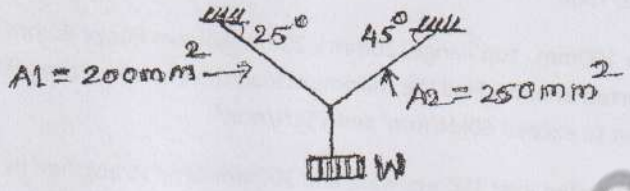
SE Civil Sem III (Choice based)
SOM

Q.P.Code: 27316

[Time: 3 Hours] [Marks: 80]

1) Question no.1 is compulsory
2) Attempt any three question from remaining five
3) Assume any suitable data if required

Q1 a)Determine the maximum weight W that can be supported by two wires as shown in fig. if the stress in each wire is not to exceed 120 N/mm² (20)



b)A cantilever beam of solid circular section and 3m long carries a concentrated load of 25kN at its free end. If the max bending stress in tension and compression are not to exceed 100 N/mm² and 60N/mm² calculate the diameter of the beam required.

c)A 230mm x 350 mm simply supported beam carries a UDL of 20kN/m over a span of 8M. Determine the maximum shear stress at a section 2m from the support.

d) A rectangular column of 230mm x 350mm and 4M lomg used as a column. If one end is hinged and other is fixed, find the safe load the column can carry if FOS-2.5. use Euler's formula.

e)Derive the expression for strain energy due to gradually applied axial load.

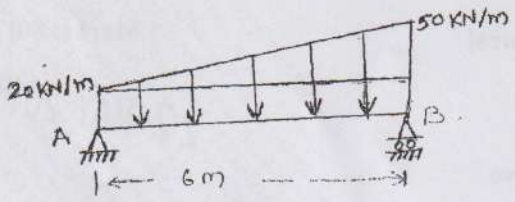
Q.2 a)A 300mm x 400mm RCC column provided with 6 bars of 16mm diameter subjected to compressive load of 800kN. Find the corresponding stress produced in steel and concrete. Take Es= 210kN/mm² Ec= 35kN/mm² (08)

B)A circular rod ABC is subjected to axial compressive load of 50kN. The part AB is hollow circular (04)

With outer diameter of 25mm and inner diameter of 10mm and length of 200mm. The part BC is solid circular with diameter of 25mm and length of 300mm.Calculate total decrease in length of the bar. Take E= 210kN/mm²

c)Draw the shear force and bending moment diagram for the beam loaded as shown in fig. (08)

Turn Over



Q3 a)What are the assumptions in theory of pure bending. (04)

b)A hollow circular column of 2.8m long is fixed at one end and hinged at other end, has to support a load of 500kN The internal diameter is 0.8 times external diameter. Calculate the external diameter with FOS=4. Take σc=330 N/mm² ȡ=1/7500 (08)

c) A I beam having web 20mm x 100mm , top flange120mm x 20mm,bottom flange 80mm x 10mm has a span of 5m and is simply supported at ends. Find the maximum load the beam can carry if the compressive and tensile stress not to exceed 60kN/mm² and 75kN/mm² (08)

Q4 a) A flitched beam consist of wooden joist 150mm wide and 300mm deep strengthen by steel plate Of 10 mm thick at bottom. Find the moment of resistance by using transformed area concept. permissible stress in wooden joist is 8N/mm². Take Es = 15Ew (08)

b) A beam of square section of size 200mm x 200mm is placed with one of it's diagonal horizontal and it carries a shear force of 80kN. Draw the shear stress distribution diagram. (08)

c)Derive the relation between SF, BM and rate of loading W (04)

q5 a) A cylindrical shell is 3m long and 1.2m in diameter and 12mm thick is subjected to internal pressure of 1.8N/mm² calculate change in dimension of shell. Take E= 210kN/mm² 1/m=0.3 (08)

b) At a point in a strained material the stresses on two mutually perpendicular plane are 120kN/mm² and 80kN/mm² both are tensile. Find the normal, tangential and resultant stress at a plane inclined 30⁰ to the major principal plane.

c) determine the area of core section for rectangular section of size 230mm x 350mm. (08)

Q6 a) A hollow circular steel shaft of 5m length has to transmit 150KW power at 120rpm. If internal diameter is 0.6 times external diameter , total angle of twist not to exceed 3⁰ and shear stress is limited to 50N/mm² . Determine the diameter of shaft. Take G= 84kN/mm² (08)

b) In the rectangular section 400mm wide and 300mm deep is subjected to compressive load of 80kN at an eccentricity of 40mm and 75 mm from centroidal xx and yy axis. Find stress at each corner. (06)

c)a rod of 300mm long and 20mm in diameter is heated through 100°C and at the same time pulled by force P. If the total elongation is 0.4mm. What is the magnitude of P Take E= 210kN/mm² and α=12x 10⁻⁶ (06)
