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Question Paper Code : 72144

B.E/B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016.

Fourth Semester

Mechanical Engineering

ME 6403 – ENGINEERING MATERIALS AND METALLURGY

(Common to Mechanical, Automobile Engineering and Automation Engineering)

(Regulation 2013)

Time: Three hours

Maximum: 100 marks

Answer ALL questions.

PART – A (10 x 2= 20 marks)

1. State Gibb's phase rule.
2. Give the typical eutectic and eutectoid reactions.
3. What is austempering?
4. Name any two shallow hardening processes.
5. Give the effects of silicon on steel.
6. What are bearing alloys? Give an example.
7. What is polymerization?
8. State the advantages of fiber reinforced composites.
9. List the application of engineering ceramics.
10. Distinguish between elasticity and plasticity.

Part – B (5 x 16 = 80 marks)

11. (a) Explain with a neat sketch of iron-iron carbide equilibrium diagram and indicate all the phases. Also write the three important invariant reactions. **(16)**
(Or)
(b) Explain the various classification of steels and cast iron with micro structure, properties and application. **(16)**

12. (a) What is hardenability? How is Jominy end quench test used to measure hardenability? (16)

(Or)

(b) Explain TTT diagram with neat sketch and indicate all the phases with microstructure. (16)

13. (a) Discuss the properties and the application of the following:

i. Tools steels (08)

ii. HSLA (08)

(Or)

(b) Explain age hardening of Al-Cu with the help of phase diagram. (16)

14. (a) What is polymerization? Explain addition polymerization and condensation polymerization with examples. (16)

(Or)

(b) What is strengthening mechanism? Explain the Strengthening mechanism of fiber-reinforced composites. (16)

15. (a) Define and Explain Brinell and Rockwell hardness with neat sketches. (16)

(Or)

(b) Explain the mechanism of plastic deformation by slip and twinning with neat sketches. (16)