BACHELOR OF ARCHITECTURE 2ND YR 1ST SEM. EXAM (Old) 2019

Subject: THEORY OF STRUCTURES- I **TIME: 3 Hours** **Full Marks: 100**

Assume any necessary data if required

No. of questions	Answer any Five questions.	Marks (20x5=100)
1.	Draw the mohr's circle for the following cases of stress conditions i) When normal stresses are equal magnitude but opposite in sign i.e $\sigma_x = -\sigma_y$. ii) When only σ_x exist and $\sigma_y = 0$.	10+10 = 20
2.	Prove the basic equation of shear stress distribution at a point of a rectangular beam section i.e. $q = F Q/I b$. q= shear stress. F= shear force. Q= first moment of the area. I=moment of inertia. b= width of the section	20
3. a)	The principal tensile stresses at a point across two perpendicular planes are 55 N/mm^2 and 25 N/mm^2. Find the normal and tangential stresses on a plane at 15 degree with the major principal plane.	15+ 5 =20
b)	Write short note on principal stress and principal plane.	

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4. a) b)	Derive the Euler's formula for column buckling for a column with both end hinged condition Draw the shear stress distribution diagram of a standard equal I section.	15+5=20
5. a) b)	Write down the assumptions and limitations of Euler's theory of column buckling. A solid round bar 70 mm dia and 2 m long is used as column, one end of which is fixed while other end hinged. Find the safe compressive load for the column using Euler's formula. Assume E =200 x10^9 N/m^2 and factor of safety 2.5.	10+ 10=20
6. a) b)	Show that maximum shear stress of a rectangular beam section is 1.5 times the average shear stress of that section i.e. τ_{max} =1.5 τ_{av} with neat sketch. What do you mean by short column and long column?	15+5=20