Code No: R1922011   **R19**   SET - 1
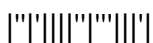
II B. Tech II Semester Regular Examinations, August/ September - 2021
STRENGTH OF MATERIALS - II
(Civil Engineering)

Time: 3 hours   Max. Marks: 75

Answer any **FIVE** Questions each Question from each unit
All Questions carry **Equal** Marks
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1	a)	Derive the stresses on an oblique plane under uniaxial loading	[8M]
	b)	The principal stresses at a point across two perpendicular planes are $70MN/m^2$ (tensile) and $30MN/m^2$ (tensile). Find the normal and tangential stresses and the resultant stresses and its obliquity at a plane at 20^0 with the major principal plane both analytically and graphically	[7M]

Or

2	a)	Derive the maximum principal strain theory.	[7M]
	b)	Mutually perpendicular faces of a square element of a thin plate are subjected to normal and shear stresses of $63MN/m^2$ (Tensile) and $47.2MN/m^2$ (Compressive) and $39.4MN/m^2$ (Shear)Determine the magnitudes and direction of the principal stresses and the greatest shearing stress	[8M]
3	a)	Derive the torsion equation of a circular shaft	[8M]
	b)	A close coiled helical spring is made out of 12mm diameter steel rod. The coil consists of 12 complete runs with a mean diameter of 140mm.The spring carries an axial pull of 300N.Find the maximum shear induced in the section of the rod. If C = $90GN/m^2$, find the deflection in the spring, the stiffness and strain energy stored in the spring.	[7M]

Or

4	a)	Derive an expression open coiled helical springs.	[6M]
	b)	A hollow steel shaft of 250mm external diameter and 200mm bore twists through an angle of 1.0 degree in a length of 3m when subjected to an axial torque. What are the values of shearing stresses at the inner and outer surfaces of the shaft? Calculate the power that is transmitted by the shaft at a speed of 300r.p.m,when the above torque is applied, C = $90GN/m^{2.}$	[10M]
5	a)	Derive Euler's equation when one end of the column is fixed and the other end is free	[7M]
	b)	Compare the crippling loads given by Rankine's and euler's formulae for tubular strut 225 cm long having outer and inner diameter of 37.5 mm and 32.5 mm respectively loaded through pin joints at both ends. Take yield stress as 315 MPa; Rankine constant(a)= 1/7500; and E= 200 GPa	[8M]

Or

6	a)	Derive Euler's method for long columns subjected to eccentric loading	[10M]
	b)	Write the limitations of Euler's formula.	[6]

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7   A tapering chimney of hollow circular section is 40 meters high. Its external   [16M]
       diameter at the base is 2.8m and at the top is 1.8m It is subjected to a wind pressure
       of 3.2kN/m^2 of the projected area. If the weight of the chimney is 5000kN and the
       internal diameter at the base is 1.0m, determine the maximum and minimum stress
       intensities at the base.

<div align="center">Or</div>

8   a)   Derive the equation of earth pressure on retaining walls   [10M]

    b)   A shaft of 80 mm diameter is subjected to a bending moment of 500 N-m and torque   [6M]
       of 400 N-m. Determine
       (a) maximum normal stress on a section perpendicular to the axis.
       (b) the maximum shear stress on a section perpendicular to the axis.

9   a)   Find the shear centre for a channel section   [10M]

    b)   Discuss in detail about unsymmetrical bending?   [6M]

<div align="center">Or</div>

10   A beam of angle section 150mm x 100mm x 10mm in simply supported over a span   [16M]
       of 1.6m with 150mm leg vertical. A uniformly distributed vertical load of 10kN/m
       is applied throughout the span. Determine the Maximum bending stress, Deflection
       at the centre.