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

Roll No.....

BE-203

B. E. (First/Second Semester) EXAMINATION, June, 2010

(Common for all Branches)

ENGINEERING MECHANICS

(BE – 203)

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt any *five* questions. All questions carry equal marks.

Unit – I

1. (a) Explain the term free body diagram. Draw the free body diagram weight W if ball placed on a horizontal surface. 6

   (b) A body weighing 2000 N is suspended with a chain AB 2 m long. It is pulled by a horizontal force of 320 N as shown in fig. 1. Find the force in the chain and the lateral displacement of body. 14

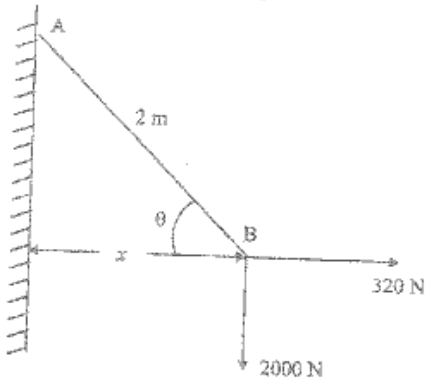

Fig. 1

Or

2. (a) State and prove Varignon's theorem. 6

   (b) A ball of weight 120 N rests in a right angle groove. The sides of the grooves are inclined at an angle of 30° and 60° to the horizontal. If all surface are smooth, determine the reactions at point of contact. 14

Unit – II

3. (a) Define the term moment of intertia and radius of gyration. 6

   (b) For the I section shown in fig. 2 find the moment of inertia about the centroidal axis $x - x$ perpendieular to web. 14

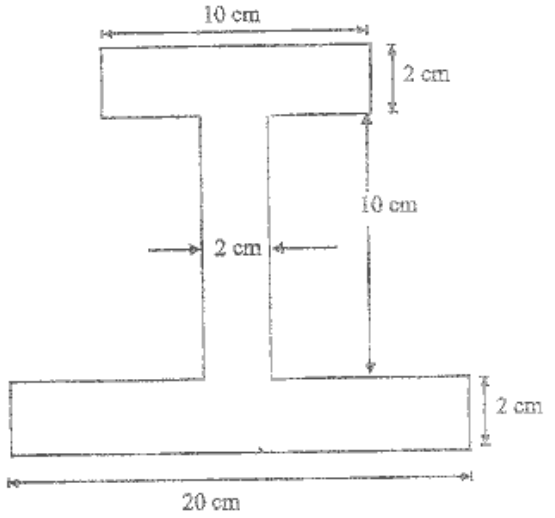

Fig. 2

Or

4. (a) Explain the Coulomb's law of friction. 6

   (b) A uniform ladder of length 10 m and weighing 20 N is placed against a smooth vertical wall with its lower end 8 m from the wall. In this position ladder is just to slip. Determine : 14

   (i) The coefficient of friction between ladder and floor.

   (ii) Frictional force acting on ladder at the point of contact between ladder and floor.

Unit – III

5. (a) Distinguish between slip and creep in a belt. 6

(b) A belt of density 1 gm/cm^3 has a maximum permissible stress of 250 N/cm^2.

Determine the maximum power that can be transmitted by a belt of 20 cm × 1·2 cm if the ratio of tight side to slack side tension is 2. 14

Or

6. (a) Explain the difference between reversible machine and self-locking machine. 4

(b) The power is transmitted using a rope drive, transmit 75 kW through a 150 cm diameter 45° grooved pulley rotating at 200 r.p.m. coefficient of friction between the ropes and pulley grooves is 0·3 and angle of lap is 160°. Each rope has mass 0·6 kg/metre and can safely take a pull of 800 N. Taking centrifugal tension into account, determine : 16

(i) The number of ropes required for drive.

(ii) Initial rope tension.

Unit – IV

7. (a) What do you mean by point of contraflexure ? 4

(b) Draw the S. F. and B. M. diagram of simply supported beam of length 7 m carrying u.d.l. as shown in fig. 3. 16

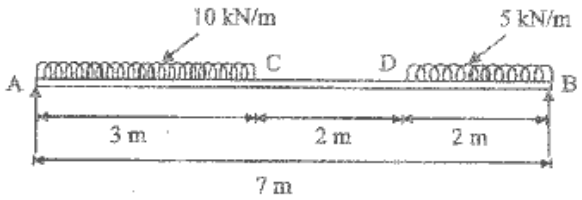

Fig. 3

Or

8. (a) What are the different types of beams ? 5

(b) Draw the SF and bending moment diagram for simply supported beam loaded as shown in fig. 4. 15

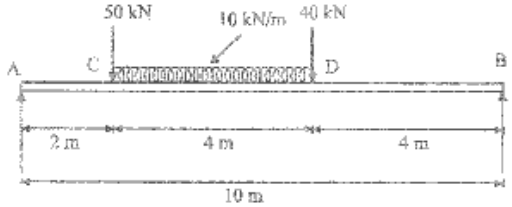

Fig. 4

Unit – V

9. (a) What are the different methods of analyzing a perfect frame ? Which *one* is used where and why ? 6

(b) Find the reactions and forces in members of the truss as shown in fig. 5, truss carries a point load of 1 kN at joint D. 14

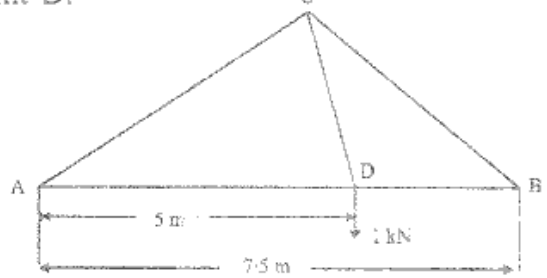

Fig. 5

Or

10. State the principle of virtual work and determine the force in member CD of the truss shown below. 20

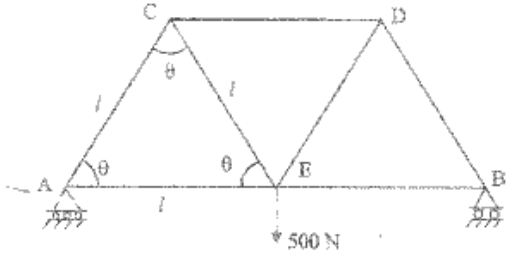

Fig. 6