Q.P.Code: 27318

1T00613 - S.E.(CIVIL)(Sem III)(CBSGS) / 49203 - STRENGTH OF MATERIALS

(3 Hours) **Total 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)Derive the relationship between rate of loading(W),shear force (SF)and bending moment(BM).(20)

b)What are the assumptions of theory of pure bending

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 long 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.TakeE= 210kN/mm^2

e) Determine the area of core section for rectangular section of size 230mm x 350mm.

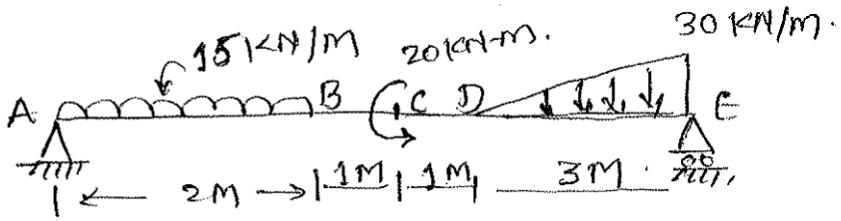
Q.2 a)A 300mm x 400mm RCC column provided with 6 bars of 16mm diameter subjected to (06)

compressive load of 8ookN. Find the corresponding stress produced in steel and concrete. Take Es= 210kN/mm^2 Ec= 35kN/mm^2

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/mm^2

c)Draw the shear force and bending moment diagram for the beam loaded as shown in fig. (10)



Q3 a)A hollow circular column of 2.8m long is fixed at one end and hinged at other end, has to (06)

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/mm^2 ȧ=1/7500

b) A I beam having web 20mm x 100mm , top flange120mm x 20mm,bottom flange 80mm x 10mm (7)

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/mm^2 and 75kN/mm^2

Turn Over

Q3 c) A flitched beam consist of wooden joist 150mm wide and 300mm deep strengthen by (07)

steel plateOf 10 mm thick at bottom. Find the moment of resistance by using transformed area concept. permissible stress in wooden joist is $8N/mm^2$. Take Es = 15Ew

Q4 a) 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)

b) A cylindrical shell is 3m long and 1.2m in diameter and 12mm thick is subjected to internal pressure of $1.8N/mm^2$ calculate change in dimension of shell. Take E= $210kN/mm^2$ 1/m=0.3 (06)

c) A rod of 300mm long and 20mm in diameter is heated through 100^0C and at the same time pulled by force P. If the total elongation is 0.4mm. What is the magnitude of P. Take E= $210kN/mm^2$ and (06)

$\alpha=12x\ 10^{-6}$

Q.5 a) At a point in a strained material the stresses on two mutually perpendicular plane are $120kN/mm^2$ and $80kN/mm^2$ both are tensile. Find the normal, tangential and resultant stress at a plane inclined 30^0 to the major principal plane. (08)

b)) 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 3^0 and shear stress is limited to $50N/mm^2$. Determine the diameter of shaft. Take G= $84kN/mm^2$ (08)

c) Draw a shear stress distribution diagram for hollow rectangular section when it is subjected to pure

bending and torsion. (04)

Q6a) 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.(08)

b) A unknown weight falls through 15mm on a collar rigidly attached to the lower end of the bar (06)

4M long and $800mm^2$ in area. If the maximum instantaneous elongation is 3mm, find the corresponding

Stress and the value of unknown weight. Take E= $210kN/mm^2$

c) A solid circular rod of 10mm diameter and length 300mm when subjected to tensile load of 20kN

show the increased in length of 5mm and decrease in diameter by 0.006mm.Calculate E,G and K. (06)
