

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER-VII (NEW) EXAMINATION – WINTER 2024

Subject Code:3172116

Date:11-12-2024

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 Weld thermal Cycle.	03
	(b) Discuss the importance of understanding welding metallurgy for engineers in the welding industry.	04
	(c) Explain why controlling heat input and interpass temperatures are critical in the arc welding process.	07
Q.2	(a) Discuss the concept of carbon equivalent (CE) in welding carbon steel/ low alloy steel materials and its importance.	03
	(b) How does preheat and post-weld heat treatment affect the microstructure and properties of welds?	04
	(c) Explain various gas/metal and slag/metal reactions occurring in weld pool during welding.	07
	OR	
	(c) Draw the Continuous Cooling Transformation (CCT) diagram for eutectoid steel and discuss the different phases that occur during cooling	07
Q.3	(a) List the family of stainless steels. Which one is most weldable.	03
	(b) Discuss the hot cracking issue with welded Austenitic stainless steels	04
	(c) What is the use of Schaffler diagram ? how it can be useful in choosing suitable welding consumable ?	07
	OR	
Q.3	(a) What are precipitation hardening grade stainless steels? How they are different from other stainless steels?	03
	(b) Discuss the weldability issues with stabilized grade Type 321 & Type 347 grade.	04
	(c) Describe the weld sensitization issue in austenitic stainless steels and propose methods to mitigate this problem	07
Q.4	(a) Noted down salient point about weldability of ferritic stainless steel.	03
	(b) Why ferrite- austenite phase balance is very necessary to maintain in duplex stainless steel welded joints?	04
	(c) What are the challenges associated with welding dissimilar metals and how can they be addressed?	07
	OR	
Q.4	(a) List the defect that may likely when Aluminium is not welded correctly.	03
	(b) AC Welding current is used for GTAW welding aluminium ? why ?	04
	(c) Outline the common welding defects encountered in nickel-based alloys and suggest preventive measures.	07

- Q.5** (a) Why Copper material is required higher heat input for welding? Why? **03**
(b) What is dilution in welding process ? how to control it ? **04**
(c) Why is it necessary to employ proper shielding when welding Titanium alloys? **07**
List the types of gases used for shielding

OR

- Q.5** (a) What is post weld heat cracking ? explain the reason behind it. **03**
(b) Define Weld ability ? discuss the tools & techniques to determine weldability. **04**
(c) Draw neat schematics of following welding defects- Crater, Incomplete root penetration, Lack of Side wall fusion, Slag inclusion, undercut, under-bead cracking, Hot cracking. **07**
