

6/5/19

Roll No.

--	--	--	--	--	--	--	--	--	--

B.E / B.Tech END SEMESTER EXAMINATIONS – APR / MAY 2019

Material Science and Engineering
Semester VII

ML8702 – Metal Joining Processes and Metallurgy
(Regulation 2012)

Time: 3 Hours

Answer ALL Questions

Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. Write the applications of Electron beam welding process.
2. What are the ways diffusion bonding achieved?
3. What are the parameters influencing the temperature distribution in welding?
4. How to calculate the efficiency of heat sources?
5. Define the term spherodization.
6. What is meant by weld metal zone?
7. Write the classifications of the carbon steels and its carbon content?
8. Write the physical properties of Ti.
9. Write the causes for surface cracks in Arc welding.
10. What are the NDT methods used to test the welds?



Part – B (5 x 16 = 80 Marks)

11. a) (i) Explain the working principle of gas tungsten arc welding process with neat sketch. Write its advantages and limitations. (8)
(ii) Describe the working principle of friction stir welding process with neat sketch. Write its advantages and limitations. (8)
12. a) Determine the average cooling rate for cooling from 800 °C to 500 °C along the weld axis of a 1 cm thick steel plate for a bead-on-plate weld made by GTAW process at a welding speed of 12 cm/min using welding current of 175 A at 20 volts. Take the melting point of steel at 1527 °C, $k = 41 \text{ W/m}^\circ\text{C}$, $\alpha = 9.1 \times 10^{-6} \text{ m}^2/\text{sec}$ and efficiency of GTAW process equal to 0.7. (16)
OR
b) Describe the experimental determination of cooling rates and critical cooling rates in welding process. (16)

13. a) Briefly describe the following two types of diagram (16)
(i) Time temperature- transformation diagram (TTT curves)
(ii) Continuous cooling transformation (CCT)
OR
- b) Write a short notes on following: (16)
(i) Heat affected zones, (ii) cold cracking
14. a) (i) Describe the welding of Austenitic Mn-steels. (8)
(ii) Write short notes on precipitation- hardening stainless steels. (8)
OR
- b) (i) Briefly describe the important points connected with welding of Ti and its alloys. (8)
(ii) Briefly explain the following problems encountered in welding aluminum. (8)
1) porosity, 2) Cracking
15. a) (i) Explain the weldment sub surface defects with neat sketches. (8)
(ii) Describe the major defects occurred in arc welding process. (8)
OR
- b) Describe the weldment testing procedure of liquid-penetrant testing method with neat sketch. (16)

