

A

Reg. No. :

--	--	--	--	--	--	--	--	--	--	--

Question Paper Code: 52909

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2018

Second Semester

Chemical Engineering

15UCH209 - PRINCIPLES OF MECHANICS

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

PART A - (10 x 1 = 10 Marks)

- Which of the following material has maximum ductility? CO1- R
(a) Mild steel (b) Copper (c) Nickel (d) Aluminium
- Mild Steel Belongs to the following category CO1- R
(a) low carbon steel (b) Medium Carbon Steel
(c) High Carbon Steel (d) Alloy Steel
- Which of the following is not a vector quantity CO2- R
(a) displacement (b) density (c) velocity (d) acceleration
A point of a body or a system of particles which moves as if the
- Total mass of the body or the system of particles were concentrated there and all the applied forces were acting at that point is called as CO2- R
(a) centre of gravity (b) centre of mass (c) centre of circle (d) centre of rotation
- A beam is a structural member which is subjected to CO3- R
(a) Axial tension or compression
(b) Transverse loads and couples
(c) Twisting moment
(d) No load, but its axis should be horizontal and x-section rectangular or circular
- In a simply supported beam, bending moment at the end CO3- R
(a) Is always zero if it does not carry couple at the end
(b) Is zero, if the beam has uniformly distributed load only
(c) Is zero if the beam has concentrated loads only
(d) May or may not be zero

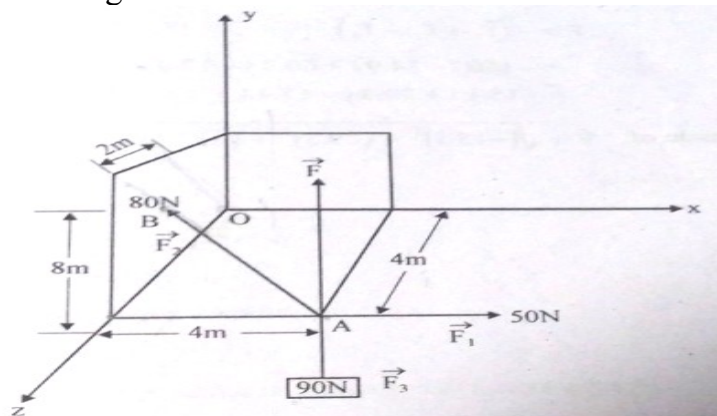
7. Figure-out the odd point in the following CO4- R
 (a) Proportional limit (b) Elastic limit (c) Yield point (d) Fracture point
8. Shape of true stress-strain curve for a material depends on CO4- R
 (a) Strain (b) Strain rate (c) Temperature (d) All
9. Moment of inertia of sphere is given as CO5- R
 (a) $2(ml^2)$ (b) r^2 (c) $1/2(r)$ (d) $2/5(mr^2)$
10. In the calculation of the radius of gyration, we use intensity of loadings. So whenever the distributed loading acts perpendicular to an area its intensity varies _____ CO5- R
 (a) Linearly (b) Non-Linearly (c) Parabolically (d) Cubically

PART – B (5 x 2= 10Marks)

11. Write any two application of Wrought Iron. CO1- R
12. List out the basic principles of Engineering Mechanics. CO2- R
13. Define principles of Transmissibility. CO3- R
14. Define Rigidity Modulus. CO4- R
15. Difference between Centroid and Center of Gravity. CO5- R

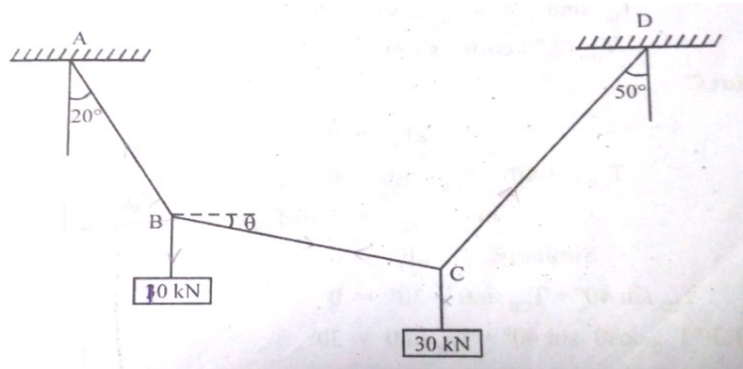
PART – C (5 x 16= 80Marks)

16. (a) What are the factors which affect physical properties of steel? CO1- U (16)
 Describe the various process adapted to manufacturing of steel.
 Or
- (b) Mention the classification of steel and explain the properties of hard steel and Mild Steel? Describe the measure adopted to prevent corrosion of ferrous metals. CO1- U (16)
17. (a) Three concurrent forces in space $F_1=50\text{ N}$, $F_2=80\text{ N}$ and $F_3=90\text{ N}$ are acting at 'A' as shown in figure below. An unknown force F attached to the system makes the particle 'A' in equilibrium. Find the magnitude and direction of the force 'F'. CO2- App (16)

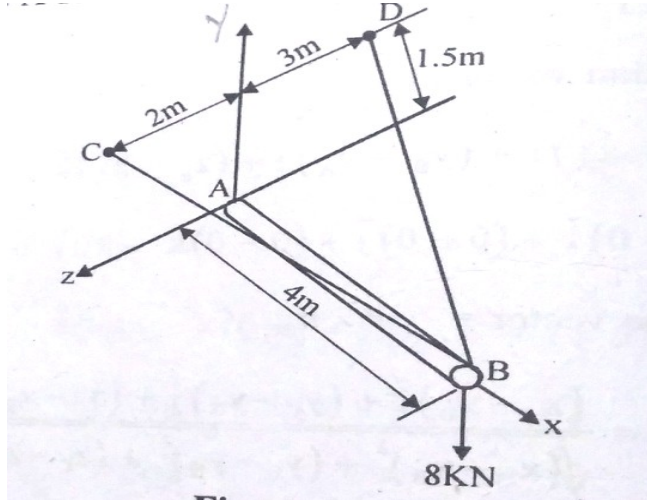


Or

- (b) A wire fixed at two points A and D as shown in figure. Two weights of 10 kN and 30 kN are supported at B and C respectively. When equilibrium is reached it is found that the inclination of AB is 20° and that of CD is 50° to the vertical, determine the tension in the segment AB, BC and CD of the wire and also the inclination of BC to the vertical. CO2- Ana (16)

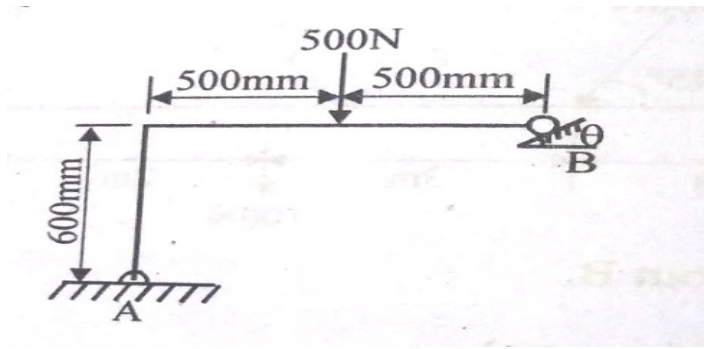


18. (a) Determine the tension in cables BC and BD and the reactions at the ball and socket at A for the rod shown in figure. CO3- Ana (16)



Or

- (b) A frame supported at A and B is subjected to force of 500 N as shown below. Compute the reactions at the support points for the cases $\theta = 0^\circ$, $\theta = 90^\circ$ and $\theta = 60^\circ$. CO3- Ana (16)

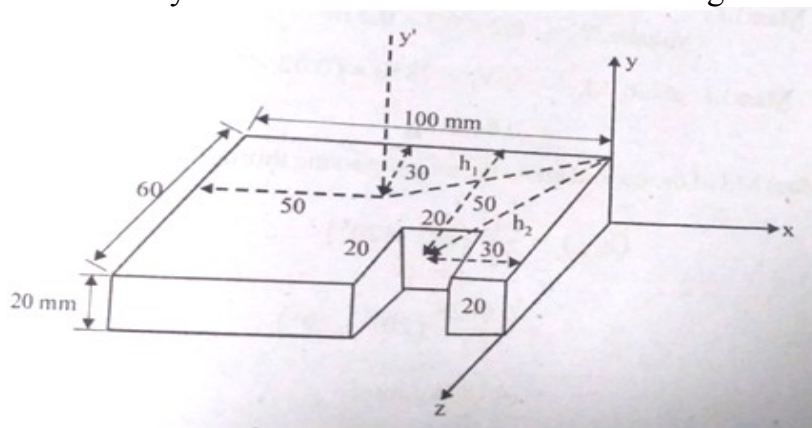


19. (a) Explain the properties of materials. CO4- U (16)

Or

(b) Derive torsional equation. CO4- U (16)

20. (a) Find the mass moment of inertia of the rectangular block shown below about the vertical y axis. A cube of $20\text{mm} \times 20\text{mm} \times 20\text{mm}$ has been removed from the rectangular block as shown below. The mass density of the material of the block is 7850 kg/m^3 . CO5- App (16)



Or

(b) Determine the moments of inertia I_x and I_y of the area shown below with respect to centroidal axes respectively parallel and perpendicular to the side AB. CO5- App (16)

