Register Number: ……

B.E/ B.TECH DEGREE EXAMINATIONS: NOV/ DEC 2010

Second Semester

U07GE201: ENGINEERING MECHANICS

(Common to All Branches)

Time: Three Hours **Maximum Marks: 100**

Answer ALL Questions:-

PART A (10 x 1 = 10 Marks)

1. Dimension of the Force is

   a) MLT^{-2} b) $ML^{-1}T^{-2}$ c) LT^{-2} d) MLT^{0}

2. Opening of the cap of a bottle is due to

   a) Moment b) Couple c) Parallel Force d) Torque

3. Conditions of Equilibrium are

   a) $\sum H = 0, \sum V = 0; \sum M = 0$ b) $\sum H = 0, \sum M = 0$ only

   c) $\sum V = 0; \sum M = 0$ only d) $\sum H = 0, \sum V = 0$ only

4. The effect of a given force remains unaltered along its line of action. This is according to

   a) Resolution b) Varignon c) Principle of Transmissibility d) Superposition of forces

5. The C.G of a right circular cone lies on its axis of symmetry at a height of

   a) $h/2$ b) $h/3$ c) $h/4$ d) h

6. A body can rotate more easily about an axis in which

   a) M.I is Least b) M.I is greatest c) M.I is Complex d) M.I is equal

7. When a ladder is resting on a smooth ground and leaning against a rough vertical wall, then the force of friction acts

   a) Towards the wall at its upper end b) Downward at its upper end

   c) Upward at its upper end d) Away from the wall at its upper end

8. The Angle Which an inclined surface makes with the horizontal, when a body placed on it is on the point of sliding down is known as

   a) Angle of Repose b) Angle of Friction

   c) Angel of Limiting Friction d) Angle of kinetic friction

9. Time required to stop a car moving with a velocity of 20 m/s with in a distance of 40 m is

   a) 2 sec b) 3 sec c) 5 sec d) 4 sec

10. The kinetic energy of a body before impact is

    a) Equal to that after impact b) Less than after impact c) More than after impact d) Equal to inertia

PART B (10 x 2 = 20 Marks)

11. A force of magnitude 750N is directed along AB where A is (0.8, 0, 1.2)m and B is (1.4, 1.2, 0)m. Write the vector form of the force
12. Two equal forces are acting at a point with an angle of 60^o between them. If the resultant force is equal to $20\sqrt{3}N$, find magnitude of each force.
13. Define Varignon's Theorem
14. List the types of Equilibrium
15. Define Center of Mass
16. What is the C.G point of the semi circular lamina, diameter d' is aligned with Y axis?
17. An object of weight 100 N is kept in position on a plane inclined 30^o to the horizontal by a horizontally applied force F as shown in Fig 17. The co-efficient of friction of the surface of the inclined plane is 0.25. determine the minimum magnitude of the friction F for maintain equilibrium

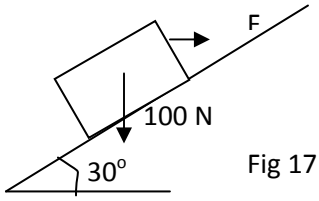

Fig 17

18. What is meant by self locking?
19. A car is moving with a velocity of 15 m/s The car is brought to rest by applying breaks in 5 seconds. Determine a) The retardation b) Distance traveled by car after applying brake.
20. A wagon of mass 3000kg is pushed along the rails with a contact force of 500N. If the resistance due to friction is 125N determine the time taken for the wagon to reach a speed of 6 m/s

PART C (5 x 14 = 70 Marks)

21. a) Determine the length of cord AC so that the 8kg lamp is suspended in the position shown in Fig 21. The un deformed length of the spring AB is $l'_{AB} = 0.4m$, and the spring has stiffness of k_{AB} = 300 N/m.

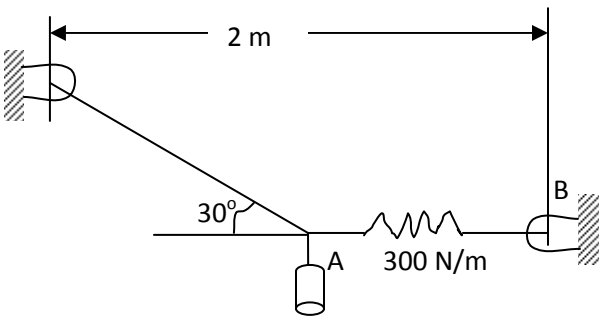

Fig 21

(OR)

b) A disable automobile is pulled by means of two ropes as shown in Fig 22. The tension in rope AB is 2500 N and the angle is α^o , knowing that the resultant of the two forces applied at A is directed along the axis of the automobile, determine by trigonometry a). The tension in rope AC (b). The magnitude of the resultant of the two forces at A.

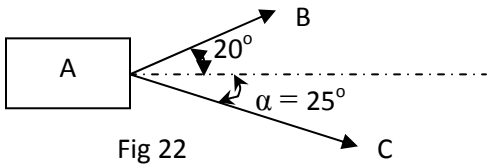

Fig 22

22. a) Determine the reaction at A & B on the overhanging beam as shown in Fig 23

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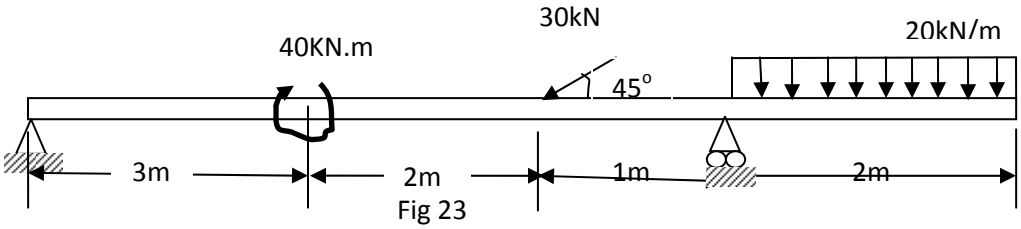

Fig 23

(OR)

b) The 200 mm x 200 mm square plate shown in Fig 24 has a mass 25kg and is supported by three vertical wires. Determine the tension in each wire.

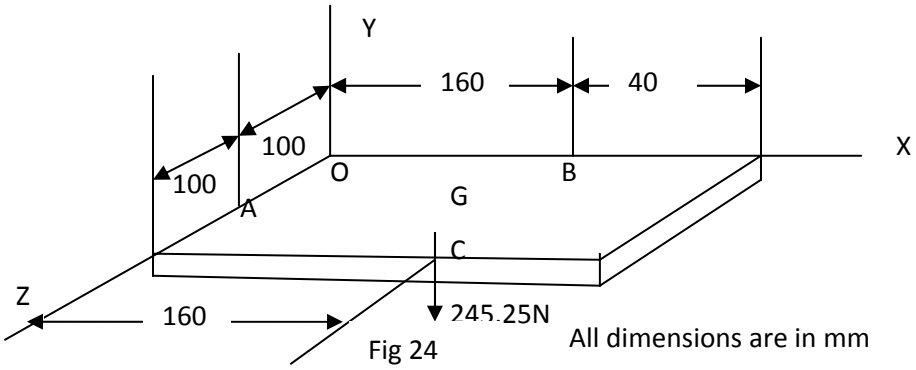

Fig 24 All dimensions are in mm

23. a) Calculate the moment of inertia and radius of gyration about the x-axis for the area shown in Fig 25

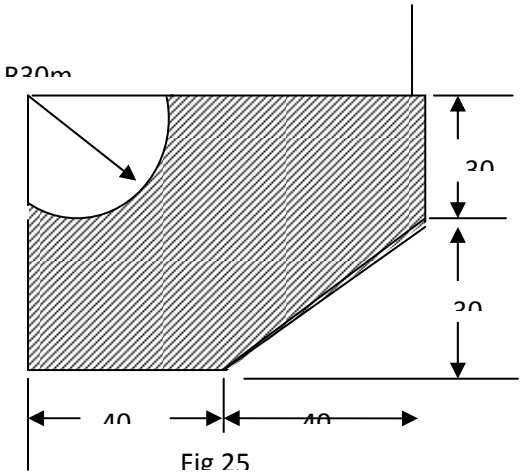

Fig 25

b) Two rectangular laminas at 60mm length and 20 mm width are placed parallel at a distance'd' mm as shown in fig 26. Determine the value 'd' such that I_{XX} and I_{YY} are equal

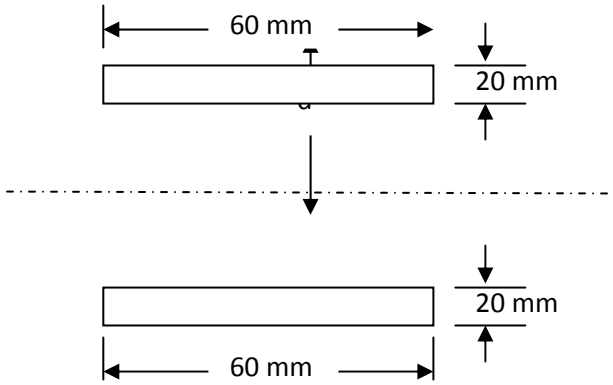

Fig 26

24. a) A body resting on a rough horizontal plane required pull of 200N inclined at 30^o to the plane just to move it as shown in fig 27(a). It was found that a push of 250N inclined at 30^o to the plane just to move the body as shown in fig 27(b). Determine the weight of the body and co-efficient of friction.

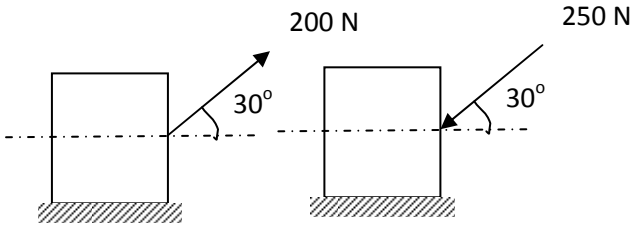

Fig 27(a) Fig 27(b)

(OR)

b) Determine the minimum tension in the rope required to support a cylinder of mass 500 kg shown in fig 28 when the rope passes (a) Once over the rod and (b) two times over the rod.Take $\mu = 0.2$

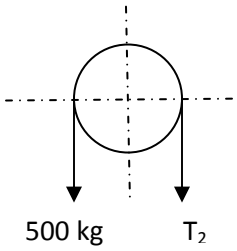

Fig 28

25. a) Automobile A and B are travelling in adjacent highway lanes and at t=0 have the distance between two automobile are 22.5m and their speeds are 38 kmph and 57 kmph respectively. Knowing that Automobile A has a constant acceleration of 0.6 m/s^2 and that B has a constant deceleration of 0.4 m/s^2. Determine a). When and Where A will overtake B and (b). The speed of each automobile at that time

(OR)

b) Two blocks are joined by an inextensible cable as shown in fig 30. If the system is released from rest, determine the velocity of block A after it has moved 2m. Assume that μ equals 0.25 between block –A and the lane and that the pulley is weight less and frictionless.

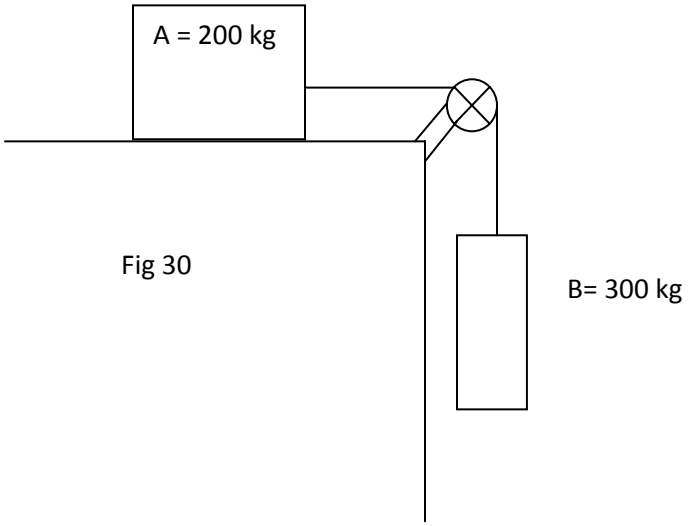

Fig 30

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