SCHOOL OF PLANNING AND ARCHITECTURE, VIJAYAWADA
B. ARCH I YEAR - I SEM. SUPPLEMENTARY EXAMINATION, JAN. 2015

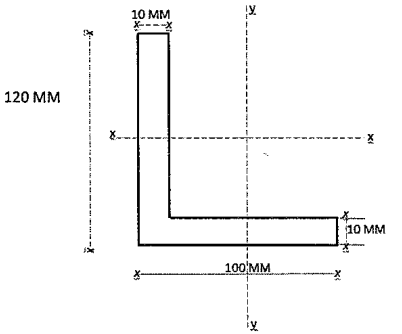
SUBJECT: TS-1: THEORY OF STRUCTURES

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

i) Answer any Fivequestions.
ii) Question No. 8 is compulsory.

Q1. a) What is parallelogram law of force? Explain with diagram. **(5)**
b) Find the magnitude of two forces such that if they act at right angles, their resultant is $\sqrt{10}$ N but if they act at 60^0, their resultant is $\sqrt{13}$ N. **(15)**

Q2. a) State parallel Axis Theorem. Draw the diagram to explain. **(5)**
b) Find the moment of inertia of the L – section (as shown below) about its horizontal and vertical centroidal axis. **(15)**



Q3. a) Define stress and clarify according to the nature of stress induced in an object. **(5)**

b) A bar ABCD 950mm long is made up of three parts AB, BC and CD of lengths 250mm, 450mm and 250mm respectively. AB and CD are cylinders having diameters 25mm and 15mm respectively. The rod BC is a square section 300mm X 300mm. The rod is subjected to a pull of 26,000 N. Find **(15)**
(i) The stresses in the three parts of the rod and
(ii) The extension of the rod. Take E = 2 X 10^5 N / mm^2.

Q4. a) Define Young's Modules, Bulk modulus, modulus of Rigidity and Poison's ratio and give the relationship between each. **(5)**
b) A rectangular steel bar 60mm wide, 10mm thick and 5mm long is subjected to an axial pull of 80KN. If the increase in length under the load is 1.5mm and decrease in thickness is 0.0014mm, determine the three elastic constants of the material, Poison's ratio and change in volume produced. **(15)**

(PTO)

Q5. a) What is a beam? Name and draw different types of beam. **(5)**

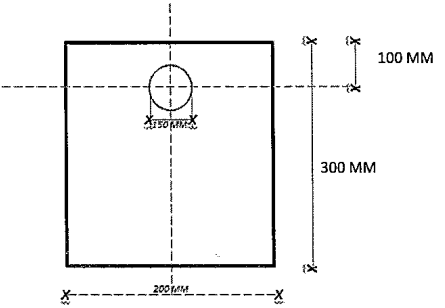
b) Draw the shear force and bending moment diagram for the following 2 beams separately. **(15)**

(i) a 5m long simply supported beam a 80N concentrated load acting at 3m from the left support.

(ii) a 8m long cantilever beam with a uniformly distributed load of 50 KN / m acting on the whole beam.

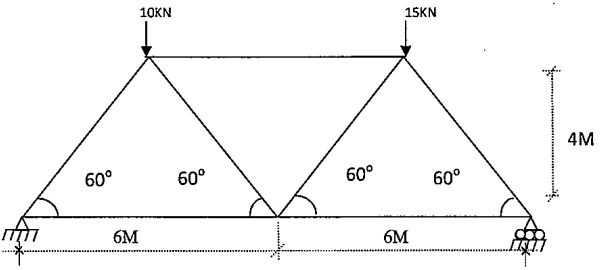
Q6. a) What is Centroid and moment of inertia? **(5)**

b) Determine the moment of inertia of a rectangular plate of size 200mm X 300mm with a hole of 150mm diameter (as shown) about AA and BB axis. **(15)**



Q7. a) What is a framed structure and give its equations between number of joints and number of members for three types of frame systems. **(5)**

b) Calculate the forces developed in each member of the truss (shown below) using method of joints **(15)**



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

a. Different types of supports.
b. Elasticity
c. Stress – strain ensure for mild steel.
d. Hooke's law.
e. Lami's Theorem
f. Temperature stress and temperature strain.