

## Third Semester B.E. Degree Examinations, March/April 2024

### Material Science and Engineering (BME303)

#### Model Question Paper

Time; 3 hours

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.

2. M; Marks, BL; Bloom's level, CO; Course outcomes.

Module-1			M	BL	CO
Q.1	a.	Calculate the APF for FCC and BCC unit cell in crystal structure.	10	L3	CO1
	b.	Define Atomic bonding mention the types and <b>explain</b> them briefly.	10	L2	CO1
<b>OR</b>					
Q.2	a.	Enumerate the type of crystal imperfections and <b>explain</b> briefly with a suitable sketch Grain boundary and Twin boundary defects.	10	L2	CO1
	b.	<b>Explain</b> Briefly the plastic deformation by Slip and Twinning with a suitable sketch.	10	L2	CO1
<b>Module-2</b>					
Q.3	a.	Draw neatly the Solid Solution Binary Phase Diagram of a Ni-Cu System and Explain briefly.	10	L3	CO2
	b.	State and <b>explain</b> fick's 1 <sup>st</sup> and 2 <sup>nd</sup> law of diffusion. Also Discuss the factors that affect diffusion.	10	L2	CO2
<b>OR</b>					
Q.4	a.	<b>Draw</b> the phase diagram which indicating two metals are completely soluble in liquid state and partially soluble in solid state.	10	L3	CO2
	b.	<b>Draw</b> the iron-Carbon equilibrium diagram and label various phases present in it, also write the three invariant reactions occurring in the diagram, indicating the temperature and composition.	10	L3	CO2
<b>Module-3</b>					
Q.5	a.	<b>Draw</b> neatly a labeled TTT diagram for eutectoid steel (0.8%C) and explain briefly the different microstructures obtained at various cooling rates.	10	L3	CO3
	b.	Briefly <b>explain</b> the Mechanism of Solidification in metals with suitable sketch.	10	L2	CO3
<b>OR</b>					
Q.6	a.	Briefly <b>explain</b> with a neat sketch the normalizing heat treatment process.	10	L2	CO3

	<b>b.</b>	With <b>neat sketches explain</b> Austempering and Martempering heat treatment Processes.	<b>10</b>	<b>L3</b>	<b>CO3</b>
<b>Module-4</b>					
<b>Q.7</b>	<b>a.</b>	With a neat flow chart, briefly <b>explain</b> the Powder Metallurgy process and its applications.	<b>10</b>	<b>L2</b>	<b>CO4</b>
	<b>b.</b>	Enumerate the different Powder Production methods. With suitable sketch briefly <b>explain</b> the Atomization method.	<b>10</b>	<b>L2</b>	<b>CO4</b>
<b>OR</b>					
<b>Q.8</b>	<b>a.</b>	With a suitable sketch briefly <b>explain</b> the Physical Vapour Deposition technique.	<b>10</b>	<b>L2</b>	<b>CO4</b>
	<b>b.</b>	With a <b>schematic diagram</b> briefly <b>explain</b> the High Velocity Oxy-fuel Coating (HVOF) process.	<b>10</b>	<b>L3</b>	<b>CO4</b>
<b>Module-5</b>					
<b>Q.9</b>	<b>a.</b>	With a neat sketch <b>explain</b> the production of composite by: (1) Filament winding process (ii) Bag molding process.	<b>10</b>	<b>L2</b>	<b>CO5</b>
	<b>b.</b>	Enumerate the types of Cast iron and <b>mention their compositions</b> , properties and applications.	<b>10</b>	<b>L3</b>	<b>CO5</b>
<b>OR</b>					
<b>Q.10</b>	<b>a.</b>	Briefly <b>explain</b> about the material selection charts and <b>show the materials selection chart</b> for Young's modulus (stiffness) and Density.	<b>10</b>	<b>L3</b>	<b>CO5</b>
	<b>b.</b>	What are the factors affecting the selection of materials explain briefly.	<b>10</b>	<b>L2</b>	<b>CO5</b>