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**Question Paper Code: 52909**

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Second Semester

Chemical Engineering

15UCH209 - PRINCIPLES OF MECHANICS

(Regulation 2015)

Duration: 1.15 hrs

Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

**(Answer any six of the following questions)**

1. Due to rusting the weight of iron CO1-R  
(a) decreases (b) increases (c) remains the same (d) uncertain
2. Steel containing upto 0.15 % carbon, is known as CO1-R  
(a) Mild steel. (b) Dead mild steel.  
(c) Medium carbon steel. (d) High carbon steel.
3. \_\_\_\_\_ is a vector whose magnitude is zero. CO2-R  
(a) Unit vector (b) Null vector (c) Sliding vector (d) Position vector
4. Which one not a vector quantity CO2-R  
(a) Mass. (b) Weight. (c) Force. (d) Velocity.
5. A single force and a couple acting in the same plane upon a rigid body CO3-R  
(a) Balance each other (b) Cannot balance each other  
(c) Produce moment of a couple (d) Are equivalent
6. Which one not a load CO3-R  
(a) Point load. (b) Uniformly distributed load. (c) Moment load. (d) Triangle load.
7. Hook's law holds good up to CO4-R  
(a) Yield point. (b) Elastic limit. (c) Plastic limit. (d) Breaking point.

8. The deformation per unit length is called CO4-R  
 (a) tensile stress      (b) compressive stress      (c) shear stress      (d) strain
9. Which one not a unit of moment of inertia CO5-R  
 (a)  $\text{mm}^4$ .      (b)  $\text{cm}^4$       (c)  $\text{m}^4$       (d)  $\text{mm}^2$ .
10. Moment of inertia of a body does not depend upon CO5-R  
 (a) Angular velocity of body      (b) Mass of the body  
 (c) Axis of rotation of body      (d) Depends on all the above

PART – B (3 x 8= 24 Marks)

**(Answer any three of the following questions)**

11. A Curved bar is formed of a tube of 20 mm outside diameter and 7.5 mm thickness. The center line of this beam is a circular arc of radius 225 mm. A bending moment of 3 kNm tending to increase curvature of the bar is applied. Calculate the maximum tensile and compressive stresses set up, in the bar. CO1-U      (8)
12. A force vector of magnitude 100 N is represented by a line AB of co-ordinates A (1,2,3) and B (5,8,12). CO2-U      (8)  
 Determine  
 (a) The components of the force along x, y and z axis.  
 (b) Angles with x, y and z axis.
13. Recall the types of welded joints with suitable diagrams. CO3- U      (8)
14. A bolt is subjected to an axial pull of 10 kN together with a transverse shear force of 5 kN. Solve the diameter of the bolt by using CO4-App      (8)  
 (i) maximum principal stress theory  
 (ii) maximum strain theory  
 (iii) Octahedral shear stress theory
15. Find the moment of inertia of a T section of flange 100 mm x 30 mm and web 20 mm x 80 mm about its centroidal axes. CO5-U      (8)