



CBCS SCHEME

BME303

USN

Third Semester B.E./B.Tech Degree Examination, Dec.2023/Jan.2024 Material Science and Engineering

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks, L: Bloom's level, C: Course outcomes.*

Module - 1			M	L	C
Q.1	a.	Calculate the APF for FCC and BCC unit cell in crystal structure.	10	L3	CO1
	b.	Enumerate the type of crystal imperfections and explain briefly with a suitable sketch grain boundary and twin boundary defects.	10	L2	CO1
OR					
Q.2	a.	Explain briefly with suitable sketches the plastic deformation by Slip and Twinning.	10	L2	CO1
	b.	Define the following terms : i) Unit cell and space lattice ii) Coordination number.	5	L2	CO1
	c.	Molybdenum has BCC and a density of $10.2 \times 10^3 \text{ kg/m}^3$. Calculate its atomic radius. The atomic weight of molybdenum is 95.94gm/mol. $N_A = 6.023 \times 10^{23}$ atoms/mol.	5	L3	CO1
Module - 2					
Q.3	a.	Draw neatly the solid solution binary phase diagram of a Ni-Cu system and explain briefly.	10	L2	CO2
	b.	State and explain briefly the Fick's 1 st and 2 nd law of diffusion.	10	L2	CO2
OR					
Q.4	a.	Explain briefly with a neat sketch the eutectic system of two components completely soluble in liquid state and partially soluble in solid state.	08	L2	CO2
	b.	Draw a neat sketch of iron-carbon equilibrium diagram and show all phases on the diagram also show the three invariant reactions.	12	L2	CO2
Module - 3					
Q.5	a.	Explain briefly mechanism of solidification with suitable sketches.	10	L2	CO3
	b.	With a suitable sketch explain normalizing heat treatment process.	10	L2	CO3
OR					
Q.6	a.	Draw a neat labeled Time-Temperature Transformation [TTT] diagram for Eutectoid steel (0.8%C) and explain briefly.	10	L3	CO3
	b.	With a neat sketch briefly explain Austempering and Martempering heat treatment process.	10	L2	CO3
Module - 4					
Q.7	a.	With a flow chart, explain briefly the powder metallurgy process and its applications.	10	L2	CO4
	b.	Enumerate the different powder production methods, with suitable sketch explain atomization method.	10	L2	CO4
OR					
Q.8	a.	Explain briefly thermal spray coating with suitable sketch. Mention the advantages of surface coatings and treatments.	10	L2	CO4
	b.	Advantages and limitations of powder metallurgy process.	10	L2	CO4