

	Sanjay Ghodawat University, Kolhapur Established as State Private University under Govt. of Maharashtra. Act No XL, 2017	2018-19 EXM/P/09/00
Year and Program 2018-19PG	School of Technology	Department-Mechanical
Course Code: MMD 505	Course Title: Advanced Solid Mechanics	Semester – I
Day and Date: Friday 4 21 Dec 2018	End Semester Examination (ESE)	Time: 10:00 to 1:00 pm Max Marks: 100

Instructions:

- 1) Figures to the right indicate full marks
- 2) All questions are compulsory
- 3) Assume suitable data wherever necessary

Q.1	Marks	Bloom's Level	CO
a) Explain clearly difference between plane stress and plane strain	05	L1	CO 1
b) Where do we use the Airy stress function? Discuss the problem of stress solved by the stress function given below	05	L1	CO 1

$$\phi = \frac{3F}{4C} \left\{ xy - \frac{xy^3}{3C^2} \right\} + \frac{P}{2} y^2$$

OR

b) Investigate what problem is solved by following stress function	05	L1	CO 1
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$$\phi = \frac{q}{8c^3} [x^2(y^3 - 3c^2y + 2c^3) - \frac{y^3}{5}(y^2 - 2c^2)]$$

Q.2			
a) Explain the Mohr's Circle method to find principal strains.	05	L2	CO 2
b) Derive compatibility equation under general condition in case of plane stress problem in rectangular coordinates	05	L2	CO 2
OR			
b) Derive the relations for strain components in Cartesian coordinate.	05	L2	CO 2

	Marks	Bloom's Level	CO
Q.3			
a) Derive equation of equilibrium in polar coordinates.	05	L3	CO 3
b) Derive the expression for stresses in circular discs	05	L3	CO 3
OR			
b) Write note on Stress function and Bi-harmonic equation	05	L3	CO 3
Q.4			
a) Find shear centre for I section with suitable data.	05	L4	CO 4
b) Explain the applications of shear centre	05	L4	CO 4
OR			
b) Find shear centre for I section with unequal flanges.	05	L4	CO 4
Q.5 Solve any three			
a) Explain Hydro dynamical analogy	10	L5	CO 5
b) Explain torsions of bars with elliptical section	10	L5	CO 5
c) Discuss torsion of hollow shaft and thin tubes.	10	L5	CO 5
d) What is torsional stress function	10	L5	CO 5
Q.6 Solve any three			
a) Find membrane stresses in partially filled spherical storage tanks	10	L6	CO 6
b) Find area of contact and maximum pressure for contact stress problem of sphere and sphere.	10	L6	CO 6
c) Discuss Contact stresses between rail and wheel	10	L6	CO 6
d) Explain membrane Analogy	10	L6	CO 6
