

M.E. MECHANICAL ENGINEERING FIRST YEAR SECOND SEMESTER – 2025

ADVANCED JOINING PROCESSES

Time: 3 Hours

Full Marks: 100

(answers any five questions)

20×5

1. A) What are the different types of heat sources in liquid state welding processes?
B) Explain the arc structure, characteristics and power in liquid state welding processes.
(4+16)
2. A) Explain heat generation (chemical heat source) in thermit welding.
B) The voltage- length characteristic of a DC current (dc) are given by

$$V = (20 + 40l) \text{ volts,}$$

Where l is the length of the arc in cm, the power source characteristic is approximated by a straight line an open circuit voltage = 80 V and an approximated by a short circuit current = 1000 amp. Determine the optimum arc length and the corresponding arc power.
(10+10)

3. A) Why a there is a need of adhesive bonding in industries?
B) Explain the different types of adhesives.
C) Draw the different types of adhesive joint configurations
(2+10+8)
4. A) Explain Laser hybrid welding with a neat sketch.
B) Discuss the laser sources for laser joining processes.
(10+10)
5. A) Explain electron beam welding, including beam generation, beam guidance, and the effects of the beam, with a diagram.
B) Explain cold pressure welding of Al-steel slide bearing and valve floater. (10+10)
6. A) What is the advantages of friction stir welding than conventional welding?
B) Explain the friction stir welding in a neat sketch
C) Draw and explain the different cross sectional zones in friction stir welding?
D) What are the advantages and disadvantages in friction stir welding process?
(2+4+6+8)
7. A) Explain the explosive welding process.
B) Explain the mechanism of explosive welding.
C) Discuss parameter selections with necessary equations for an explosive welding.
(4+4+12)