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Total No. of Pages : 03

Total No. of Questions : 09

B.Tech. (EE/Electrical & Electronics Engg.) (2018 Batch)

B.Tech. (Electronics & Electrical Engg.) (2018 Batch) (Sem.-3)

ENGINEERING MECHANICS

Subject Code : BTXX-XXX-18 M.Code : 76385

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions. 3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :
 - a) Explain law of mechanics.
 - b) What is Eigen value?
 - c) Explain Vector quantities.
 - d) Define the free body diagram of a body in an equilibrium system, and explain its importance.
 - e) The maximum range of a projectile is 2000 m. What should be the angle of elevation so as to obtain a range of 1400 m if the initial velocity remains unchanged?
 - f) Explain Newton's Second Law of Motion.
 - g) How would you distinguish between the motions, when it is subjected to
 - i) Constant acceleration
 - ii) Variable acceleration
 - h) Two forces are acting on a body and the body is in equilibrium. What conditions should be fulfilled by these two forces?
 - i) Define mass moment of inertia and explain the transfer formula for mass moment of inertia.
 - j) What do you understand by free precession?

SECTION-B

2. Determine the magnitude of the resultant force by adding the rectangular components of the three forces (Fig.1).

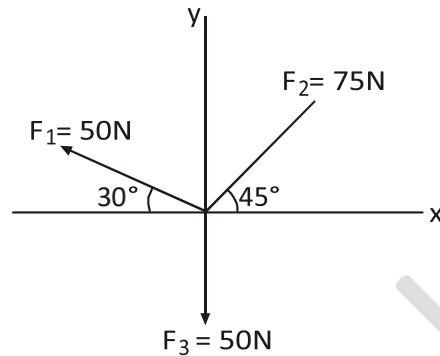


FIG.1

3. Define moment of force about a point and show that the algebraic sum of the moments of two coplanar forces about a point is equal to the moment of their resultant about that point.
4. The position coordinate of a particle which is confined to move along a straight line is given by $s = 2t^3 - 24t + 6$, where s is measured in meters from a convenient origin and t is in seconds. Determine :
- a) The time required for the particle to reach a velocity of 72 m/s from its initial condition at $t = 0$,
 - b) The acceleration of the particle when $v = 30\text{ m/s}$
 - c) The net displacement of the particle during the interval from $t = 1\text{ s}$ to $t = 4\text{ s}$.
5. Determine the position of centroid and calculate the moment of inertia" about its horizontal centroidal axis of a T - beam shown in Fig.2.

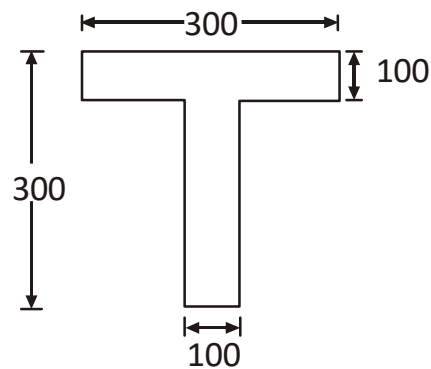


FIG.2

6. A dynamics instructor demonstrates gyroscopic principles to his students. He suspends a rapidly spinning wheel with a string attached to one end of its horizontal axle. Describe the precession motion of the wheel.

SECTION-C

7. a) Derive Euler theorem.
b) Distinguish kinematics & kinetics.
8. A simply supported beam AB of span 6 m is loaded as shown in Fig.3. Determine the reactions at A and B.

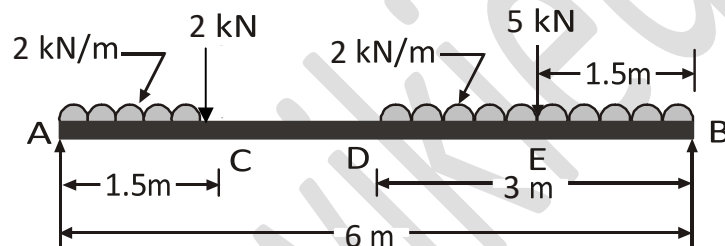


FIG. 3

9. A solid steel shaft transmits 100 kW at 150 rpm. Determine the suitable diameter of the shaft if the maximum torque transmitted exceeds the mean 20% in each revolution. The shear stress is not to exceed 60 MPa. Also find the maximum angle of twist in a length of 4 m of the shaft. $G = 80 \text{ GPa}$.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.