

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2023****Subject Code:3172116****Date:16-12-2023****Subject Name: Welding Metallurgy****Time: 10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) Define (1) Preheating (2) Post heating (3) Inter pass temperature	03
	(b) Explain the effect of carbon content on weldability	04
	(c) Explain the CCT diagram of eutectoid steel using different cooling rate	07
Q.2	(a) Differentiate gas metal and slag metal reactions.	03
	(b) Evaluate” DCEN polarity gives higher depth of penetration compared to DCEP polarity during SMAW process”	04
	(c) Discuss the effect of heat input on weld pool shape with diagram.	07
	OR	
	(c) Discuss the significance of carbon equivalent, pre heat and post heat during the welding of carbon steel.	07
Q.3	(a) Explain sensitization problem during welding and possible solution to prevent it.	03
	(b) Explain the effect of arc length on arc voltage and weld bead width.	04
	(c) Explain various gas metal and slag metal reactions occurring during welding	07
	OR	
Q.3	(a) Classify different stainless steel based on microstructure.	03
	(b) Explain the effect of weld current and torch speed on weld bead geometry with schematic diagram	04
	(c) Explain Schaeffler diagram	07
Q.4	(a) List out the assumption to derive Rosenthal’s equation	03
	(b) Explain contribution of alloying elements in precipitation hardening in PH steel.	04
	(c) Explain the different methods to avoid solidification cracking in Al alloy welding	07
	OR	
Q.4	(a) Explain isothermal cycle.	03
	(b) How the solidification cracking prevented in austenitic stainless steel?	04
	(c) Explain the hot cracking and cold cracking and remedial measure to prevent it.	07
Q.5	(a) Draw the schematic of following defects- porosity, slag inclusion and lack of penetration.	03
	(b) Discuss the TCP phase formation in nickel-based alloy and discuss the possible solution to control it.	04
	(c) Discuss any one weldability test procedure in detail	07
	OR	
Q.5	(a) Explain significance of trailing and backing shielding gas in welding of titanium alloy.	03

- (b)** How would preheating of the workpiece affect the secondary dendrite arm spacing in welds of aluminum alloys and why? **04**
- (c)** Explain the varestraint test for weldability **07**
