

Reg. No.

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B.E. / B.TECH. DEGREE EXAMINATIONS, DEC 2019

Third Semester

ME16303 – ENGINEERING MATERIALS AND METALLURGY*(Common to AE and ME)***(Regulation 2016)****Time: Three Hours****Maximum : 100 Marks**Answer **ALL** questions**PART A - (10 X 2 = 20 Marks)**

	CO	RBT
1. State Hume's Rothery rule governing the substitutional solid solution.	1	R
2. Define eutectic and eutectoid reactions of steel.	1	U
3. Distinguish the hardening and hardenability.	2	U
4. List any four case hardening techniques applied for steel.	2	R
5. What is HSLA? Mention percentage of carbon present in it.	3	R
6. Differentiate brass and bronze.	3	U
7. Define the term polymerization and state its types.	4	R
8. Write the unique properties of ceramics.	4	U
9. Define the term hardness and write its significance.	5	U
10. How the creep failure occur in metallic materials.	5	AP

PART B - (5 X16 = 80 Marks)

11. (a) (i) Discuss the classification of steels and cast irons with appropriate flow chart. **(8)** **1** **U**
- (ii) Draw the phase diagram of binary isomorphous system with suitable example. **(8)** **1** **U**
- (OR)**
- (b) (i) Draw Iron Carbide diagram and explain the invariant reactions and phases. **(16)** **1** **U**

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|-------------|-----|------|--|-------------|----------|-----------|
| 12. | (a) | (i) | Define the term annealing. Discuss the different types of annealing process with suitable phase diagram. | (12) | 3 | AP |
| | | (ii) | Distinguish Austempering and Martempering. | (4) | 3 | AP |
| (OR) | | | | | | |
| | (b) | (i) | Describe the Jominey End Quench test in details for determination of hardenability. | (10) | 3 | AP |
| | | (ii) | Explain the pack carburizing method with neat diagram. | (6) | 3 | AP |
| 13. | (a) | (i) | Describe the different types of stainless steels with respect to composition, properties and applications. | (12) | 3 | U |
| | | (ii) | Write short notes on Bearing alloys. | (4) | 3 | U |
| (OR) | | | | | | |
| | (b) | (i) | Discuss the processing method, composition, properties and applications of Maraging steel. | (6) | 3 | U |
| | | (ii) | Discuss the steps and the mechanism of precipitation hardening of Al-Cu alloy. | (10) | 3 | U |
| 14. | (a) | (i) | Explain the addition and condensation polymerization method with suitable example. | (8) | 4 | U |
| | | (ii) | Write the properties and applications of the following polymers,
(I) PMMA, (II) PP, (III) ABS (IV) PTFE | (8) | 4 | U |
| (OR) | | | | | | |
| | (b) | (i) | Discuss the properties and applications of the any three engineering ceramics. | (12) | 4 | U |
| | | (ii) | Write short notes on FRP. | (4) | 4 | U |
| 15. | (a) | (i) | Explain the Brinell and Vickers hardness testing methods with neat diagrams. | (12) | 5 | AP |
| | | (ii) | Distinguish slip and twinning deformation mechanisms. | (4) | 5 | U |
| (OR) | | | | | | |
| | (b) | (i) | Explain the fatigue testing method with suitable diagram. | (12) | 5 | AP |
| | | (ii) | Distinguish the Brittle and Ductile fracture. | (4) | 5 | U |