C 26947 (Pages : 3) Name.....

Reg. No.....

FIRST AND SECOND SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, JUNE 2003

EN 2K, 107–A. ENGINEERING MECHANICS

(AI/CH/CE/CS/EE/EC/IT/IC/AE)

[New Scheme]

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Assume suitable data that are not given.

I. (a) Explain resultant and equilibrant of a force system.

(b) State and explain Varignon's theorem.

(c) What is a plane truss ? What are the assumptions made in the analysis of plane trusses.

(d) Explain direction cosines.

(e) State and explain the principle of virtual work.

(f) Define Simple machine, Mechanical advantage and Velocity ratio.

(g) State and explain Newton's second law of motion.

(h) State the law of conservation of energy and explain.

(8 × 5 = 40 marks)

II. (a) Determine the graphically the resultant of the force system given in Fig. 1.

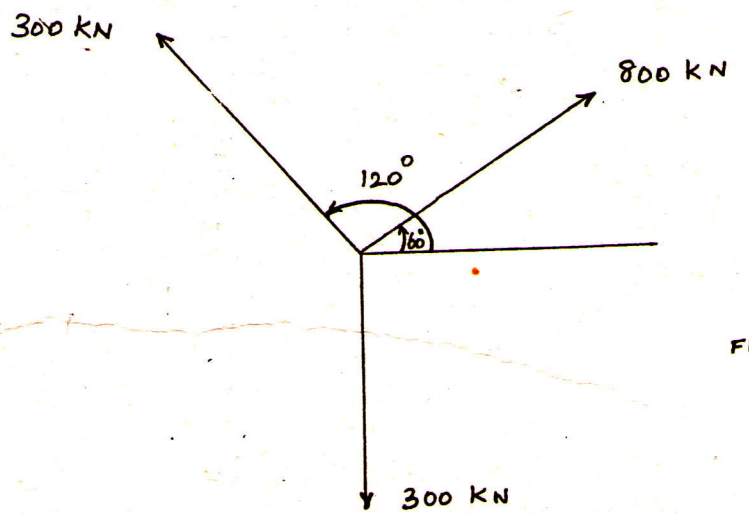

FIG.1.

Or

(b) An effort of 200 N is required to just move a body up an inclined plane of angle 15°, the forces acting parallel to the plane. If the angle of inclination of the plane is made 20°, the effort required, applied parallel to the plane is found to be 230 N. Find the weight of the body and the coefficient of friction.

III. (a) Find the forces in the various members of the frame shown in Fig. 2.

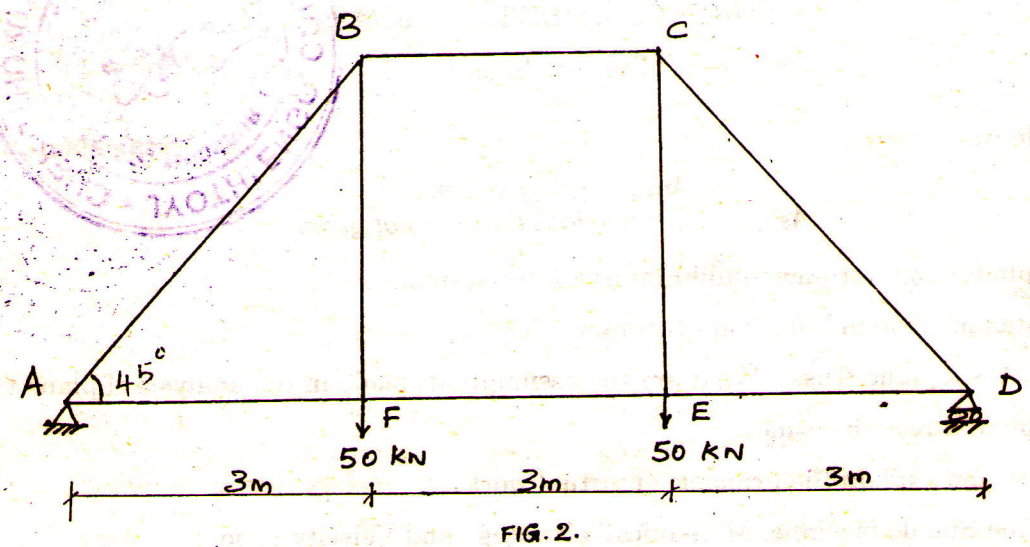

FIG. 2.

Or

(b) A 200 N cylinder is supported by three wires as shown in Fig. 3. Determine the tension in each wire.

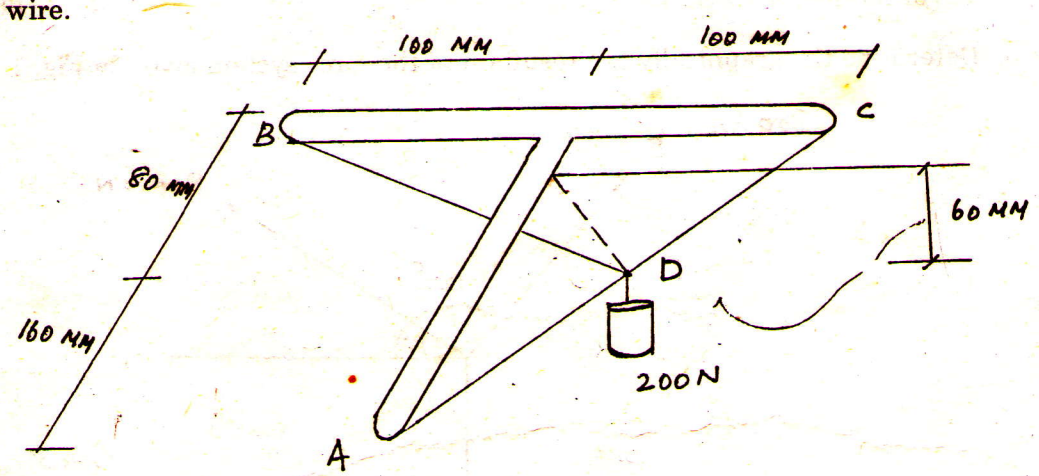

FIG. 3.

IV. (a) What load will be lifted by an effort of 100 N, if the velocity ratio is 20 and the efficiency of the machine at this is 80 percent ? If the machine has a constant frictional resistance, determine the law of machine and find the effort required to run the machine at (i) No load ; and (ii) Load of 1,000 N.

Or

(b) Find the moment of Inertia of the plane area shown in Fig. 4.

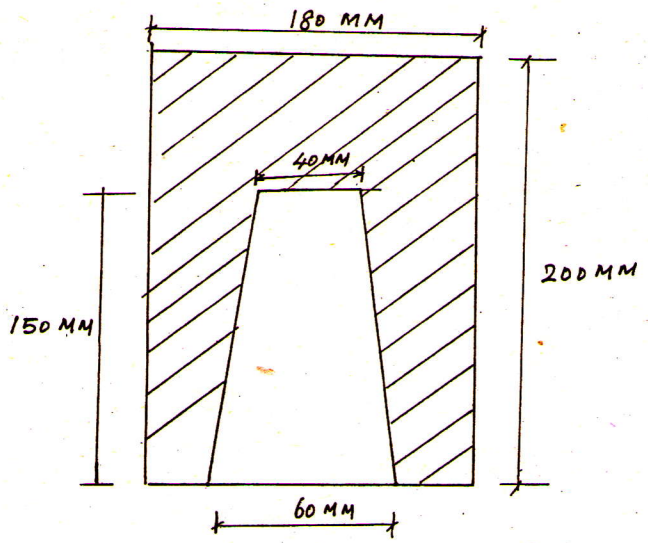

Fig. 4

V. (a) A tower is 90 m. in height. A particle is dropped from the top of the tower and at the same time another particle is projected upward from the foot of the tower both the particle meet at a height of 30 m. Find the velocity with which the second particle is projected upward.

Or

(b) A car of mass 1,000 kg. travelling at the rate of 35 m/s clashes in to the near of a truck of mass 8,000 kg. travelling in the same direction but with a velocity of 5 m/s. After the collision, the speed of the truck increases to 9 m/sec. Find the velocity of the car after collision. What is the value of the coefficient of restitution ?

(4 × 15 = 60 marks)