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 ability of a material to deform without breaking is
      called   (CO1)
      a)   Elasticity   b)   Plasticity
      c)   Creep   d)   None of these

Q.2   Conditions of equilibrium are   (CO3)
      a) $\sum V=0, \sum H^1 0, \sum M=0$
      b) $\sum V=0, \sum H=0, \sum M^1 0$
      c) $\sum V^1 0, \sum H=0, \sum M=0$
      d) $\sum V=0, \sum H=0, \sum M=0$

Q.3   The rate of change of bending moment is equal to
                                              (CO3)
      a)   Slope   b)   Deflection
      c)   Shear force   d)   Poisson's ratio

Q.4   When shear force at a point is zero, the bending moment
      at that point will be   (CO3)
      a)   Zero
      b)   Minimum
      c)   maximum
      d)   Maximum or Minimum

Q.5   The moment of inertia of an area is always least with
      respect to   (CO4)
      a)   Bottom most axis   b)   Vertical axis
      c)   Radius of gyration d)   Centroidal Axis

Q.6   The strength of beam mainly depends upon   (CO5)
      a)   Section modulus   b)   Bending moment
      c)   its weight   d)   C.G of the section

Q.7   Bending stresses are also known as   (CO5)
      a)   Shear stresses   b)   Longitudinal stresses
      c)   Hoop stresses   d)   Temperature stresses

Q.8   The shear stress at a section in a beam varies along
                                              (CO6)
      a)   Depth   b)   Width
      c)   Perimeter   d)   None of these

Q.9   Rankine formula holds good for   (CO8)
      a)   Long column
      b)   Short column
      c)   Medium column
      d)   Both long and short column

Q.10 If n>(2j-3), the frame will be
      a)   Perfect frame   b)   Deficient frame
      c)   Redundant frame   d)   None of these

SECTION-B

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

Q.11 Compression test is performed for_____ materials.
                                              (CO1)
Q.12 What is S.F.D.?   (CO3)
Q.13 Draw neat sketch of simply supported beam.   (CO3)
Q.14 What is moment of inertia?   (CO3)
Q.15 What is the MOI for rectangular section having width B
      mm and depth D mm?   (CO4)
Q.16 The bending stress in any layer is directly proportional to
      the distance of the layer from_____.   (CO5)
Q.17 What do you mean by simple bending?   (CO5)
Q.18 The shear stress at the top of rectangular section
      is_____.   (CO6)
Q.19 Define Slope?   (CO7)

Q.20 Deflection at the fixed end of cantilever beam is _____. (CO7)

SECTION-C

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

Q.21 Write down about (CO1)
a) Ductility   b) Malleability c) elasticity.

Q.22 Write down about types of stresses. (CO2)

Q.23 Explain the stress strain curve for mile steel with proper labelling. (CO2)

Q.24 What is Poisson's ratio? Give it value for different materials. (CO2)

Q.25 State various types of beams and explain any two of them. (CO3)

Q.26 Draw the S.F.D. and B.M.D for simply supported beam of length L m having point load W kN at its center. (CO3)

Q.27 A cantilever AB of length 4m carries a U.D.L of 3 kN/m over a whole length and a point load of 4KN at free end. Draw S.F.D and B.M.D. (CO3)

Q.28 What is relationship between load, shear force and bending moment? (CO3)

Q.29 Briefly explain : (CO4)
a) Theorem of parallel axis
b) Section modulus?

Q.30 Draw the detailed shear stress distribution diagram for a rectangular section of beam. (CO6)

Q.31 Derive the expression for a minimum slope and deflection for a simply supported beam of length 'L' carrying a point load "W" at is mid span. (CO7)

Q.32 Define equivalent length and also explain various end conditions of a loaded column. (CO8)

Q.33 Write the assumptions in Euler's theory along with its limitations. (CO8)

Q.34 State various assumptions made for determination of forces in various members of a truss. (CO9)

Q.35 State and explain the method of joints for analysis of a truss. (CO9)

SECTION-D

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

Q.36 A brass bar, having cross-sectional area of 900mm², is subjected to axial force as shown in Fig.1.Find the total change in length of a bar. Take $E=2x10^5$ N/mm² (CO2)
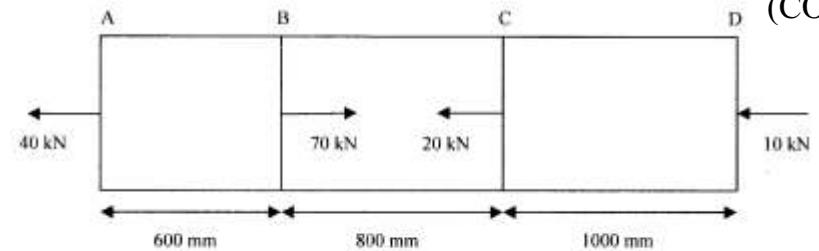

Fig. 1

Q.37 A cantilever beam AB of length 4m as shown in Fig.2, carries a udl of 3kN/m length over a whole length and a point load of 4kN at the free end. Draw the S.F.D. and B.M.D. (CO3)
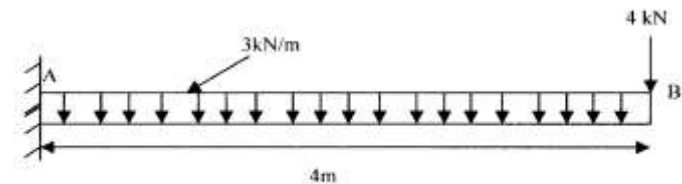

Fig. 2

Q.38 A rectangular beam of 4 m long, 100 mm wide and 200 mm deep is simply supported. Find the maximum distributed load that beam can carry if the bending stress should not exceed 10 N/mm². (CO5)