G.R. No. [   ]

MARCH 2020 INSEM (T1)
S. Y. B.TECH.(PROGRAM) (SEMESTER – IV/VI)

COURSE NAME: MECHANICS OF STRUCTURES II
COURSE CODE: CVUA22183

(PATTERN 2018)

Time: [1 Hour]   [Max. Marks: 20]

Instructions to candidates:

1. Attempt Q.1 **OR** Q.2, Q.3 **OR** Q.4, Q.5 **OR** Q.6
2. Figures to the right indicate full marks
3. Use of scientific calculator is allowed
4. Assume suitable data wherever required

Q. 1) a) A hollow circular shaft having OD 80mm and ID 60mm is used to transmit a torque of 300 kNm. Determine the maximum shear stress induced in the shaft.   [4] (CO 1)

   b) A cantilever of span 'L' is subjected to a point load 'P' at the free end. The cross-section of the cantilever has constant EI. Find out the deflection at the free end.   [4] (CO 1)

OR

Q. 2) A torque of 3.3 kNm acts on a solid circular shaft of 80mm diameter. Find out the bending moment that can be applied on the cross section of the shaft in addition to the torque if the maximum shear stress is not to exceed 60 MPa. Also determine the major and minor principal stress.   [8] (CO 1)

Q. 3) a) A short column with square cross-section of sides 400mm carries a load of 900kN with eccentricity of 40mm about one of the centroidal axis parallel to one side of the cross-section. Find out the maximum and minimum stresses induced in the column cross-section.   [4] (CO 2)

   b) A machine element transmits compressive force and is hinged at both the ends and is 2m long. It's cross-section is square in shape with dimensions 40 X 40. Yield stress for the material is 350Mpa and Rankine's constant a is 1/7500. Using Rankine's formula find out whether this element can carry a compressive force of 200 kN safely or not.   [4] (CO 2)

OR

Q. 4) A tapering chimney is 30m high and it is hollow in cross section. It's base has outer diameter of 2.4m and inner diameter of 0.8m. The top has outer diameter of 1.6m. Wind pressure of intensity 2.2kN /m^2 acts on the projected area. The weight of chimney is 4000kN. Determine the maximum and minimum stresses induced at the base of the chimney.

[8]

(CO 2)

Q. 5) In a tension member, tensile stress is 40MPa. Find the direct and shear stress on a plane making an angle of 30^0 to the plane of tensile stress.

[4]

(CO 1)

OR

Q. 6) At appoint in a strained material, shear stress acting on mutually perpendicular planes is 60MPa accompanied by no direct stress. Determine the major and minor principal stresses.

[4]

(CO 1)