Roll No. ....

3rd Sem / Civil/Highway Engg.
Subject:- Structural Mechanics

Time : 3Hrs.   M.M. : 100
SECTION-A

Note: Multiple choice questions. All questions are compulsory   (10x1=10)

Q.1 The capacity to withstand impact load is reffered as   (CO-1)
   a) Hardness   b) Malleability
   c) Toughness   d) Ductility

Q.2 At the point of contraflexure   (CO-3)
   a) B.M. is minimum
   b) B.M. is maximum
   c) B.M. is either zero or changes sign
   d) None of these

Q.3 Point of contraflexure is called   (CO-3)
   a) Hinge
   b) Factor of safety
   c) The point of inflexion
   d) None of these

Q.4 A beam is said to be continuous   (CO-3)
   a) It has more than two supports
   b) It has only one support
   c) It is infinitely long
   d) It extends beyond its support

Q.5 The units of moment of inertia is   (CO-4)
   a) L b) L^2
   c) L^3 d) L^4

Q.6 The bending stress at the neutral axis is   (CO-5)
   a) Tensile   b) Compressive
   c) Shear   d) Zero

(1)   180732/120732

Q.7 Pick up most economical section for a beam   (CO-5)
   a) Square   b) Circular
   c) Rectangular   d) I-section

Q.8 The ratio of average shear stress to maximum shear stress of a circular section is   (CO-6)
   a) 2/3   b) 3/2
   c) 2   d) 3/4

Q.9 A member of a structure carrying axial compressive load is called   (CO-8)
   a) Tie   b) Shaft
   c) Strut   d) None of these

Q.10 The basic perfect frame is   (CO-9)
   a) Triangle   b) Rectangle
   c) Hexagon   d) Square

SECTION-B

Note: Objective type questions. All questions are compulsory.   (10x1=10)

Q.11 The area under stress-strain curve indicates toughness. (True/False)   (CO-1)

Q.12 _____ is defined as the algebraic sum of all the vertical force action on one side of the section.   (CO-3)

Q.13 Define B.M.D.   (CO-3)

Q.14 Units of redius of gyration are _____.   (CO-4)

Q.15 The moment of inertia of a simple circular section is _____.   (CO-4)

Q.16 Moment of resistance = _____ x Section modulus.   (CO-5)

Q.17 The moment of inertia of the area about any axis is known as _____.   (CO-5)

Q.18 The stress caused by the shearing force at the section of a beam is called _____.   (CO-6)
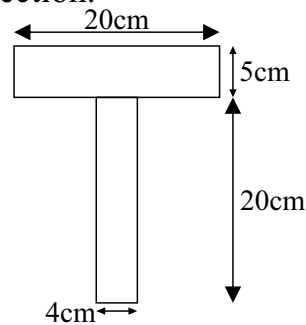
(2)   180732/120732

Q.19 EI is known as flexural rigidity of the beam. (True/Fasle) (CO-7)

Q.20 The vertical intercept between the bent and unbent beam at any point is called _____. (CO-7)

SECTION-C

Note: Short answer type questions. Attempt any twelve questions out of fifteen questions. (12x5=60)

Q.21 Write a short note on mechanical properties of steel. (CO-1)

Q.22 State and explain Hook's law. (CO-2)

Q.23 What is volumetric strain? Explain. (CO-2)

Q.24 Write down the relationship between E, K, G and μ, where E=modulus of elasticity, K=bulk modulus, G=shear modulus, μ=poison's ratio. (CO-2)

Q.25 State and explain various types of loads. (CO-3)

Q.26 Draw the S.F.D. and B.M.D. of simply supported beam of length L m carrying udl of w kN/m over its whole span. (CO-3)

Q.27 Explain the relationship between shear force and bending moment of a section. (CO-3)

Q.28 State and enlist various types of end supports of a beam. (CO-3)

Q.29 Find the moment of inertia of T-section as shown in fig 1. About X-X and Y-Y axis passing through the centroid of the section. (CO-4)

Q.30 Explain the concept of shear stress in beam. (CO-6)

Q.31 Derive the expression for a maximum slope and deflection for a simply supported beam of length L m carrying udl of w kN/m over its whole span. (CO-7)

Q.32 Differentiate between medium and short column. (CO-8)

Q.33 State (CO-8)
a) Euler's formula b) Slenderness ratio

Q.34 Write down about perfect frames, deficient frames and redundant frames. (CO-9)

Q.35 State and explain the method of sections for analysis of truss. (CO-9)

SECTION-D

Note: Long answer type questions. Attempt any two questions out of three questions. (2x10=20)

Q.36 A steel bar 2m long and 30mm diameter is subjected to an axial pull of 30 kN. If the Young's modulus of elasticity of the material is $2x10^5$ N/mm². Find (CO-2)
a) Stress b) Strain
c) The elongation of the bar

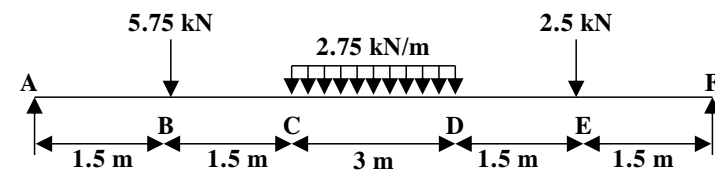Q.37 Draw the S.F.D. and B.M.D. of loaded beam as shown in the Fig.2. (CO-3)

Fig. 2

Q.38 A cantilever of 5m span is of 40mm width and 120mm depth. A uniformly distributed load of 5kN/m is acting on it. Calculate the maximum bending stress induced in the beam. (CO-5)

(Note : Course outcome/CO is for office use only)