

EX/ARCH/CE/T/215/2018(S)

**BACHELOR OF ARCHITECTURE 2ND YR 1<sup>ST</sup> SEM.**

**SUPPLEMENTARY EXAM. 2018**

**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 (5x20=100)
1. a)	Prove the basic equation of theory of simple bending of a rectangular beam section i.e. $M/I = \sigma / y = E/R$ .	20
2. a)	Show that maximum shear stress of a rectangular beam section is 1.5 times the average shear stress of that section with neat sketch.	10+10=20
b)	Deduce and draw the shear stress distribution of a standard equal I section.	
3. a)	Construct Mohr's circle for the case of biaxial stress where $\sigma_x$ is tension and $\sigma_y$ is compression. Assume $\sigma_x = \sigma_y/2$ .	10+10=20
b)	The principal tensile stresses at a point across two perpendicular planes are $70 \text{ N/mm}^2$ and $40 \text{ N/mm}^2$ . Find the normal and tangential stresses on a plane at 30 degree with the major principal plane.	
4. a)	Write down the assumptions of Euler's theory of column buckling.	5+15=20
b)	Derive the Euler's formula for column buckling for a column with both end hinged condition.	

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5.

Determine end displacement and slope of a cantilever beam carrying udl  $W$  per unit length over half span as shown in figure 1.  $EI$  constant. 20

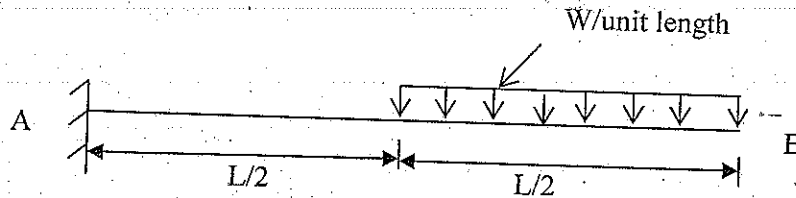


Figure 1.

6.

a)

Write down the first and second theorem of moment area method with neat sketch 5+15=20

b)

Deduce and draw the shear stress distribution of a circular section.