

GUJARAT TECHNOLOGICAL UNIVERSITY
DIPLOMA ENGINEERING – SEMESTER – VI • EXAMINATION – SUMMER 2016

Subject Code: 3355503**Date: //2016****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. 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 different metallurgical effect of welding operation. 07
 (b) Calculate cooling rate of weld joint from following data. 07
 $T_o=35^{\circ}\text{C}$, $T_c = 550^{\circ}$, $t= 10 \text{ mm}$, $f=0.85$, $E = 25\text{V}$, $v=6\text{mm/sec.}$,
 $I = 150\text{amps}$ and $PC=0.0044\text{J/mm}^3$, $^{\circ}\text{C}$, $K = 41 \text{ J/M.s } ^{\circ}\text{C}$
- Q.2 (a) Explain porosity formation with neat sketch in weld and suggest 07
 its remedies.
 (b) Draw neat sketch of TTT diagram use for welding and show 07
 different micro structure observed in it.
 OR
 (b) Explain hydrogen Embrittlement and cracking with neat 07
 sketch.(HIC cracks)
- Q.3 (a) Draw neat sketch of different zones of steel weld melts as 07
 represents on an IC diagram.
 (b) Explain properties of HAZ 07
 OR
- Q.3 (a) Explain weld ability of HSLA steel 07
 (b) What is carbon equivalent? Explain carbon equivalent for low 07
 alloy steel.
 Calculate carbon equivalent from following given data :
 Material: SA 240 TYPE304 plate austenitic stainless steel
 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, elongation=40
- Q.4 (a) Explain weld ability considerations of austenitic stainless steel 07
 (b) List different welding techniques used for austenitic stainless 07
 steel and explain any one with neat sketch.
 OR
- Q. 4 (a) Explain knife line attack problem in welding of austenitic 07
 stainless steel and suggest its remedies.
 (b) Prepare WPS from following data 07
 1. Design code : ASME section VIII Div.1
 2. Specification standard : ASME section IX
 3. Base metal :8 mm thick SA 240 TP 304L
 4. Welding process : GTAW
 5. Joint Design : Double “V”
 6. Filler metal : AWS ER-308L-15 SFA 5.9 DIA 1.2 mm
 7. PWHT : NIL

8. Shielding Gas used : Argon

- Q.5 (a) Explain welding characteristics of aluminium 07
(b) Explain different problems associated with welding of titanium. 07
- OR
- Q.5 (a) Write definition of Residual stresses in weld. Explain 07
mechanical residual stresses, metallurgical residual stresses and
reaction stresses with neat sketch.
(b) Explain concept and types of distortion with neat sketch 07
