B.E.(with Credits)-Regular-Semester 2012 - Mechanical Engineering Sem VIII
## ME8042 - Stress Analysis

P. Pages : 2                                                                                    **GUG/W/16/7116**

Time : Three Hours                    *4888*                                   Max. Marks :80

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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, Q. 9 Or Q. 10.
         3.  Due credit will be given to neatness and adequate dimensions.
         4.  Assume suitable data wherever necessary.
         5.  Illustrate your answers wherever necessary with the help of neat sketches.

1.      Derive the relations for stress components in case of simply supported beam subjected to       **16**
        uniformly distributed load, using the approach of stress function.

                                              **OR**

2.  a)  Derive the expressions of equilibrium for a two dimensional state of stress in a Cartesian      **10**
        coordinates.

    b)  Explain from the basic principles the concepts of equation of.                                    **6**
        i)   Equilibrium

        ii)  Boundary conditions.

        iii) Compatibility conditions.

3.  a)  Derive general equation of equilibrium in polar coordinate system.                              **16**

                                              **OR**

4.  a)  Derive the expression for stresses induced in a cylinder subjected to internal and external    **10**
        pressure, using the concept of stress function.

    b)  State the effect of circular hole on stresses in case of plate subjected to tensile load.          **6**

5.  a)  Describe the procedure for preparing a photoelastic model.                                        **4**

    b)  State and explain stress-optic law and derive the expression to calculate $\sigma_1 - \sigma_2$ for two      **8**
        dimensional photoelasticity.

    c)  State the various materials used for making photoelastic models. Explain various                   **4**
        properties in material should possess.

                                              **OR**

6.  a)  Why is it necessary to use the separation techniques in photoelasticity ? Explain any one         **9**
        technique in detail.

    b)  Discuss Tardy's method of compensation in detail.                                                 **7**

**7.** a) Derive the expression for bridge output when. **10**

   i) One arm of the bridge is sensitive to the strain.

   ii) Two arm of the bridge are sensitive to the strain.

   iii) Four arm of the bridge are sensitive to the strain.

   b) What do you mean by gauge factor of strain guages? Derive the relation for guage factor. **6**

**OR**

**8.** Write short notes on **any three.** **16**

   i) Stress Freezing oven.

   ii) Reflection polariscope.

   iii) Fringe multiplication. technique.

   iv) Fringe sharpening.

**9.** A rectangular rosettle is mounted on a steel specimen (E = 210 Gpa, $\mu$ =0.3). The guage **16**
readings taken were.
$\epsilon_A = 800\ \mu_\epsilon$  $\epsilon_B = 400\ \mu_\epsilon$  $\epsilon_C = -200\ \mu_\epsilon$ Find the principle stresses and principal
strain.

**OR**

**10** a) Explain Brittle coating method for stress and strain analysis. **8**

   b) Write short notes on **any two.** **8**

   i) Semiconductor strain gauges.

   ii) High temperature strain gauges.

   iii) Self temperature compensated guages.

   iv) Commercial strain indicators.

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