Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

IV SEMESTER B.TECH (CIVIL) END SEMESTER EXAMINATIONS

APRIL/MAY 2019

SUBJECT: STRENGTH OF MATERIALS [CIE 3283]

Date of Exam: **07/ 05 / 2019** Time of Exam: **2 PM to 5 PM** Max. Marks: **50**

Instructions to Candidates:

- Answer ALL the questions & missing data may be suitably assumed

1A.	Define, i) Flexural rigidity ii) Section modulus	**2**	**CO1**
1B.	Calculate the moment of resistance of a symmetrical I-beam having flange dimension 100 mm × 20 mm and web dimension 20 mm × 80 mm, if the allowable bending stress in the material is not to exceed 50 MPa.	**3**	**CO1**
1C.	A T-shape cantilever beam of length 3 m has the following cross section details: flange size-100 mm × 20 mm and it is in tension zone, web size-10 mm × 200 mm. What is the magnitude of load per meter run which can be applied if the maximum tensile bending stress is 40 N/mm^2? Also find the allowable compressive bending stress?	**5**	**CO1**
2A.	A wooden beam 100 mm wide and 150 mm deep is simply supported over a span of 4 m. If shear force at a section of the beam is 4500 N, find the shear stress at a distance of 25 mm above the neutral axis.	**3**	**CO1**
2B.	Derive Euler-Bernoulli differential equation for the elastic curve of a beam.	**3**	**CO2**
2C.	Determine the maximum deflection of a simply supported beam of span 'L' carries uniformly distributed load of intensity 'W' over the entire span.	**4**	**CO2**
3A.	Determine the ratio of power transmitted by a hollow shaft and a solid shaft when both are made of same material and have same weight, length and speed. The diameter of solid shaft is 150 mm and external diameter of hollow shaft is 250 mm.	**5**	**CO3**
3B.	A body is subjected to mutually perpendicular tensile stresses of 80 MPa and 40 MPa, each of these stresses are accompanied by shear stress of 60 MPa as shown in **Fig.Q.3B.** Determine the resultant stress on the plane inclined at 45^0.	**3**	**CO4**
3C.	Explain, (i) Principal plane (ii) Obliquity	**2**	**CO4**
4A.	Explain the term, joint efficiency in thin cylinder.	**2**	**CO4**
4B.	A thin cylinder 800 mm internal diameter is 3 m long has a shell thickness of 10 mm. The cylinder is subjected to an internal pressure of 2.5 N/mm^2. Determine the hoop stress, maximum shear stress, change in diameter and change in volume. Take E= 200 GPa and Poisson's ratio = 0.3.	**5**	**CO4**
4C.	A thick cylinder of inner radius 200 mm with wall thickness of 50 mm is subjected to an internal fluid pressure of 50 MPa and external pressure of 20 MPa. Determine hoop stress developed across the thickness.	**3**	**CO4**

5A.	Explain slenderness ratio.	**2**	**CO5**
5B.	Explain the limitation of Euler's formula for long column.	**3**	**CO5**
5C.	Find Euler's crippling load for a hollow cylindrical column 40 mm external diameter with 4 mm thick wall. The length of the column is 3.2 m and is pinned at both the ends. Also determine crippling load by Rankine's formula. Take F_c= 335 MPa, a= 1/7500 and E = 209 kN/mm^2.	**5**	**CO5**

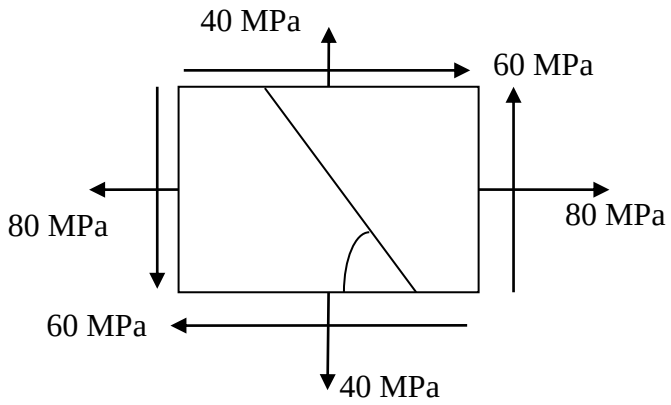

Fig.Q.3B