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(Pages 3)

Name.....

Reg. No.....

COMBINED FIRST AND SECOND SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2006

EN 04 107 A—ENGINEERING MECHANICS (A)

(CE, AI, CH, CS, EE, EC, IT, IC, BM, BT, PT)

(2004 admissions)

Time : Three Hours

Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 5 *marks.*

1. (a) State and prove Vavignons Theorem.
   (b) Explain the conditions of Equilibrium.
   (c) State the laws of Friction.
   (d) State and explain perpendicular axis theorem.
   (e) Find the support reaction for the given system in Fig.1.

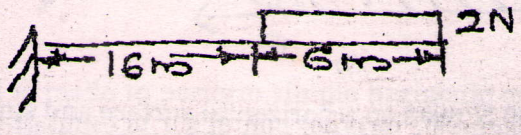

Fig. 1.

   (f) What are the different types of trusses ?
   (g) Derive the expression for Maximum Range of a projectile.
   (h) State and explain d'Alembert's principle.

(8 × 5 = 40 marks)

Part B

Answer **all** *questions.*
Each question carries 15 *marks.*

II. (a) Find Force in the string AC and BC in Fig.2.

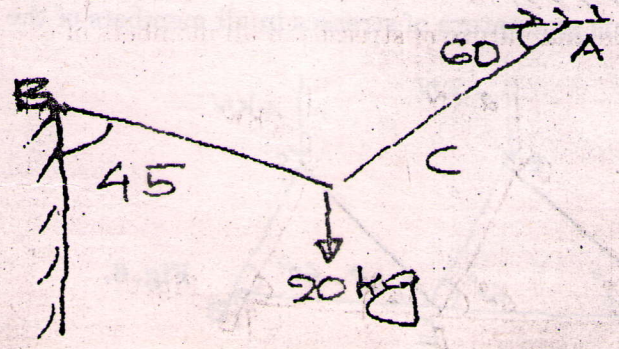

Fig. 2.

Or

(b) Two cylinders of diameter 60 mm. and 30 mm. are placed as given in Fig.3. Find reaction at AB and C.

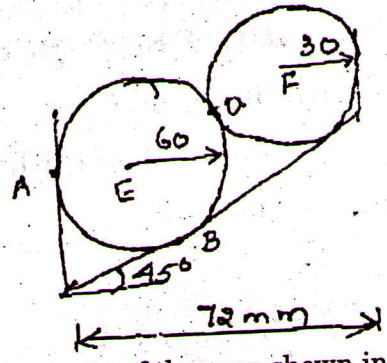

Fig.3.

III. (a) Obtain the moment of inertia of the area shown in Fig.4 with respect to the x-axis.

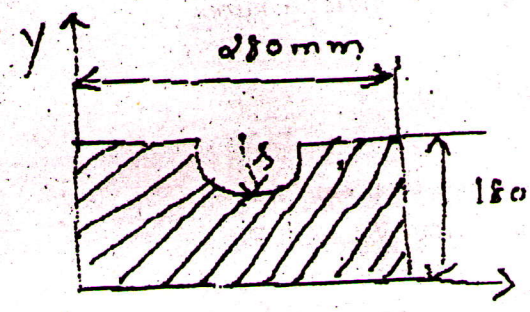

Fig.4.

Or

(b) A block of weight $W_1 = 1000$ N rests on a horizontal surface and supports on top of it another block of weight $W_2 = 250$ N as shown in Fig. 5. The block W_2 is attached a vertical wall by the inclined string AB. Find the magnitude of the horizontal force P, applied to the lower block as shown, that will be necessary to cause sliping to impend. The coefficient of static friction for all contiguous surface is $\mu = 0.3$.

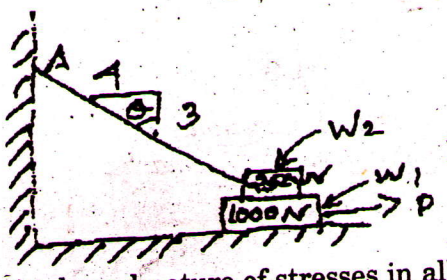

Fig. 5.

IV. (a) Calculate the magnitude and nature of stresses in all members of the truss with loading as shown in Fig. 6.

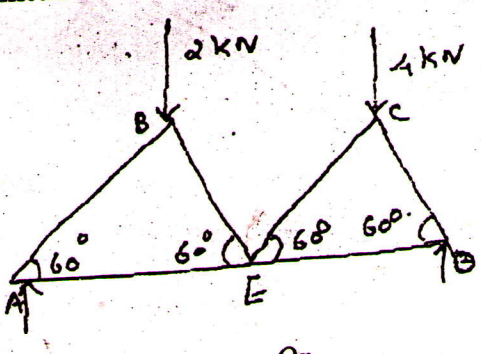

Fig. 6.

Or

(b) Determine the support reactions of a beam shown in Figure 7.

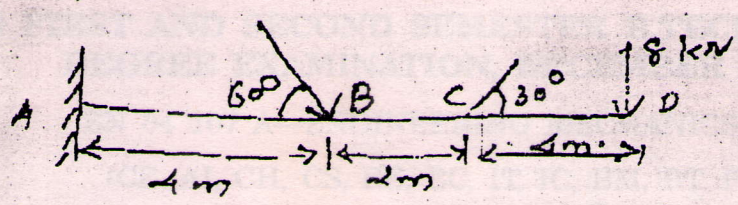

Fig. 7.

V. (a) Determine the periods of vibration of weight P attached to springs of stiffness C_1 and C_2 in 2 different cases as shown in Fig. 8.

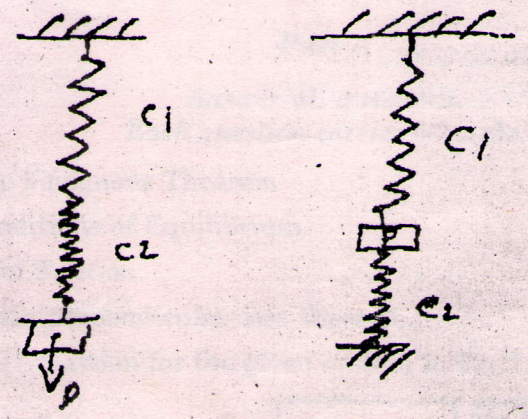

Fig. 8.

Or

(b) A horizontal board is made to perform simple harmonic oscillations horizontally, moving to and Fro through a distance of 1.2 m and making 15 complete oscillations per minute. Find the least value of the coefficient of friction in order that a heavy body placed on the board may not slip.

(4 × 15 = 60 marks)