ADVANCED WELDING TECHNOLOGY
(MECH 3222)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) Arc-welding uses following electric supply
(a) only A.C. (b) only D.C.
(c) Both AC and DC (d) special Spiral waveform.

(ii) The most commonly used flame in gas welding is
(a) neutral (b) oxidizing
(c) carburizing (d) all of the above.

(iii) Distortion in welding occurs due to
(a) improper clamping methods
(b) use of wrong electrodes
(c) oxidation of weld pool
(d) improper composition of parent material.

(iv) In reverse polarity welding
(a) electrode holder is connected to the negative and work to positive
(b) electrode holder is connected to the positive and work to negative
(c) work is positive and holder is earthed
(d) holder is positive and work is earthed.

(v) Too high welding current in arc welding would result in
(a) excessive piling up of weld metal, poor penetration, wasted electrodes
(b) excessive spatter, under cutting along edges, irregular deposits, wasted electrodes
(c) too small bead, weak weld, and wasted electrodes
(d) cracked electrode.

(vi) What is the minimum frequency used in ultrasonic welding?
(a) 20 kHz (b) 30 kHz
(c) 40 kHz (d) 50 kHz.

(vii) Which electrode is used in plasma arc welding?
(a) Cast iron (b) Mild steel
(c) Tungsten (d) Stainless steel.

(viii) Which one of the following is not a heat affected region?
(a) Grain growth region (b) Grain refined region
(c) Grain enlarged region (d) Transition region.

(ix) Which of the carbon steel is easy to weld?
(a) Low carbon steel (b) Medium carbon steel
(c) High carbon steel (d) stainless steel.

(x) The depth of penetration of arc will _____, if welding current is increased.
(a) increase (b) decrease
(c) fluctuate (d) not dependent on current.

Group–B

2. (a) Compare between GMAW and FCAW. *[(CO1) (Understand/LOCQ)]*
(b) Discuss the projection welding process. *[(CO1) (Remember/LOCQ)]*
6 + 6 = 12

3. (a) Two steel sheets of 1.8 mm thickness are resistance welded in a lap joint with a current of 9500 A for 0.15 s. The effective resistance of the joint can be taken as 100 μΩ. The joint can be considered as a cylinder of 5 mm diameter and 1.5 mm height. The density of steel is 0.00786 g/mm^3 and heat required for melting steel is 10 J/mm^3. Find out the heat requirement for welding and melting efficiency. *[(CO1) (Evaluate/HOCQ)]*
(b) Name the parameters that are to be set while performing SMAW. *[(CO2) (Analyse/IOCQ)]*
8 + 4 = 12

Group - C

4. (a) State the advantages of PAW over EBW. (any three points). *[(CO3) (Understand/LOCQ)]*
(b) Discuss any one method of underwater welding. *[(CO3) (Remember/LOCQ)]*
6 + 6 = 12

5. (a) Elaborate the process of friction stir welding. *[(CO3) (Understand/LOCQ)]*
(b) Describe the process of diffusion welding. *[(CO3)(Remember/LOCQ)]*
6 + 6 = 12

Group - D

6. (a) What is HAZ? Explain three disadvantages of HAZ. *[CO4][LOCQ/Understand]*

(b) Explain the influence of current on the characteristics of weldment.

[CO4][IOCQ/Analyze]

6 + 6 = 12

7. (a) Justify the importance of pre- heating on welding. *[CO4][HOCQ/Evaluate]*
   (b) Propose a suitable method of welding cast iron. *[CO5][HOCQ/Create]*

6 + 6 = 12

Group - E

8. (a) Propose a robotic welding setup with a neat sketch. *[CO5][HOCQ/Create]*
   (b) State any three safety practices that are to be followed while performing Arc welding. *[(CO6) (Remember/LOCQ)]*

6 + 6 = 12

9. (a) Discuss the reason behind cracks in welded regions. Also suggest remedies for the defect. *[(CO5)IOCQ/Analyse]*
   (b) Elaborate any one type of destructive tests that is performed to analyze the joint strength. *[(CO5)LOCQ/Remember]*

6 + 6 = 12

Cognition Level	*LOCQ*	*IOCQ*	*HOCQ*
Percentage distribution	*56*	*17*	*27*

Course Outcome (CO):

After the completion of the course students will be able to

1. Compare the processes of common welding technology
2. Evaluate process parameters in different welding processes.
3. Demonstrate critical and precise welding processes and their setups.
4. Analyze the metallurgical properties after welding and select post welding heat treatments, if required.
5. Explain the weldability of different materials and implement the knowledge of welding fixtures and automation in different welding processes.
6. Identify the welding defects, its causes and remedial measures.

**LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question.*