

SCHOOL OF PLANNING AND ARCHITECTURE, VIJAYAWADA
B. ARCH II YEAR - III Sem, REGULAR EXAMINATION, DEC- 2014

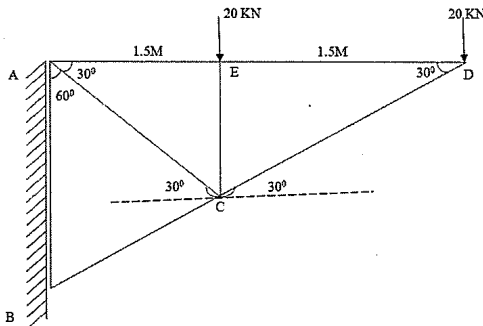
THEORY OF STRUCTURES (TS-3)

Maximum Marks – 100

Time – 3.00 Hours

- a) Answer any Five Questions*
b) Question No.8 is Compulsory.
c) Scientific Calculator is allowed

- Q1. a. Derive the equation of simple bending $M/I = f/y = E/R$ explain with neat diagram. (20)
b. Define Modulus of section and its application.
- Q2. A rectangular beam 160mm deep and 80mm wide is subjected to a maximum bending moment of 400 KNm. Find the maximum stress in the beam, find also the stress at a distance of 40mm from NA. Determine the radius of curvature for that position of beam where bending moment is maximum. Take $E = 2 \times 10^5 \text{ N/mm}^2$. Draw the stress diagram (20)
- Q3. A beam simply supported span 8m carries point loads 30 KN, 20 KN and 50 KN at a distance of 2m, 4m and 6m respectively from left support. Determine the position and amount of max shear force, bending moment and deflection given $I = 695 \times 10^6 \text{ mm}^4$ and $E = 200 \text{ KN/mm}^2$ (20)
- Q4. Find analytically the forces in all members of the cantilever truss shown below. (20)



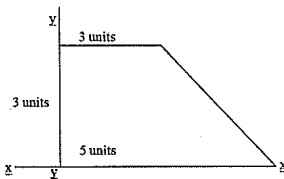
- Q5. a) Explain types of Domes and Vaults and explain their important features. (20)
b) Name the elements of an Arch with a neat sketch.
- Q6. A reinforced concrete dome of span 6m as base diameter with a rise of 1.5m is to be designed for a water tank. The uniformly distributed live load including finishes on dome may be taken as 2 KN/m^2 . Adopting M20 grade concrete and Fe 415 grade steel design the dome and ring beam. Permissible tensile stress is 100 N/mm^2 . (20)

- Q7. A double cover butt joint is used to connect plates of 16mm thick. Design the riveted joint and determine its efficiency. (20)

Given dia of rivets = $6.04 \sqrt{t}$, $P_s = 100 \text{ N/mm}^2$, $P_b = 300 \text{ N/mm}^2$. Working stress in axial tension = $0.6f_y$, $f_y = 260 \text{ N/mm}^2$

- Q8. Answer any **Four** of the following: (4 x 5=20)

- Design a lintel beam for an opening of 1.2m X 2.1m size having floor height 3m. Using M20 grade concrete and 10mm diameter Fe415 bars. Take width of wall is 230mm.
- Discuss and draw variation of bending stress and shearing stress distribution of rectangular beam.
- M.I. of rectangle, circular & triangular sections.
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Area =

C.G =

M.I =

- Find the modulus of section of hollow circular section of external diameter 400mm and internal diameter 300mm.
- Types of Arches with neat sketches