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| **SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR**  sietklogo(Approved by AICTE, New Delhi & Affiliated to JNTUA, Anantapuramu)  (Accredited by NAAC with ‘A’ Grade)  (An ISO 9001:2008 Certified Institution)  Siddharth Nagar, Narayanavanam Road, PUTTUR-517 583  **QUESTION BANK**  **Subject with Code: Materials Engineering Course & Branch: B. Tech - ME Year &Sem : I-B. Tech &II-Sem Regulation: R18** |

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|  |  | **UNIT - I** |  |
| **1** |  | What are the Mechanical and Technological Properties of Engineering Materials? | **(10M)** |
| **2** |  | Explain the effect of grain boundaries on the properties of alloys, also determine the grain size. | **(10M)** |
| **3** | (a) | What is Hume Rothery, s rules? Discuss in detail | **(5M)** |
|  | (b) | Explain crystal imperfections | **(5M)** |
| **4** |  | What are the various types of solid solutions? Explain with examples. | **(10M)** |
| **5** |  | What is the Necessity of alloying? | **(10M)** |
| **6** |  | Draw a neat sketch of HCP and Simple cubic crystal structure and calculate its packing factor, coordinate number | **(10M)** |
| **7** |  | What is Material science and metallurgy? Explain the Types of Bonds in solids with neat sketches | **(10M)** |
| **8** | (a) | Draw a neat sketch of FCC crystal structure and calculate its packing factor, coordinate number | **(5M)** |
|  | (b) | Draw a neat sketch of BCC crystal structure and calculate its packing factor, coordinate number | **(5M)** |
| **9** |  | What are the various types of solid solutions? Explain with neat sketch. | **(10M)** |
| **10** | (a) | Give a brief note on intermediate alloy phases | **(5M)** |
|  | (b) | Explain the Electron compound? | **(5M)** |

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|  |  | **UNIT - II** |  |
| **1** | (a) | What is Phase? What are different types of phase diagram? | **(3M)** |
|  | (b) | Define invariant reactions in phase Diagram with an examples. | **(7M)** |
| **2** |  | What are the eutectoid and eutectic reactions in Cu-Ni & Al-Cu binary phase diagram. | **(10M)** |
| **3** |  | Write the peritectic ,eutectic and eutectoid reaction of Fe-Fe3c phase diagram. | **(10M)** |
| **4** | (a) | Explain the phase transformation in solid state | **(5M)** |
|  | (b) | Draw the allotropy of iron and their properties. | **(5M)** |
| **5** |  | Draw the Fe-Fe3 c equilibrium diagram and label all the points, lines and areas. Explain its important features. | **(10M)** |
| **6** | (a) | Draw the Eutectoid system diagram | **(3M)** |
|  | (b) | Explain and Draw the Equilibrium cooling and heating of pure metals/alloys system. | **(7M)** |
| **7** | (a) | Draw an equilibrium diagram for an isomorphism system | **(5M)** |
|  | (b) | Explain An isomorphism system of your choice to scale and label all the points and its important features | **(5M)** |
| **8** |  | Draw the Eutectoid system diagram and label all points, lines and areas. Explain its important features. | **(10M)** |
| **9** |  | Explain Lever rule with tie line? | **(10M)** |
| **10** |  | Draw and explain the Fe-Fe3c phase diagram invariant reactions? | **(10M)** |

**UNIT-III**

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|  |  | Explain the structure and properties of white cast iron | (10M) |
|  |  | Explain the structure and properties of Copper and its alloys? | (10M) |
|  |  | Explain the structure and properties of Grey cast iron? | (10M) |
|  | (a) | What is steel? What are the classifications of the steels? | (5M) |
|  | (b) | Explain the structure and properties of Spheriodal graphite cast iron? | (5M) |
|  | (a) | What is Effect of alloying elements on Iron – Iron carbon system? | (5M) |
|  | (b) | Write Classification of Steels | (5M) |
|  |  | Explain the structure and properties of Aluminum and its alloys? | (10M) |
|  |  | Explain the structure and properties of Titanium and its alloys? | (10M) |
|  | (a) | Explain the structure and properties of malleable cast iron | (5M) |
|  | (b) | Explain the structure and properties of Ductile cast iron | (5M) |
|  |  | Explain the structure and properties of below steel  i) Hadfield manganese steels ii) tool and die steels | (10M) |
|  | (a) | Explain briefly on Carbon Steel | (5M) |
|  | (b) | Write a notes on Low alloy Steel | (5M) |

**UNIT-IV**

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|  |  | Write about Annealing, normalizing, Hardening. Draw and explain the structures. | (10M) |
|  | (a) | Explain the toughness .How it is measured and explain their types? | (5M) |
|  | (b) | Explain the Hardness. How it is measured and explain their types? | (5M) |
|  |  | Explain the below  i) surface - hardening methods ii) Age hardening Treatment | (10M) |
|  | (a) | Discus in details about heat treatment process of plastic | (5M) |
|  | (b) | What is cryogenic treatment? How is it done for the alloys? | (5M) |
|  |  | What are TTT diagrams? How they prepared? What is their significance? | (10M) |
|  | (a) | What is the purpose of using normalizing, Annealing and Hardening? | (5M) |
|  | (b) | Explain about various Hardening process use for alloys? | (5M) |
|  |  | What is Fracture Mechanism. Explain the mechanical properties of materials and Fracture | (10M) |
|  |  | Explain the below  i) Tempering ii) Hardenability | (10M) |
|  |  | Explain mechanical property of strength tests(Tensile, compression, shear ) | (10M) |
|  |  | What are heat treatment processes? Explain briefly. | (10M) |

**UNIT-V**

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|  | (a) | Enumerate the difference between the particle and Reinforced composites. | (5M) |
|  | (b) | What is ceramic material? Explain crystalline ceramics | (5M) |
|  | (a) | What are glasses? How they manufacture? | (5M) |
|  | (b) | Discuss about the Glass micro structure and properties. | (5M) |
|  |  | What are the various methods of component manufacture of composites? | (10M) |
|  |  | Why are fiber glass reinforced composites used extensively? | (10M) |
|  |  | What is composite material? How is it classified? Give a short notes. | (10M) |
|  |  | Explain the Ceramic matrix composite. Discuss about their properties. | (10M) |
|  |  | Explain Metal matrix composite. Discuss about their properties. | (10M) |
|  |  | Explain carbon – carbon composites. Discuss about their properties. | (10M) |
|  | (a) | What are cermets? what are their properties? | (5M) |
|  | (b) | How the cermets manufactured? Give Examples | (5M) |
|  |  | What is the polymer? Explain the polymer matrix composite | (10M) |