M.E. Second Semester (Mechanical Engineering (Adv. Manu. & Mech. Sys. Desig.)) (New - CGS)

13472 : Experimental Stress Analysis : 2 MMD 4

P. Pages : 2 | **AU - 3390**

Time : Three Hours | Max. Marks : 80

Notes :
1. All question carry marks as indicated.
2. Answer **three** question from Section A and **three** question from Section B.
3. Due credit will be given to neatness and adequate dimensions.
4. Assume suitable data wherever necessary.
5. Illustrate your answer necessary with the help of neat sketches.
6. Use of pen Blue/Black ink/refill only for writing the answer book.

SECTION - A

1.	a)	What is birefriengence ? Explain with neat sketch.	**5**
	b)	If a particular point in a photoelastic model is observed in a mercury light source (λ = 5481A°) fringe order (N) = 3 is obtained, what will be fringe order if sodium light (λ = 5893A°) is used ?	**8**
2.	a)	Derive expression for a stressed photoelastic model in a plane polariscope.	**6**
	b)	Explain oblique incidence method of separating the principal stresses.	**7**
3.	a)	What is time edge effect in photoelastic materials ? How it can be eliminated ?	**6**
	b)	A tensile specimen made of CR-39 with material fringe value of 19.6 N/mm, 16 mm wide and 6 mm thick. In a experiment fringe orders 2, 2.5, 3 are observed, calculate load in each case ?	**7**
4.	a)	Explain shear difference method for separating principal stresses.	**6**
	b)	Explain Frozen stress method in three dimensional photoelasticity.	**7**
5.		With the help of neat sketch, describe passage of light through a circular polariscope with a stressed model and drive the condition for extinction of light for light field arrangement.	**14**

SECTION - B

6.	a)	Explain strain gauge construction of electrical wires ?	**5**
	b)	What is strain sensitivity ? Explain different strain sensitivities ?	**8**
7.	a)	What is strain rosette ? Explain different rosettes configurations in use ?	**5**
	b)	A strain gauge has gauge length of 20 mm and looped around to a radius of 0.3 mm. Calculate cross sensitivity factor. If gauge is used on steel for which $\epsilon_{yy} / \epsilon_{xx} = 0.3$, Calculate corrected gauge factor if prescribed gauge factor is 2.1 what will be gauge factor if $\epsilon_{yy} / \epsilon_{xx} = 0.8$?	**8**

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8. a) Explain Moire Fringe technique using geometrical approach. 6

b) A grating is given a slight rotation (θ) with respect to a second grating of same pitch. Moire fringe is formed making an angle (ϕ) with respect to a second grating. Both the gratings are of pitch 25 lines per mm. Determine the angle (θ) and inter fringe spacing (δ), if angle (ϕ) is equal to - 7

i) 50° and ii) 90°.

9. a) Explain crack patterns in brittle coating technique ? 5

b) In a brittle coating experiment coating stresses observed are 0.7 MPa and 0.88 MPa, assume for specimen E = 200 GPa, μ = 0.29 for coating E = 1.4 GPa, μ = 0.42. Determine stresses in specimen. 8

10. Write short notes on the followings. 14

i) Types of strain rosettes.

ii) Fixing of strain gauges.

iii) Types of brittle coatings.

iv) Potentiometer circuit.

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