BT MRE-IV(R/S)-06-24-3241 Reg. No. | | | | | | | | |

B

B.Tech. Degree IV Semester Regular/Supplementary Examination in Marine Engineering June 2024

19-208-0403 METALLURGY AND MATERIAL SCIENCE
(2019 Scheme)

Time: 3 Hours Maximum Marks: 60

Course Outcome
On successful completion of the course, the students will be able to:

CO1: Understand the crystal structure of metal, defects occurring in crystals of metals and the process of solidification of metals under slow and fast cooling
CO2: Understand the phase rule, phase diagrams, solid solutions, examples of binary solid solutions and to understand the mechanism of corrosion and its prevention methods.
CO3: Understand about different heat treatment methods and different metals and alloys
CO4: Gain knowledge about the phenomena of failure occurring in metals
CO5: Learn about the different destructive and non-destructive tests and the different metals used on board
Bloom's Taxonomy Levels (BL): L1 – Remember, L2 – Understand, L3 – Apply, L4 –Analyze, L5 – Evaluate, L6 – Create
PI – Programme Indicators

(Answer *ALL* questions) (5 × 15 = 75)

			Marks	BL	CO	PI
I.	(a)	Find atomic packing factor of Simple Cubic, Body Centered Cubic and Face Centered Cubic structures.	7	L2	1	1
	(b)	Explain the following crystal imperfections: (i) Point defect (ii) Line defect (iii) Edge dislocation (iv) Screw dislocation	8	L1	1	1
		OR				
II.	(a)	What is Polymorphism? Explain with example.	6	L1	1	1
	(b)	What are Millar indices? Sketch the following planes of cube: (i) [110] (ii) [100] (iii) [111]	5	L2	1	1
	(c)	Differentiate between homogeneous and heterogeneous nucleation in solidification of metals.	4	L3	1	1
III.	(a)	Explain Gibb's Phase rule.	3	L1	2	1
	(b)	Sketch Iron–Carbon diagram show all regions, composition and temperature.	6	L3	2	1
	(c)	Write notes on the following reactions: (i) Eutectic (ii) Paratactic (iii) Eutectoid.	6	L1	2	1
		OR				

(P.T.O.)

			Marks	BL	CO	PI
IV.	(a)	What are the factors influencing corrosion?	3	L2	2	1
	(b)	What are the possible methods to prevent or control corrosion?	6	L2	2	1
	(c)	Write note on:	6	L2	2	1
		(i) Marine coating				
		(ii) Cathode protection				
		(iii) Corrosion resist material for propellers, heat exchangers and hull.				
V.	(a)	Explain TTT diagram in detail, what is its use?	10	L3	3	1
	(b)	What is Jomini Test, how it is done?	5	L2	3	1
		OR				
VI.	(a)	Prepare a flow chart for the production of iron and steel, starting from Blast furnace and production of Pig iron.	10	L1	3	1
	(b)	Write composition, properties and use of Brass, Bronz and Y– Alloy.	5	L2	3	1
VII.	(a)	What is work hardening how it happens?	5	L1	4	1
	(b)	Differentiate between cold working and hot working. Explain merits and demerits of both.	10	L3	4	1
		OR				
VIII.	(a)	Explain mechanism of Creep.	5	L1	4	1
	(b)	Write brief notes on:	10	L1	4	1
		(i) Griffith's Theory				
		(ii) Fatigue failure and S N Curve.				
IX.	(a)	How hardness test is conducted?	5	L2	5	1
	(b)	Explain various types of NDT.	10	L1	5	1
		OR				
X.	(a)	Write material composition, Strength value and properties of materials used for making (i) Rudder (ii) Propeller.	5	L3	5	1
	(b)	Briefly describe application of the following materials in Ship board:	10	L2	5	1
		(i) Chromium				
		(ii) Ceramic				
		(iii) Titanium.				

Bloom's Taxonomy Levels
L1 - 42%, L2 - 35%, L3 - 23%.

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