B. E. (Met. Eng.) Part III 6th Semester Examination, 2013

Sub: Material Properties Evaluation

(Code: MT- 604)

Time: 3 hrs | Full Marks: 70

Use **Single** answer script.
Answer any **Seven** questions.
Use your own words as far as practicable.

1. (a) What is DBTT? How do you determine the DBTT from impact test?
   (b) Why are notched specimens usually tested in impact tester?
   (c) How do grain size and cold working influence the impact properties in steel?

   4+2+4

2. State true or false and justify your comments: 10
   (a) Superplasticity occurs in the strain rate range of 10^2 to 10^4 s^{-1}.
   (b) Material is notch brittle when NSR is less than unity.
   (c) Slack quenching results in poorer tensile properties.

3. Distinguish between each of the following pairs: 10
   (a) Diffuse necking and localised necking
   (b) Izod and Charpy impact test
   (c) Strain hardening exponent and strain rate sensitivity

4. (a) What is compressive strength? How does L/D ratio influence the compressive strength?
   (b) Why brittle materials are usually tested under compression?
   (d) How does temperature influence the engineering stress-strain curves of mild steel?

   4+2+4

5. (a) Why very thin specimen should not be tested in Brinelll hardness test?
   (b) Why hardened steel specimens are usually tested in Izod impact tester?
   (c) State and explain Meyer's law on indentation hardness.

   3+2+5

Contd. to page 2

6. (a) Explain the functions of cleaners, emulsifiers and developers in liquid penetrant testing.
   (b) Explain why viscous liquid is not used as a penetrant.
   (c) Name the basic steps in correct sequence for conducting liquid penetrant test.

   2+5+3

7. (a) With reference to the magnetic particle testing, describe the methods used to detect defects in the following
   (i) Tubes
   (ii) Large rings
   (b) State the differences in detecting defects with DC and AC source.

   8+2

8. (a) Name the gamma ray sources commonly used for radiographic testing.
   (b) What are penetrameters? Explain their usefulness in radiographic testing.
   (c) Suggest and explain the radiographic imaging technique one should select for detecting defects in large diameter pipes.

   2+4+4

9. Explain how (i) fatigue cracks and (ii) slag entrapment in a component can be detected by using normal beam ultrasonic tests with A scan mode.

   5×2 = 10

10. Write brief notes on ***any three*** of the following. 10
   (a) Radiographic films
   (b) Test specimens for creep tests
   (c) Particles used in magnetic particle testing
   (d) Advantages and disadvantages of NDT methods
   (e) Borescope
   (f) Limitations of using radiographic imaging technique.