Registration no: | | | | | | | | | | |

Total Number of Pages: 2

M.TECH
MDPE 2009

2nd Sem MTech Regular/ Back Examination – 2015-16
Experimental Stress Analysis
BRANCH(S): Mechanical System Design
Time: 3 Hours
Max marks: 70
Q.CODE:T528

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 Answer the following questions: (2 x 10)

a) Write the principle of capacitive strain gauge.
b) How would you compensate temperature effect on strain gauge output?
c) What are the various elements in a circular polariscope?
d) Draw a potentiometer circuit with a strain gauge.
e) What is Tardy's method in photoelasticity?
f) What is a plane shear gauge?
g) Define isoentatics in brittle coating method.
h) Give various applications of photoelasticity.
i) State the law of failure of brittle coatings.
j) What are various methods to prepare grids on the test object?

Q2 a) Give the three dimensional stress-strain relations of an elastic body. (5)
b) If the principal stresses at any point in a body are 100MPa and 40 MPa and the principal stress direction is 30 degree. Find the normal and shear stresses acting on the body. (5)

Q3 a) Give briefly the operating principles of mechanical, optical, acoustic, pneumatic strain gauges. (5)
b) Define the gauge factor of a resistance strain gauge. What are the essential requirements of electrical resistance strain gauge? (5)

Q4 Explain the Wheatstone bridge circuit for measurement of strain from a strain gauge. Define the circuit sensitivity of the circuit with four strain gauges. What is meant by 4-arm and 2-arm circuits? (10)

Q5 a) Derive the stress-optic law and give some commonly used photoelastic materials. (5)
b) Differentiate between isoclinics (lines of slopes) and isochromatics (stress difference) in a plane-polariscope. Give output intensity. (5)

Q6 a) Describe any two methods of separation of principal stresses. (5)
b) Explain the method of stress-freezing for 3-D photoelastic analysis (5)

Q7 a) Give the principle of reflection photoelasticity and state its advantages. (5)
b) Explain briefly the various stages in brittle coating method. (5)

Q8 Write short notes on any *two* of the following (5 x 2)
a) Semi-conductor strain gauges
b) Strain gauges as load measurement transducers
c) Grid method for two dimensional strain measurement
d) Components of digital photoelasticity for stress fields