Enrolment No/Seat No.: _____

R.N.G.PATEL INSTITUTE OF TECHNOLOGY-RNGPIT

(An Autonomous Institute U/s UGC Act 1956)

B.Voc. SEMESTER-II, SEMESTER END EXAMINATION – WINTER 2025

SUBJECT CODE: 1PT203 **DATE: 05-01-2026**

SUBJECT NAME: MATERIAL SCIENCE AND METALLURGY

TIME: 11:00 AM to 12:00 PM **TOTAL MARKS: 50**

Instructions

1. It is **compulsory** for students to write **Enrolment No. /Seat No.** on the question paper.
2. Attempt all questions in the question paper.
3. The figures to the right of each question indicate full marks. Make suitable assumptions with proper justification wherever required.
4. Simple, non-programmable scientific calculators are permitted.
5. BL - Cognitive Level (As per Revised Bloom's Taxonomy) (R-Remember, U-Understanding, A –Application, N –Analyze, E – Evaluate, C -Create), CO - Course Outcomes.

			Marks	BL	CO
Q.1	**(a)**	Give selection criteria of material for engineering applications.	**05**	**U**	**1**
	(b)	Give Classification of plain carbon steel.	**05**	**R**	**3**
Q.2	**(a)**	Explain Edge dislocation and screw dislocation with neat sketch.	**05**	**U**	**2**
	(b)	Explain a atomic packing factor and calculate the APF for BCC and FCC structures.	**05**	**U**	**2**
		OR			
Q.2	**(a)**	Explain homogeneous and heterogeneous nucleation process with neat sketch.	**05**	**U**	**2**
	(b)	Write a Hume Rothery's rules for Substitutional Solid solution formation.	**05**	**R**	**2**
Q.3	**(a)**	Write the various types of Cast iron and explain any one.	**05**	**U**	**3**
	(b)	Write the effect of following alloying elements on the properties of steel: (1) Chromium (2) Molybdenum (3) Vanadium (4) Tungsten (5) Tungsten.	**05**	**R**	**3**
		OR			
Q.3	**(a)**	Distinguish between hypo-eutectoid and hyper-eutectoid steel.	**05**	**R**	**3**
	(b)	Distinguish between hypo-eutectic and hyper-eutectic steel.	**05**	**R**	**3**

Q.4	**(a)**	Draw iron- carbon diagram and mention all major elements.	**05**	**R**	**4**
	(b)	Explain with a neat sketch Time-Temperature-Transformation (TTT).	**05**	**U**	**4**

OR

Q.4	**(a)**	Define Heat Treatment and classify heat treatment processes.	**05**	**R**	**4**
	(b)	Differentiate between annealing and normalizing.	**05**	**R**	**4**
Q.5	**(a)**	What is the main objectives of NDT method?	**05**	**R**	**5**
	(b)	Describe Liquid Penetrant Testing (LPT) method and state their advantages and Limitations.	**05**	**U**	**5**

OR

Q.5	**(a)**	Explain in detail Magnetic Particle Testing (MPT) method along with its advantages, disadvantages.	**05**	**U**	**5**
	(b)	Describe Ultrasonic Testing (UT) method and mention its advantages and Limitations.	**05**	**U**	**5**

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