SCHOOL OF PLANNING AND ARCHITECTURE, VIJAYAWADA
B. ARCH I YEAR - I SEM. REGULAR EXAMINATION, DEC. 2014

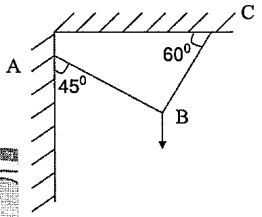
SUBJECT: TS-1: THEORY OF STRUCTURES

Maximum Marks – 100 **Time – 3.00 Hours**

i) Answer any Five questions.
ii) Question No. 8 is compulsory.

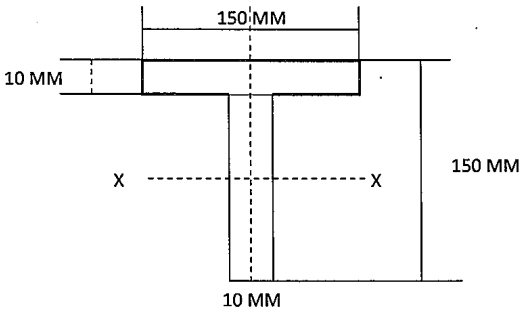
Q1. a) State Lami's Theorem. Explain with diagram **(5)**

b) An electric light fixture weighing 15 N hangs from a point 'B', by two strings AB and BC as shown. Using Lami's Theorem, determine the forces in the strings AB and BC. **(15)**



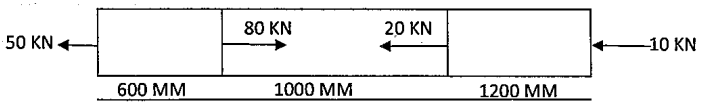
Q2. a) Explain perpendicular Axis Theorem with diagram **(5)**

b) Determine the position of Centroid and find the moment of inertia of T – section (as shown) about its horizontal and vertical centroidal axis. **(15)**



Q3. a) Define strain and classify according to nature of strain developed upon different forces acting on an object. **(5)**

b) A brass bar having a cross sectional area of $1000mm^2$ is subjected to axial forces as shown. Find the total change in length of bar. Take $E = 1.05 \times 10^5 N / mm^2$ **(15)**



(PTO)

Q4. a) Explain stress - strain curve for mild steel. **(5)**

b) A copper bar of 20mm diameter and 360mm long registers an elongation of 0.5mm and decrease in diameter of 8.34 X 10^{-3} mm under a direct (tensile) load of 47.1 KN. Determine the Young's modulus and Poison's ratio of copper. **(15)**

Q5. a) What are supports? Draw different types of supports with their free body diagrams. **(5)**

b) Draw shear force diagram and bending moment diagram for the following two beams separately. **(15)**

(i) A 6m long simply supported beam with a concentrated load of 25KN at 4m from left support.

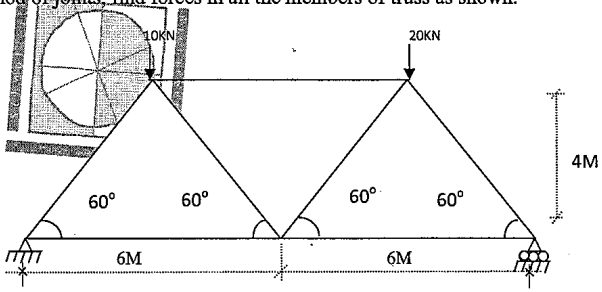
(ii) A 7m long cantilever beam with a uniformly distributed load of 30 KN/m on the whole beam.

Q6. a) What is centre of gravity and radius of gyration? **(5)**

b) A masonry dam of trapezoidal section with one face is vertical. Top width of dam is 3m, bottom width of dam is 6m and height is 6m. Find the position of centroid. **(15)**

Q7. a) What are the three assumptions to determine which members of a truss do not carry forces. Explain with diagram **(5)**

b) Using method of joints, find forces in all the members of truss as shown. **(15)**



Q8. Write short notes on any four. **(20)**

a. Types of loads.

b. Varignon's theorem

c. Systems of forces.

d. Five mechanical properties of materials.

e. Triangle law of forces.

f. Shear force and bending moment diagram for a WKN concentrated load acting at the centre of a simply supported beam of total length *l* meters.