

B. E. (Met.) (Part - III) 6<sup>th</sup> Semester Examination - 2010  
SUB: MATERIAL PROPERTIES EVALUATION  
(MT - 604)

Time: 3 hrs

Full Marks: 70

Use single answer script.  
Answer any five questions.  
Use your own words as far as practicable.

- (a) What is fatigue?  
(b) How you present high cycle fatigue test data?  
(c) Distinguish between thermal fatigue and corrosion fatigue.  
(d) What do you mean by fatigue notch factor?  
2+5+4+3
- (a) What is creep?  
(b) Compare and contrast between creep test and stress rupture test.  
(c) What are the essential requirements of creep resistant materials?  
(d) Why creep fractures are usually intergranular?  
2+5+4+3
- (a) Compare and contrast between destructive and non destructive test.  
(b) State the principle of use of thermocolour in non destructive testing purpose.  
(c) Justify the potential of X-ray radiography for testing of casting defects.  
6+4+4
- (a) What do you mean by compressive strength? State the various factors which will influence the compressive strength of a material.  
(b) Explain why compressive strength is higher than the tensile strength of a material.  
(c) How is the shape of the creep curve affected by the applied stress and test temperature?  
(d) Why Mn:C ratio is kept 3:1 for a satisfactory notch toughness in steel?  
5+3+4+2
- (a) What is impact test? What is its importance?  
(b) State the various criteria to express the impact transition temperature.  
(c) How does the fatigue property of a material depend on its surface condition and residual stress?  
(d) Why are notched specimens usually tested in charpy impact tester?  
3+5+4+2
- (a) What is strain rate? How does the strain rate influence the stress-strain curve of a ductile metal?

(b) What do you mean by superplasticity? How do grain size, strain rate sensitivity and test temperature influence the superplastic behaviour of metals and alloys?

(c) Distinguish between yield ratio and notch strength ratio.

5+5+4

(a) State the principle of Poldi hardness test. Suggest its application.

(b) Mention the use of microhardness test in materials research purpose.

(c) What are the various Rockwell superficial hardness scales?

(d) How does the property of age hardenable aluminium alloy change as a result of cyclic loading?

5+4+3+2

Distinguish between each of the following pair.

3<sup>1/2</sup> × 4

(a) Continuous and residual magnaflux test

(b) Wood's and Orowan's concept

(c) Primary and secondary creep

(d) Sonic and ultrasonic test