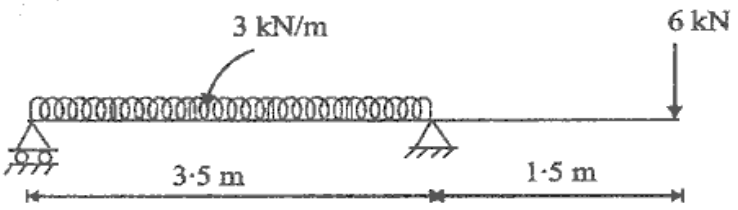

Fig. 4

Unit – V

9. (a) State and explain the principle of virtual work. 6

   (b) Two beams AB and BC are hinged at B as shown in fig. 5. Using the principle of virtual work find the reaction at D due to the load P at x from C. 14

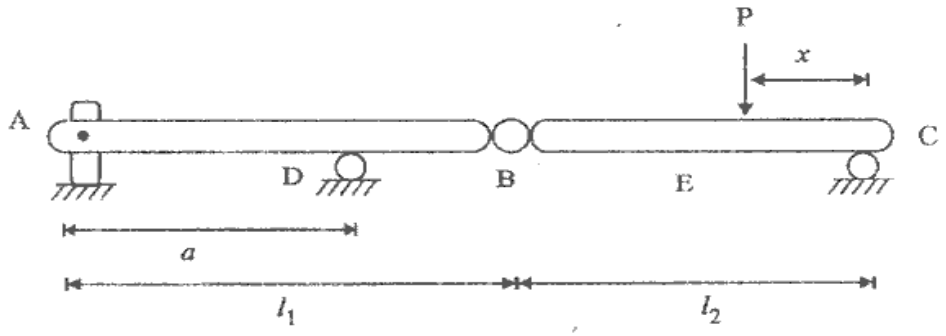

Fig. 5

Or

10. (a) What do you understand by redundant truss ? Explain with example. 6

    (b) Find the axial forces in all the members of a truss shown in fig. 6. 14

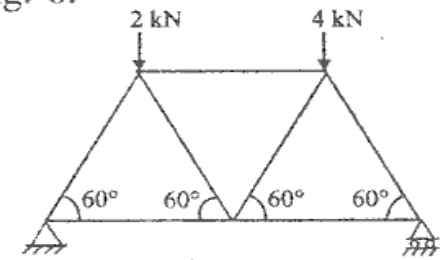

Fig. 6