Seat No.: _____ Enrolment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA ENGINEERING – SEMESTER –V (NEW) • EXAMINATION – SUMMER - 2018

Subject Code: 3355503 Date: 03-May-2018

Subject Name: Welding Metallurgy

Time: 02:30 PM To 05:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make Suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Use of programmable & Communication aids are strictly prohibited.**
5. **Use of only simple calculator is permitted in Mathematics.**
6. **English version is authentic.**

Q.1	(a)	Explain weld metal solidification of with neat sketch.	07
	(b)	Calculate cooling rate of weld joint from following data. To=35°C, Tc = 550°, t= 10mm, f=0.9, E = 21V, v=5mm/sec., I = 110amps and PC=0.0044 J/mm3 ,°C, K = 41 J/m.s ° C	07
Q.2	(a)	List different gases absorb by welds. List different defects produce in weld due to it. Explain different sources of gas absorption.	07
	(b)	Draw iron carbon diagram and show different micro structures observed in it. Show Paritactic point, Eutectic point and Eutectoid point. Write reaction of this three point.	07
		OR	
	(b)	Explain hydrogen Embrittlement and cracking with neat sketch.(HIC cracks)	07
Q.3	(a)	Explain effect of following parameters on weld joint. 1. Increase interpass temperature 2. Increase electrode diameter 3. Increase heat input 4. Change in welding position from flat to vertical up	07
	(b)	Draw neat sketch of different zones of steel weld melts as represents on an IC diagram.	07
		OR	
Q.3	(a)	Explain weld ability of low carbon steel and its carbon equivalent.	07
	(b)	Prepare WPS from following data 1. Design code : ASME section VIII Div.1 2. Specification standard : ASME section IX 3. Base metal :12 mm thick SA 240 TP 304 4. Welding process : GTAW 5. Joint Design : Double “V” 6. Filler metal : AWS ER-308-15 SFA 5.9 DIA 1.2 mm 7. PWHT : NIL 8. Shielding Gas used : Argon	07
Q.4	(a)	What is carbon equivalent? Explain carbon equivalent for low alloy steel. Calculate carbon equivalent from following given data : Material: SA 240 TYPE304 plate austenitic stainless steel	07

Chemical composition: C=0.08% Mn=2% Ph=0.045% S=0.03% Si=1% Ni=8% Cr=18%
Mechanical properties: tensile strength-485 N/mm2 yield strength=205 N/mm2, %elongation=40

	(b)	Explain Delong diagram with neat sketch	07

OR

Q. 4	(a)	Explain carbide precipitation problem in welding of austenitic stainless steel and suggest its remedies.	07
	(b)	List different processes used for welding aluminium and its alloys. Explain any one with neat sketch.	07
Q.5	(a)	Explain steps involved in arc welding of titanium and its alloys.	07
	(b)	Explain different problems associated with welding of titanium.	07

OR

Q.5	(a)	Explain mechanical residual stresses, metallurgical residual stresses and reaction stresses with neat sketch.	07
	(b)	Explain need for residual stresses relieving. List different methods of relieving welding residual stresses.	07

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