BRAINWARE UNIVERSITY

Term End Examination 2018 - 19

Programme - Dip. CSE/ Dip. EE/ Dip. ECE

Course Name - Engineering Mechanics

Course Code - DMEE010201

(Semester – 1)

Time allotted: 3 Hours **Full Marks: 70**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group –A

(Multiple Choice Type Question) 10 x 1 = 10

1. *Choose the correct alternative from the following*

(i) Moment of inertia of rectangle of base ‘b’ and width ‘d’ about base is given by

a. $bd^3/3$ b. $bd^3/12$
c. $bd^3/26$ d. None of the above

(ii) Mass moment of inertia of a sphere of radius ‘r’ and mass ‘M’ is

a. $2/5\ Mr^2$ b. $1/2\ Mr^2$
c. $4/5\ Mr^2$ d. None of the above

(iii) Centre of gravity of solid hemisphere of radius ‘R’ is

a. 3R/8 b. R/2
c. 3R/4 d. None of the above

(iv) Axis passing through the centroid is known as

a. Parallel axis b. Perpendicular axis
c. Centroid axis d. None of the above

(v) Moment of force

a. Varies directly with distance from the pivot b. Varies inversely with its distance from the pivot
c. Is independent with distance from the pivot d. None of the above

(vi) The action of a force which cause motion is known as

a. Moment
b. Work
c. Torque
d. Power

(vii) Moment of force is a

a. Scalar quantity
b. Vector quantity
c. Either (a) and (b)
d. None of the above

(viii) Which of the following quantity is usually considered as a fundamental quantity

a. Mass
b. Time
c. Length
d. All of the above

(ix) In the first class lever , the point of application of load and effort

a. Lie on the same side of the fulcrum
b. Lie on the opposite sides of the fulcrum
c. Both (i) and (ii)
d. None of the above

(x) Co –efficient of friction depend upon

a. Roughness of surfaces of contact
b. Materials of the surface of contact
c. Weight of the body to be moved
d. None of the above

Group – B

(Short Answer Type Questions) 3 x5 = 15

Answer any *three* from the following

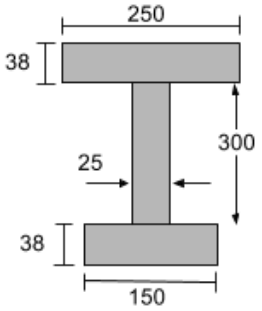
2. State the law of parallelogram of force and show that R = $\sqrt{P^2 + Q^2}$, when two forces P and Q are acting at right angle to each other. 2+3
3. The resultant of two forces P and 2P including an angle α is P√3. Find the α and angle made by the resultant with the force of magnitude P. 5
4. Discuss the various type of friction 5
5. Determine the centroid of a semicircular area of radius 'R'. 5
6. What is machine? Define the mechanical advantage of machine. 2+3

Group – C

(Long Answer Type Questions) 3x 15 = 45

Answer any *three* from the following

7. (a) Determine the centroid of given is as shown in Figure



10

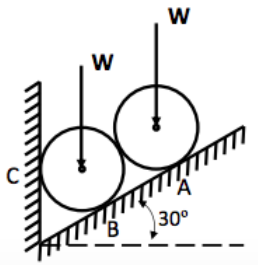
(b) What is the difference between centroid and centre of gravity? 5

8. (a) Differentiate between angle of friction and cone of friction. 5

(b) A body of weight 150 N placed on a rough horizontal plane. Determine the co-efficient of friction, if a horizontal pull of 150 N is applied on the body 10

9. (a) State and prove the Lami's theorem 8

(b) Two identical rollers, each of weight W=2000 N are supported by an identical plane and a vertical roller as shown in Figure. Determine the reaction at the support. Assume the surface to be smooth.



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10. (a) Define and explain coplanar, non-coplanar and concurrent forces. 6

(b) Two force F_1 and F_2 acting at a point have a resultant R. If F_2 is doubled R is doubled. Again of the direction of F_2 is reversed, then R is doubled. Then show that $F_1:F_2:R = \sqrt{2}:\sqrt{3}:\sqrt{2}$ 5

(c) In a concurrent force system, the forces are acting on a point at angle 60^0, the resultant force is 150 N and one of the forces is 100 N. Determine the unknown force. 4

11.

(a)	Define and explain scalar and vector quantities.	4
(b)	What do you mean by equilibrium? What is the condition of equilibrium?	2+2
(c)	In a differential pulley block, a load of 1800 N is raised by an effort of 100 N, the number of teeth on the larger and smaller block are 12 and11respectively, find the velocity ratio, mechanical advantages, and efficiency of the machine.	4
(d)	Difference between static friction and dynamic friction.	3
