Reg. No. :

Question Paper Code : 42837

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018

Second Semester

Mechanical Engineering

ME 2151 – ENGINEERING MECHANICS

(Common to all Branches)

(Regulations 2008)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions.

PART – A **(10×2=20 Marks)**

1. Differentiate Kinetics and Kinematics.
2. State the parallelogram law of vector addition.
3. What is free body diagram ?
4. What is the difference between moment and couple ?
5. State Pappus Guldinus theorem I.
6. What do you understand by axis of symmetry. Give an example.
7. What is angle of repose ?
8. Define co-efficient of friction.
9. Define co-efficient of restitution.
10. State D-Alembert's principle.

PART – B (5×16=80 Marks)

11. a) i) Determine the resultant a system of four coplanar concurrent forces as shown in Figure 11 (a) (i) by composition of forces by method of resolution. (8)

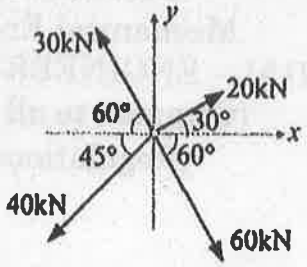

Fig. 11(a) (i)

ii) A thin ring of weight 100N and radius 300 mm is held against a smooth wall by a 200 mm long string AB as shown in figure 11 (a) (ii). Determine (a) the tension in the string and (b) the reaction at C. (8)

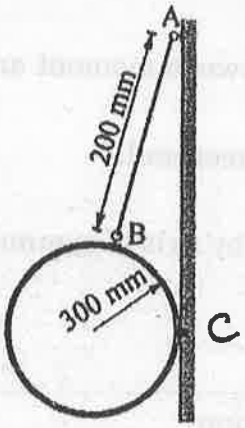

Fig. 11(a) (ii)

(OR)

b) Three forces of magnitude 40 kN, 15 kN and 20 kN are acting at a point O as shown in fig.11(b). The angles made by 40 kN, 15 kN and 20 kN forces with X-axis are 60°, 120° and 240° respectively. Determine the magnitude and direction of the resultant force. **(16)**

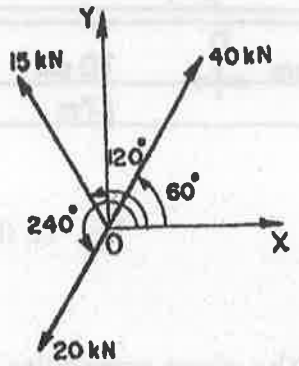

Fig. 11(b)

12. a) Four parallel forces of magnitudes 100 N, 150 N, 25 N and 200 N are shown in fig.12 (a). Determine the magnitude of the resultant and also the distance of the resultant from point A. **(16)**

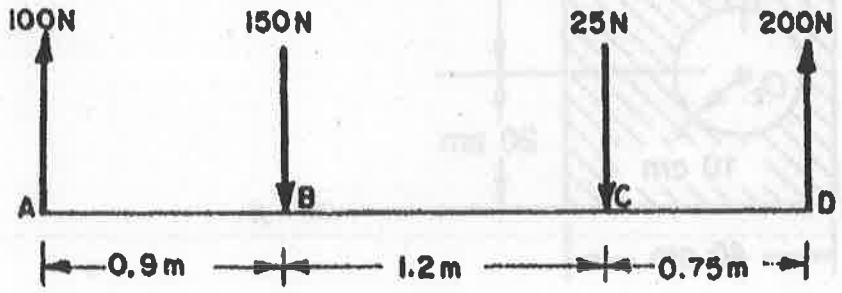

Fig. 12 (a)

(OR)

b) A beam AB 1.7 m long is loaded as shown in fig. 12(b). Determine the reactions at A and B. **(16)**

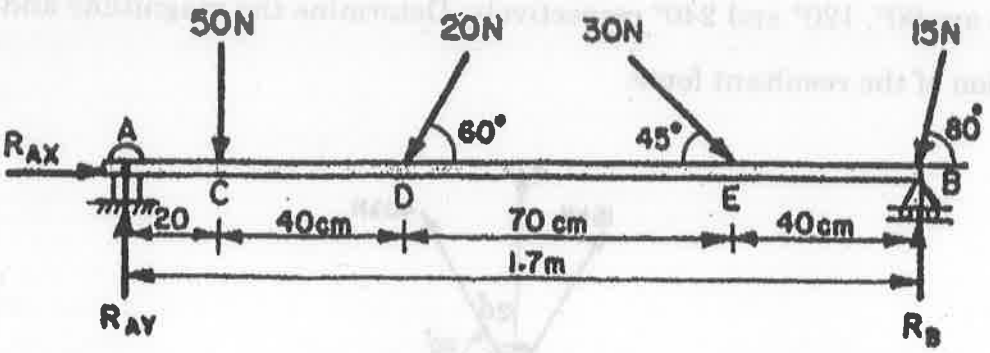

Fig. 12 (b)

13. a) Locate the centroid of the given composite area shown in fig.13(a). **(16)**

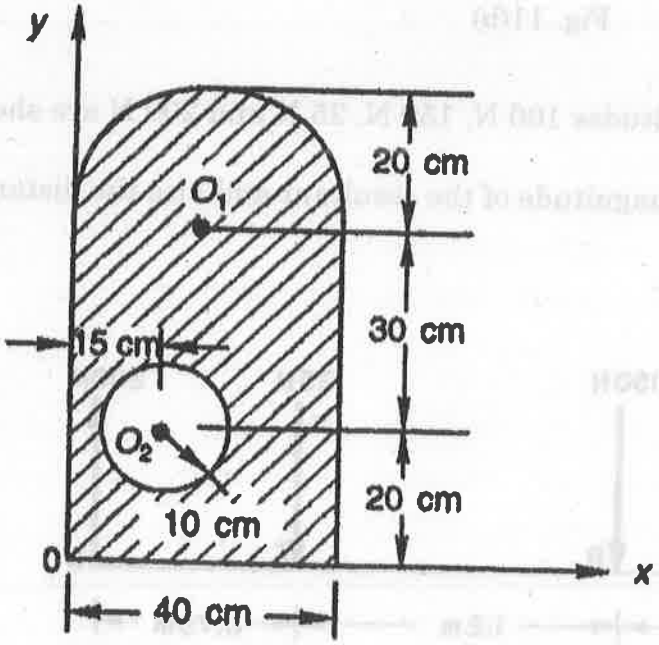

Fig. 13 (a)

(OR)

b) Find the moment of inertia of the section shown in Fig.13(b) about horizontal and vertical axes through the centroid. **(16)**

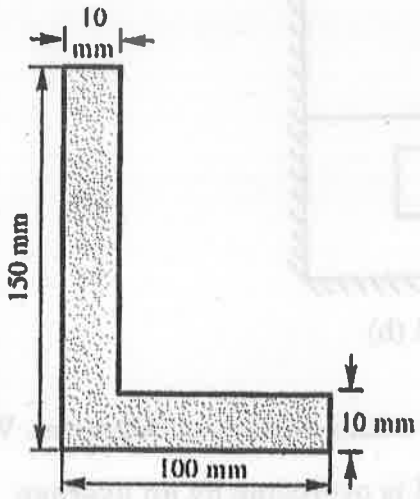

Fig. 13 (b)

14. a) Determine the least and greatest value of W in fig.14 (a) to keep the system of connected bodies in equilibrium. μ for surfaces of contact between plane AC and block = 0.28 and the between plane BC and block = 0.2. **(16)**

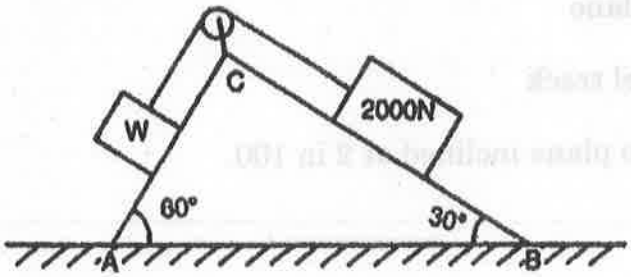

Fig. 14 (a)

(OR)

b) Determine the force P required to intend the motion of the block B shown in Fig.14(b), to the left. Take $\mu = 10.3$ for all surfaces of contact. **(16)**

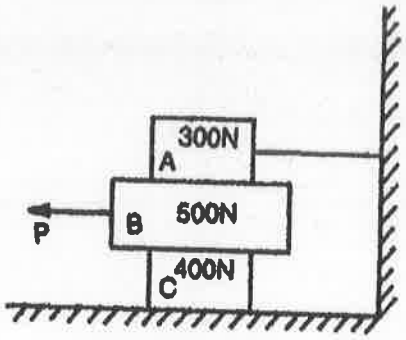

Fig. 14 (b)

15. a) A gun weighing 300 kN fires a 5000 N projectile with a velocity of 300 m/sec. With what velocity will the gun recoil ? If the recoil is overcome by an average force of 600 kN, how far will the gun travel ? How long will it take ? **(16)**

(OR)

b) A train weighing 3000 kN is moving up a slope of 2 in 100 with an acceleration of 0.04 m/sec^2. Tractive resistance is 6 N/kN. Determine the acceleration of the train if it moves with the same tractive force,

a) Up the plane **(5)**

b) On a level track **(5)**

c) Down the plane inclined at 2 in 100. **(6)**
