KUMARAGURU
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Register Number:……..

B.E / B.TECH DEGREE EXAMINATIONS: JUNE 2015

(Regulation 2009)

Second Semester

MEC102: ENGINEERING MECHANICS

(Common to AE/AUE/CE/MCE/ME/FT/BT/TXT)

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

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. All forces do not lie in the same plane but their line of action pass through a single point is called
   a) a) coplanar, concurrent forces
   b) b) Non coplanar Non concurrent forces
   c) Non coplanar, concurrent forces
   d) coplanar parallel forces
2. Force which is equal and opposite to the Resultant force is called
   a) Concentrated force
   b) Reactive force
   c) Equilibrant
   d) composite force
3. Moment of a force
   a) varies directly with its distance from the pivot
   b) is independent of its distance from the pivot
   c) No relation with distance
   d) Proportional to square of its distance
4. Which of the following is an example of a couple
   a) Turning the cap of the pen
   b) Twisting a screw driver
   c) Unscrewing the cap of a ink bottle
   d) All of the above
5. The centre of gravity of a solid cone lies on the axis at a height of -------- of the total height above the base
   a) 1/4
   b) 3/4
   c) 2/4
   d) 2/8
6. Moment of inertia of semicircle about its X-X axis is given by

a) $0.11r^4$ b) $0.14r^4$

c) $0.2r^4$ d) 0.001r

7. The cause for friction between two bodies is due to --------- property of projecting particles

a) Interlocking b) Inter twisting

c) Inter rolling d) Inter sliding

8. The angle of the inclined plane at which the body tends to slide is known

a) Angle of Repose b) Angle of friction

c) Limit angle d) Angle of slide

9. The coefficient of restitution for indirect impact of a body with a fixed plane can be calculated using

a) $e=u^2/v$ b) e = vcosϴ/ ucosα

c) u cosα/vcosɵ d) e = u/v

10. The path traced by the projectile in air is known as

a) Projectory b) Trajectory

c) Time of flight d) skyjectory

PART B (10 x 2 = 20 Marks)

11. What are the effects of a force?
12. What is meant by composition and resolution of a force?
13. State varignons theorem.
14. What is meant by support reactions?
15. What is the function of fixed support?
16. State pappus and guildinus theorems.
17. Write the expression for

a) Moment of inertia of triangular section about its base

b) Moment of inertia of semicircle about its base.

18. State the Laws of Static friction.
19. List any three friction devices.
20. State Impulse – momentum principle.

PART C (5 x 14 = 70 Marks)

21. a) A wheel has five equally spaced radial spokes, all in tension. If the tension of

three consecutive spokes are 500N, 700N AND 600N respectively. Find the tension in the other two spokes.

(OR)

b) A horizontal bar ABCD is 9m long where AB=BC=CD=3m.Forces 800N,1000N,1500N and 700N act at A,B,C,D respectively and line of action of these forces make angles 60 degree,90 degree,30degree and 90degree respectively with AD. Find the magnitude, direction and position of the Resultant force.

22. a) Determine the reactions at support A and B of the beam shown in fig below

(OR)

b) Determine the support reactions of the beam shown in fig below

23. a) A hemisphere of dia 60mm is placed on the top of a cylinder whose dia is also 60mm.The height of the cylinder is 75mm.Find the centre of gravity of the composite body.

(OR)

b) Determine the moment of Inertia about THE CENTROIDAL X-X, and Y-Y axis of the "L" section of size 125 * 95* 10 (height *length* thick).

24. a) A uniform ladder rests with one end against a smooth vertical wall and the other on the ground ,the coefficient of friction being 0.75.If the inclination of the ladder to the ground be 45 degree .Show that a man whose weight is equal to that of the ladder ,can just ascend to the top of the ladder without its slipping.

(OR)

b) A block overlying a 10 degree wedge on a horizontal floor and leaning against a vertical wall and weighing 1500N is to be raised by applying a horizontal force to the wedge. Assuming coefficient of friction between all the surfaces in contact to be 0.3, determine the minimum horizontal force, to be applied to raise the block.

25. a) A projectile is aimed at a mark on the horizontal plane through the point of projection and falls 12m short when the angle of projection is 15degree; while it overshoots the mark by 24m when the angle of projection is45 degree .Find the angle of projection to hit the mark.

(OR)

b) Three perfectly elastic balls A, B and C of masses 4kg, 8kg.and16kg move in the same direction with velocities of 8m/sec,2m/sec,and 1.5m/sec resp. If the ball "A" impinges with the ball "B" which in turn impinges with the ball "C, Prove that the balls A and B will be brought to rest by the impacts.

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