

21/11/13.

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B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV / DEC 2013

Material Science Engineering

Seventh Semester

20

ML 9403 & WELDING METALLURGY

(Regulation 2008)

Time: 3 Hours

Answer ALL Questions

Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. Define – Straight Polarity in welding.
2. How to quantify the heat input during the welding process?
3. Plot the effect of carbon on the size of the gamma loop in Iron – Chromium phase diagram.
4. How to control the sensitization in welding of stainless steels?
5. List any two stabilized grades of stainless steel.
6. What are the four types of solidification modes in austenitic stainless steel?
7. What is meant by steam reaction in oxygen bearing grades of copper?
8. Name the precipitates in the 6xxx and 7xxx series heat treatable aluminium alloys.
9. What is meant by undercut in welding?
10. What is the reason for occurring cluster porosity in the weld zone?

Part – B (5 x 16 = 80 marks)

11. Compare the welding processes with respect to heat input and the power density of the heat source. Also compare the efficiencies of the heat source in different welding processes. (16 marks)
12. a) Explain the effect of following welding parameters on weldability.
 - (i) Welding current (4 marks)
 - (ii) Arc voltage (4 marks)
 - (iii) Welding speed (4 marks)
 - (iv) Electrode diameter (4 marks)

(OR)

- b) Explain the fusion zone and heat affected zone transformation in welding of carbon steel which contains 0.15% C. **(16 marks)**

13. a) Explain the solidification modes in Austenitic stainless steel. **(16 marks)**

(OR)

- b) Write short notes on the following.
(i) Welding of cast iron **(8 marks)**
(ii) Weldability of ferritic stainless steel grades **(8 marks)**

14. a) (i) Classify Aluminium alloys. Explain the issues in welding of heat treatable aluminium alloys. **(10 marks)**
(ii) List the factors that are influencing welding of aluminium alloys. **(6 marks)**

(OR)

- b) Write short notes on the following.
(i) Welding of copper alloys **(8 marks)**
(ii) Welding of Titanium alloys **(8 marks)**

15. a) Explain the following in detail.
(i) Distortion in welding **(8 marks)**
(ii) Residual stresses in welding and its effects **(8 marks)**

(OR)

- b) List the factors that have to be considered in welding of dissimilar metals. Explain some of the aspects in welding carbon steel with stainless steel. **(16 marks)**