B.E. Mechanical Engineering Eighth Semester

ME8042 - Elective-III : Stress Analysis

P. Pages : 1 **GUG/W/18/2077**

Time : Three Hours * 1 5 9 0 * Max. Marks : 80

Notes :
1. All questions carry marks as Indicated.
2. Answer Q.1 OR Q.2 Q.3 OR Q.4, Q.5 OR Q.6, Q.7 OR Q.8,
3. Due credit will be given to neatness and adequate dimensions.
4. Assume suitable data wherever necessary.
5. Diagrams and Chemical equation should be given wherever necessary.
6. Illustrate your answers wherever necessary with the help of neat sketches
7. Use of slide rule, Logarithmic tables, Steam tables, Mollier's chart, Drawing instruments, Thermodynamic tables for moist air, Psychrometric charts and Refrigeration charts is permitted.

1.	a)	State and explain 'Saint Yen ants' principle.	**7**
	b)	What is Airy's stress function? How is it useful to solve practical problems of stress analysis.	**7**
	c)	Considering the equilibrium of cubical element denote the stresses on all sides of this element.	**6**

OR

2.		Derive the relations for σ_x , σ_y and τ_{xy} for simply supported beam of length 'ℓ' and height 'h' subjected to UDL of q N/M along it's length Assume unit width.	**20**
3.		Derive the stress equations for equilibrium and compatibility equation for plane stress problem.	**20**

OR

4.		Derive the general equation of equilibrium in polar coordinate System.	**20**
5.	a)	Describe the procedure for preparing a photo elastic model.	**10**
	b)	Explain stress-optic law with necessary derivation.	**10**

OR

6.	a)	Explain plane and circular polariscope setups with neat sketches.	**10**
	b)	Explain any one method for separation of principle stresses.	**10**
7.	a)	Why it is necessary to stress-freeze the photo elastic model in 3-D photo elasticity.	**7**
	b)	Explain the various methods of bridge balancing.	**6**
	c)	What do you mean by gauge factor of strain gauges? Derive the relation for same.	**7**

OR

8.	a)	Describe the procedure to be followed for mounting of the strain gauges.	**8**
	b)	Explain the phenomenon of 'fringe multiplication' in photo elasticity.	**6**
	c)	Explain the classification of strain gauges.	**6**

****