Reg. No. : | | | | | | | | | | |

Question Paper Code: 50929

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2017

Second Semester

Chemical Engineering

15UCH209 - PRINCIPLES OF MECHANICS

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Steel containing 0.8 to 1.5% carbon, is known as

   (a) mild steel (b) dead mild steel
   (c) medium carbon steel (d) high carbon steel

2. Brass is an alloy of

   (a) copper and zinc (b) copper and tin
   (c) copper, tin and zinc (d) none of these

3. The deformation per unit length is called

   (a) tensile stress (b) compressive stress
   (c) shear stress (d) strain

4. The thermal stress is a function of

   (a) Increase in temperature (b) modulus of elasticity
   (c) coefficient of linear expansion (d) all the above

5. The design of the pressure vessel is based on

   (a) longitudinal stress (b) hoop stress
   (c) longitudinal and hoop stress (d) none of these

6. A rivet is specified by

   (a) shank diameter (b) length of rivet
   (c) type of head (d) length of tail

7. The forces, which meet at one point and their lines of action also lie on the same plane are known as

(a) coplaner concurrent forces (b) coplanar non-concurrent forces
(c) non-coplaner concurrent forces (d) non-coplaner non-concurrent forces

8. The moment of inertia of a rectangular section 3cm wide and 4cm deep about X-X axis is

(a) $9cm^4$ (b) $12cm^4$ (c) $16cm^4$ (d) $20cm^4$

9. At the neutral axis of a beam

(a) the layers are subjected to maximum bending stress
(b) the layers are subjected to minimum bending stress
(c) the layers are subjected to compression
(d) the layers do not undergo any strain

10. A double strap butt joint (with equal straps) is

(a) always in single shear (b) always in double shear
(c) either in single or double shear (d) any one of these

PART - B (5 x 2 = 10 Marks)

11. What is the composition of cast iron?

12. Define factor of safety.

13. What are the types of welded joints?

14. Define the radius of gyration?

15. Define stiffness.

PART - C (5 x 16 = 80 Marks)

16. (a) Write short notes on (i) Wrought iron (ii) Plain Carbon steel. (16)

Or

(b) (i) What is the effect of alloying elements in steels? (4)

(ii) What is the classification of steels? (4)

(iii) Briefly explain any four non ferrous metals. (8)

17. (a) (i) A cement concrete of 150mm size crushes at a load of 337.5KN. Determine the working stress, If the factor of safety is 3. (8)

(ii) A steel rod 2m long and 20mm diameter is subjected to an axial pull of 45KN. Find the change in dimensions of the rod. Assume E= $2x10^5$ N/mm^2 and Poisson's ratio is 0.3. (8)

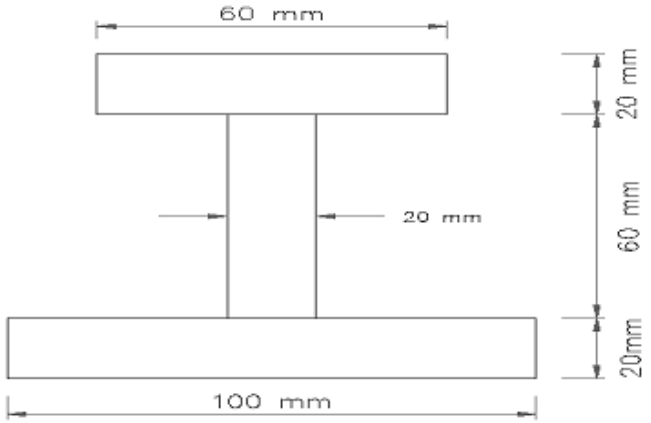
Or

(b) (i) Write short notes on (i) Stress due to impact load (ii) Temperature stresses. (8)

(ii) What are the assumptions made in theory of pure torsion? (8)

18. (a) (i) A bolt is used for lifting a load of 50KN. Find the nominal diameter of the bolt, if the tensile stress is not exceed 100 N/mm^2, Assume coarse threads, if the bolt extends 50mm into the components, what will be the shear stress in the threaded portion of the bolt. (8)

(ii) A plate 50mm wide and 12mm thick is welded to another plate by means of double parallel fillet welds as shown in figure. The allowable working shear stress for the weld material is 75 N/mm^2. The static tensile load acting on the plates is 70KN. Calculate the length of the weld. (8)



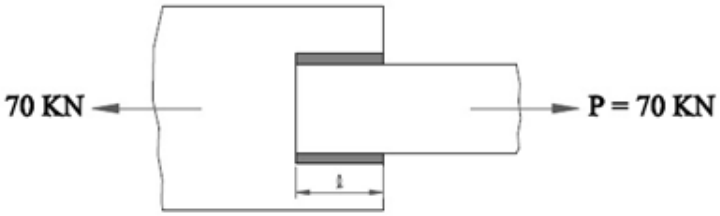
Or

(b) (i) State the difference between brazing and soldering. (4)

(ii) Write any four representations of welded joints. (4)

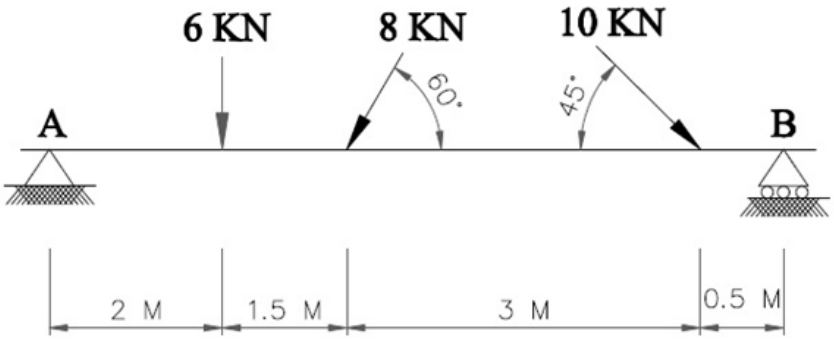
(iii) Explain briefly about stresses induced in screwed fasteners. (8)

19. (a) Determine the moment of inertia of the given I-Section as shown in figure. (16)



Or

(b) (i) Determine the support reaction of the beam as shown in figure. (8)



(ii) Define the term of Polar moment of inertia. (4)

(iii) Define the term of Product moment of inertia. (4)

20. (a) (i) Write short notes on deflection of beams. (4)

(ii) What are the factors considered for the selection of beam? (4)

(iii) What are the stresses induced in welded joints? (8)

Or

(b) (i) Describe the procedures involved in design of tension members. (10)

(ii) Write short notes on stiffness. (6)