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Total number of printed pages – 2

B. Tech
PCMT 4304

Sixth Semester Regular Examination – 2014

MECHANICAL WORKING AND TESTING OF MATERIALS

BRANCH(S) : MM, MME

QUESTION CODE : F 244

Full Marks – 70

Time : 3 Hours

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



1. Answer the following questions :

2 × 10

- (a) Define the term “troptometer”.
- (b) Explain angle of bite.
- (c) What are the different types of indentations frequently observed with a pyramid indenter ?
- (d) Define Meyer’s law.
- (e) State the advantages of indirect extrusion over direct extrusion.
- (f) State the relationship between hardness and flow curve.
- (g) What is patenting ?
- (h) How does an increasing mean stress influence the allowable alternating stress and fatigue limit ?
- (i) How does fracture stress and mode of fracture vary with specimen thickness ?
- (j) Based on the basic structural changes that occur when a metal is subjected to cyclic stress what are the different stages of the fatigue process ?

P.T.O.

2. (a) Discuss briefly about the types of rolling mills with sketches. 5
(b) Describe the different types of rolling defects and explain their causes. 5
3. (a) Discuss the basic factors that can contribute to brittle-cleavage fracture. 5
(b) Differentiate the Charpy impact test and Izod impact test. 5
4. Describe the torsion test and express the following properties:
(a) Twisting moment of solid bar.
(b) Shear stress of solid bar.
(c) Maximum shear stress for cylindrical specimen. 10
5. (a) Discuss the scope and significance of non-destructive testing. 5
(b) Write the principle, specifications and limitations of liquid penetrant test. 5
6. (a) Explain low cycle fatigue and the Coffin-Manson relation. 5
(b) Explain cyclic strain control fatigue and the response of metals to cyclic strain cycle. Explain the cyclic stress-strain curve. 5
7. (a) Distinguish between stress intensity factor and fracture toughness. Explain fracture toughness and the design tradeoff that is inherent in fracture mechanics design through suitable sketches. 5
(b) Draw a typical creep curve and explain the various stages. 5
8. (a) Derive the expression for the maximum draft (Δh_{\max}) that can be taken in rolling. 5
(b) Differentiate between hot rolling and cold rolling. 5

