final

### THEORY OF STRUCTURES (TS-2)

Maximum Marks – 100

Time – 3.00 Hours

a) Answer any Five Questions
b) Question No.8 is Compulsory.
c) Any missing data can be suitably assumed and stated

Q1. a) List and explain different types of supports. **(06)**

b) A simply supported beam of 6m is loaded as shown in the figure. Construct the shear force and B.M diagrams for the beams and find the position and value of maximum bending moment. **(14)**
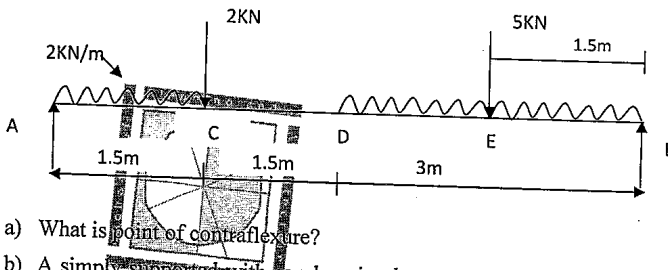
Q2. a) What is point of contraflexure?

b) A simply supported with overhanging beam 9m length as shown in figure. Sketch the S.F.D & B.M.D. Locate the point of contraflexure and determine the position and magnitude of maximum bending Moment. **(20)**
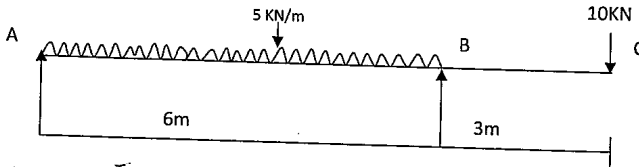
Q3. a) What are the assumptions made in theory of simple bending? **(10)**

b) Derive the flexure equation with a neat sketch. **(10)**

Q4. a) A beam 300mm deep of symmetrical section has I=8000 x 10^4mm^4 and is simply supported over a span of 6m. Calculate **(10)**

i)   The UDL it can carry

ii) The point load can carry at the centre (neglecting the self weight of the beam) if the maximum bending stress is not exceed 110N/mm^2

b) A simply supported beam of span 5m carries a UDL of 10KN/m and a point load of 10KN placed at 2m from left support. If the permissible stress in timber is 8N/mm^2, design the suitable section assuming d=2b. **(10)**

Q5.
  a) State Mohrs theorem I and II.

  b) Derive Euler-Bernoulli equation with a neat sketch. **(05)**

Q6. Find slope and deflection for **(15)**

  i) Cantilever beam subjected to UDL over entire span of 'l'.

  ii) Cantilever beam subjected to partial UDL over length of 'l₁' **(20)**

  iii) Cantilever beam subjected to partial UDL over length of 'l₁' from free end.

Q7.
  a) A central beam of 4m long is subjected to UDL of 2KN/m in addition to control point load of 12KN. Determine the maximum slope and deflection, if E=200KN/mm² and I=3181 cm⁴. **(10)**

  b) Explain plastic state of analysis in steel structures with neat graph.

Q8. Write short notes of *any four* of the following **(10)**

  a) A cantilever of 4m span carries a UDL of 10KN/m up to a distance of 3m from free end. Draw S.F and B.M diagrams. **4 x 5=20**

  b) List and explain the defects in timber.

  c) A cantilever of 120mm x 250mm deep, 2m long is carrying a load of 10KN at the free end and 20KN at a distance of 1m from free end. Find the deflection at the free end. E=200KN/m².

  d) Give a detailed comparison of softwood and hardwood for its various properties.

  e) Derive the max shear stress distribution over a solid circular section.

  f) What is strain? Define list and explain different types of strains.