Registration No. : | | | | | | | | | | |

Total number of printed pages – 3

B. Tech

PCME4203

Third Semester Examination – 2013

INTRODUCTION TO PHYSICAL METALLURGY AND ENGINEERING MATERIALS

BRANCH : MANUTECH, MANUFACT, ATUO, MECH

QUESTION CODE : C- 495

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 unit cell.

(b) What is coordination number in crystal structure ?

(c) Write the difference between ductile fracture and brittle fracture.

(d) What is the creep in metallic material ?

(e) Define recrystallization temperature.

(f) What is season cracking ?

(g) What causes the decrease in hardness during tempering of plain-carbon steel ?

P.T.O.

(h) Distinguish between hardness and hardenability of steel.

(i) What are the advantages of composites over conventional materials ?

(j) Explain why carburising is done on low carbon steel.

2. (a) What is a solid solution and discuss the difference between substitution and interstitial solid solution ? 5

(b) Explain phase transformation. 5

3. (a) Aluminium has F. C. C. structure, its density is 2700 kg/m^3 calculate the unit cell dimension and atomic diameter. Atomic weight of aluminium is 26.98. 6

(b) Draw the following planes and directions in a F. C. C. structure (112) and (001). 4

4. (a) What is fatigue ? Draw the S-N curve for ferrous material. 5

(b) Explain critical resolve shear stress. 5

5. (a) Draw and explain the TTT diagram for 0.4% carbon steel. 5

(b) Define the term heat treatment. Why the steels are heat treated ? 5

6. (a) Distinguish between role of tin and zinc as protective coating. 5

(b) Specify the material used for aircraft plane with reasons. 5

7. (a) Explain briefly how continuous-glass fibers are made ? What is the difference between fiber and a whisker ? 5

(b) What is sintering process ? What occurs to the ceramic particles during sintering ? 5

8. Write short notes on the following : 2.5 × 4

(a) Self- lubricating bearing rings

(b) Strain hardening

(c) Gibb's phase rule

(d) Age hardening.