Model Question Paper

Total Duration (H:M):3:00

Course: Materials Science and Technology(BMET-302)

Maximum Marks: 100

Q.No	Questions	Marks	CO	BL
1a	Write about the various types of cast iron in terms of composition and properties.	**6**	**CO1**	**L3**
1b	Classify crystalline imperfections. Explain the difference between Frenkel and schottky defects with neat diagrams.	**6**	**CO1**	**L3**
1c	Explain Annealing and Normalizing processes for hypo and hyper eutectoid steels.	**8**	**CO2**	**L2**
2a	Explain rotating beam method for fatigue test with neat diagram and also explain S-N curve.	**6**	**CO3**	**L3**
2b	How are extrinsic semiconductors different from intrinsic semiconductors? Also give classification of extrinsic semiconductors.	**6**	**CO4**	**L3**
2c	Draw Iron carbon diagram neatly showing importanttransformations and write all the invariant reactions.	**8**	**CO2**	**L3**
3a	Explain composition, properties and applications of i) Phosphor bronze ii) Duralumin iii) Monel metal and iv) Invar	**6**	**CO3**	**L3**
3b	For an FCC unit cell, find the relationship between the length of the side 'a' of the FCC unit cell and the radius of its atoms, and also find the atomic packing factor of FCC lattice.	**6**	**CO1**	**L3**
3c	What are plastics? Write the differences between Thermoplastic and Thermosetting polymer.	**8**	**CO5**	**L3**
4a	A sample of BCC iron was placed in an X-ray diffractometer (XRD) using incoming X-rays with a wavelength $\lambda = 0.1541$ nm. Diffraction from the {110} planes was obtained at $2\theta = 44.70°$. Calculate a value for the lattice constant 'a' of BCC iron. (Assume first-order diffraction with n = 1).	**6**	**CO1**	**L3**
4b	How is the hardness of a material determined by a hardness testing machine? What are the different types of hardness tests? Explain them.	**8**	**CO2**	**L3**
4c	Briefly describe the "Meissner effect" with a neat schematic.	**6**	**CO4**	**L3**
5a	What are different Non-destructive tests (NDT)? Write about any **three** of them in brief with suitable diagrams.	**10**	**CO3**	**L2**
5b	Differentiate between paramagnetic, ferromagnetic, and diamagnetic materials with neat diagrams. Also explain hysteresis curve with neat diagram.	**10**	**CO4**	**L3**
6a	Define composites and classify them. Explain polymer matrix composite and ceramic matrix composite.	**10**	**CO5**	**L3**
6b	Derive the microscopic form of ohm's law in terms of conductivity, current density and applied electric field. What are differences between electrical conductivity of conductors, insulators and semi-conductors in term of energy band theory?	**10**	**CO4**	**L4**