GANPAT UNIVERSITY

B.TECH SEM. V MECHANICAL & MECHATRONICS ENGINEERING

CBCS REGULAR EXAMINATION NOV-DEC -2012

2ME501 MATERIAL TECHNOLOGY

TIME:-3 HOURS **TOTAL MARKS-70**

INSTRUCTION: - (1) Attempt all questions.

(2) Assume suitable data if necessary.

(3) Figures to the right indicate full marks.

Section-I

Que.-1 **12**

(a) Draw a neat sketch of Iron-Iron carbide equilibrium diagram along with phases presents.

(b) Explain solidification characteristics of 0.4%C and 1.2% C from liquid condition to room temperature.

(c) Find relative amount of ferrite and pearlite for 0.2%C, 0.4%C and 0.6% C at room temperature.

Que.-2 **11**

(a) What is heat treatment? Differentiate between full annealing and isothermal annealing process along with objectives of annealing process.

(b) What is diffusion annealing? Why diffusion annealing is followed by full annealing or process annealing?

(c) Why hardening process is always followed by tempering process?

OR

Que.-2 **11**

(a) How to construct T.T.T. diagram? Explain significance of T.T.T. diagram on heat treatment of steel.

(b) Explain austempering & martempering process in detail.

(c) What is critical cooling rate? Explain factors affecting C.C.R.

Que.-3 **12**

(a) Differentiate between gray & white cast iron with respect to its microstructure, properties and application.

(b) What is case hardening process? Explain pack carburizing process along with its area of application.

(c) Write short note on: "Induction hardening"

OR

Que.-3 (a) Explain factors governing substitution solid solubility. Differentiate between **12**

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substitutional and interstial solid solution

(b) Explain allotropic transformation of pure iron.

(c) Explain phase diagram of binary eutectic system having complete insolubility of two elements in solid state.

(d) Explain effects of following alloy elements on properties of steel:

(i) Chromium (ii) Manganese (iii) Nickel

Section-II

Que.-4 12

(a) Define powder metallurgy. Explain each step in powder metallurgy with example.

(b) Discuss the advantages, limitations and applications of powder metallurgy.

(c) Explain the Magnetic Particle inspection test in detail.

OR

Que.-4 12

(a) Explain in detail briquetting or die compaction process with suitable example.

(b) Discuss importance of pre-sintering and sintering operation.

(c) Enlist the various Non-Destructive Test. Also discuss its application and limitation.

Que.-5 11

(a) What is corrosion? Enlist corrosion prevention techniques and discuss any one of them.

(b) Explain Stress and Crevice corrosion with suitable example.

(c) Define the following terms:

(i) Crystal structure (ii) Unit cell (iii) Atomic Radius

OR

Que.-5 11

(a) Explain the Oxygen absorption mechanism with suitable example.

(b) Enlist classification of composite material. Enlist the function of matrix in composite.

(c) Describe about the APF. Find out the APF value for FCC structure.

Que.-6 **Write short notes on any three of the following:** 12

(a) Aluminum and its alloys

(b) Rubber

(c) Refractory material

(d) Ceramic Material

END OF PAPER

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