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B.E. / B.TECH. DEGREE EXAMINATIONS, DEC 2019

Second Semester

ME16251 – ENGINEERING MECHANICS*(Common to AE,CH,CE,MR and ME)***(Regulation 2016)****Time: Three Hours****Maximum : 100 Marks**Answer **ALL** questions**PART A - (10 X 2 = 20 Marks)**

	CO	RBT
1. Give a practical example of coplanar forces acting on a body	1	R
2. Two forces of 400 N and 600 N act at an angle of 90° to each other. Determine the magnitude and direction of resultant force.	1	U
3. What is meant by free body diagram?	1	R
4. State varignon's Theorem.	1	R
5. Distinguish between centroid and centre of mass.	2	R
6. State perpendicular axis Theorem.	2	U
7. Write the SI unit of work, energy and power.	3	R
8. A car changes its speed uniformly from 100 to 50 km/hr in 5 seconds What is its deceleration?	3	U
9. What is meant by frictional force?	4	R
10. A car wheel rotates at constant angular speed of 25 rad/s. What is the speed (RPM) of the wheel?	4	U

PART B - (5 X16 = 80 Marks)

11. (a) A system of forces acting on a body resting on an incline plane is as shown in Fig.1. Determine the resultant force and its direction which is measured from x axis, if $\theta = 40^\circ$, $W = 1200$ N, $N = 919.25$ N, $F = 200$ N and $T = 1200$ N. **(16)**

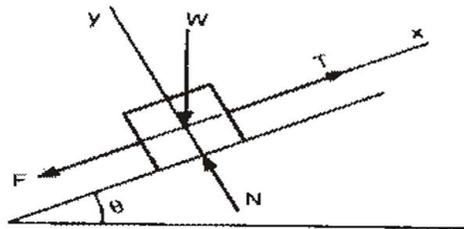


Fig1

(OR)

- (b) (i) Determine the horizontal force P to be applied to a block of weight 2500 N to hold it in position on a smooth inclined plane shown in Fig 2, which makes an angle of 30° with the horizontal (12) 1 AP

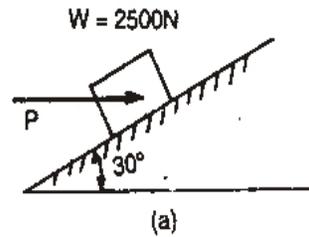


Fig 2

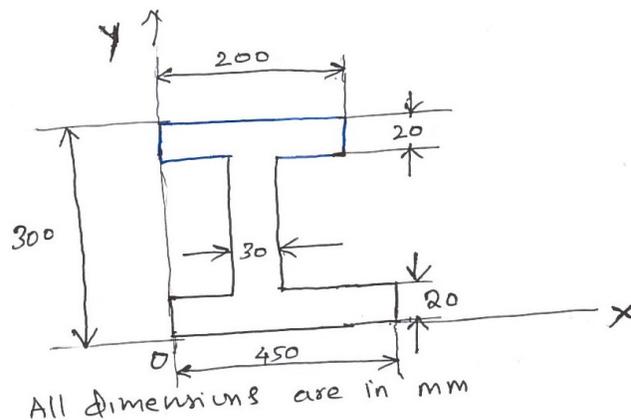
- (ii) State principle of transmissibility (04) 1 R

12. (a) A motorcycle weighs 150 kg (without rider). The distance between front and rear axle (Wheel base) is 1.33 m . A rider is sitting 0.4 m from front axle. The percentage of total load (Motorcycle and rider) acting on the rear axle is 60% . Determine the location of centre of gravity of motorcycle from the rear axle. (16) 1 AP

(OR)

- (b) Distinguish between moment and couple with a suitable free body diagram of a force system and also explain about the effect of moment and couple in the force system (16) 1 U

13. (a) Determine the centroid of the given composite section with respect to Reference axes OX and OY . (16) 2 AP



(OR)

(b) Drive an expression to determine the area moment of inertia a rectangle and triangle plane (16) 2 AP

14. (a) (i) A car starts from rest and attain a speed of 'V' m/s after a time of 'T' sec. Determine acceleration, velocity and distance travelled in terms of time 't' sec (12) 3 AP

(ii) State newton's law of motion (04) 3 U

(OR)

(b) (i) Briefly discuss about impact of elastic bodies (12) 3 U

(ii) Define impulse and momentum (04) 3 U

15. (a) (i) Discuss the equilibrium analysis of any simple system with sliding friction. (12) 4 AP

(ii) State the laws of sliding friction (04) 4 R

(OR)

(b) The step pulley shown in Fig.3 starts from rest and accelerates at 5 rad/s^2 . (16) 4 AP
How much time is required for block A to move 50 m down? Find also the velocity and acceleration of A and B at that time

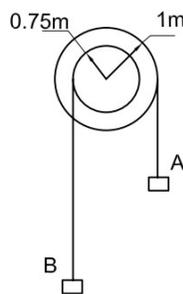


Fig 3