

C 31675

(Pages 3)

Name.....

Reg. No.....

**COMBINED FIRST AND SECOND SEMESTER B.TECH. (ENGINEERING)
DEGREE EXAMINATION, JUNE 2007**

EN 2K 107 A—ENGINEERING MECHANICS (A)

(Common to AI, CH, CE, CS, EE, EC, IT, IC and AR)

Time : Three Hours

Maximum : 100 Marks

Answer all questions.

Assume suitable data that are not given.

- I. (a) State the principle of static friction.
(b) Three parallel forces F_1 , F_2 and F_3 are acting on a body as shown in Fig. 1 and the body is in equilibrium. If force $F_1 = 350$ N and $F_3 = 1000$ N and the distance between F_1 and F_2 be 2 m, determine the magnitude of force F_2 and the distance F_2 from force F_3 .

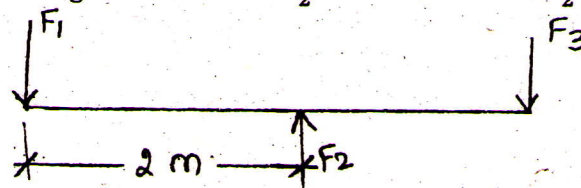


Fig. 1.

- (c) Differentiate between plane truss and space truss.
(d) A simply supported beam of span 9 m. carries a uniformly varying load from zero at end A to 900 N/m at end B. Calculate the reactions at the two ends of the support.
(e) Find the centre of gravity of the I-section shown in Fig.2.

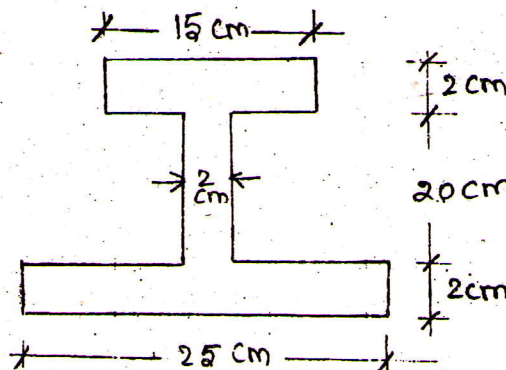


Fig. 2.

- (f) State parallel and perpendicular axis theorem.
(g) A particle is projected at such an angle with the horizontal that the horizontal range is 6 times the greatest height attained by the particle. Find the angle of projection.
(h) State and explain principle of dynamic equilibrium.

(8 × 5 = 40 marks)

Turn over

- II. (a) A square plate of 3 m side is acted upon by forces as shown in Fig. 3. Find the resultant in magnitude, direction and also the point of application with respect to the corner D.

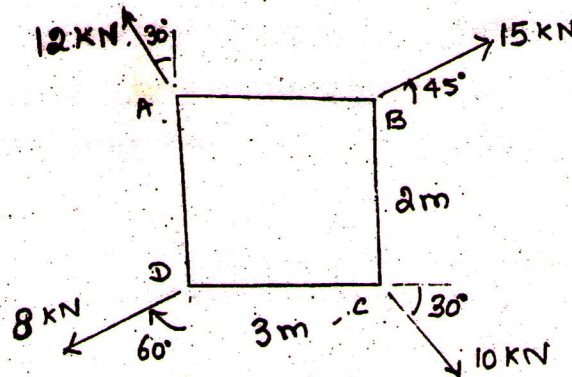


Fig. 3.

Or

- (b) A body of 600 N is lying on an inclined plane, whose inclination with the horizontal is 30° . If the coefficient of friction between the plane and body is 0.4, find the minimum and maximum horizontal force, which will keep the body in equilibrium.
- III. (a) Determine the tension in each segment of the cable which is loaded as shown in Fig. 4.

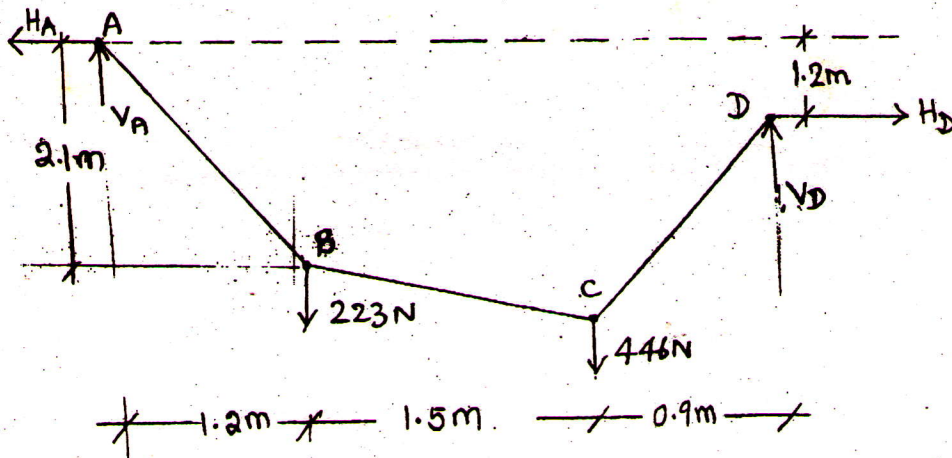


Fig. 4.

Or

- (b) Analyse the truss shown in Fig. 5, using method of joints and tabulate the results.

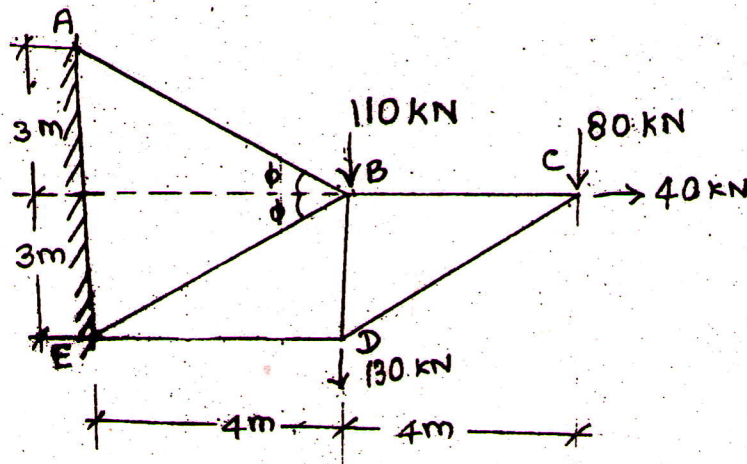


Fig. 5.

- IV. (a) For the beam shown in Fig. 6, find the reactions at the supports using the principle of virtual work.

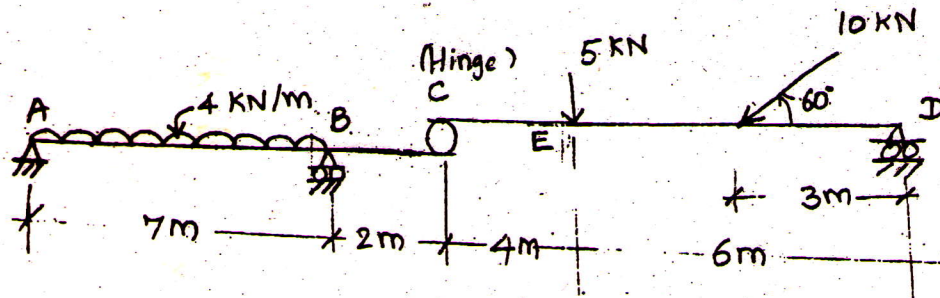


Fig. 6.

Or

- (b) Find the moment of inertia of the area shown in Fig. 7. about the centroidal, horizontal and vertical axes.

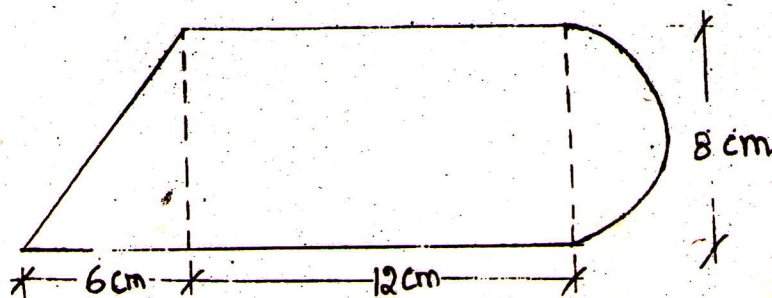


Fig. 7.

- V. (a) A wheel rotating about a fixed axis at 30 rpm is uniformly accelerated for 70 seconds, during which time it makes 60 revolutions. Find (a) Angular velocity at the end of this interval and (b) time required for the speed to reach 120 revolutions/min.

Or

- (b) A chain of length 50.5 m is placed on a pulley whose radius is 16 cm. One end of the chain hangs down 40 m below the point it leaves the pulley. A man holds the other end of the chain and pulls it down until the length of the chain on both sides of the pulley is equal. Find the work done by the man. Given the weight of the chain as 10 N/m length and the pulley is frictionless.

(4 × 15 = 60 marks)