

**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) In DCEP polarity system of arc welding electrode experiences an amount of heat as  
(a) 67%                      (b) 33%                      (c) 50%                      (d) 100%.
- (ii) Arc blow takes place due to  
(a) magnetic field generated near the electrode  
(b) existence of oil film on metallic surface  
(c) large electrode gap  
(d) compressive stress generated on the surface.
- (iii) The main objective of the flux coating in electrode material is  
(a) to resist the corrosion in the electrode  
(b) to provide inert environment on the weldment  
(c) to provide extra material into the weld pool  
(d) to reduce the HAZ.
- (iv) In resistance welding process, the heat rate does not depends on  
(a) current    (b) contact resistance  
(c) weld time    (d) thickness of materials.
- (v) In resistance welding, applied pressure is kept constant during  
(a) squeeze time    (b) weld time  
(c) hold time    (d) off time.
- (vi) If carbon percentage in steel is 4%, then it is classified as  
(a) Low carbon steel    (b) Medium carbon steel  
(c) High carbon steel    (d) Composite carbon steel.
- (vii) With the increase in welding speed, heat in per unit length of weld will  
(a) increase                      (b) decrease                      (c) remain same                      (d) be undetermined.

- (viii) Sub surface crack cannot be detected by  
(a) magnetic particle test (b) dye penetration test  
(c) radiography test (d) X-ray detection test.
- (ix) Teach pendant is associated with  
(a) welding robot (b) welding positioner  
(c) welding fixtures (d) welding method.
- (x) Which one is a destructive test of weld inspection  
(a) tensile test (b) magnetic particle test  
(c) eddy current test (d) dye penetration test.

**Group - B**

2. (a) Explain the arc generating principle of welding. [(CO1)(analyze/IOCQ)]  
(b) Explain why pure tungsten electrode is not used in TIG. [(CO2)(analyze/IOCQ)]  
**7 + 5 = 12**
3. (a) Explain how flux cored arc welding is advantageous over submerged arc welding. [(CO2)(understand/LOCQ)]  
(b) Write down the working principle of seam welding with sketch. [(CO2)(analyze/IOCQ)]  
**6 + 6 = 12**

**Group - C**

4. (a) Draw a neat picture of electron beam welding system and explain the principle of operations. [(CO3)(Evaluate/HOCQ)]  
(b) Write down the four applications of laser beam welding. [(CO3)(Analyze/LOCQ)]  
**6 + 6 = 12**
5. (a) Write down the names and function of the equipment used in ultrasonic welding process. [(CO3)(Analyze/IOCQ)]  
(b) Explain the influence of pressure, temperature and time on diffusion welding process. [(CO3)(Analyze/IOCQ)]  
**5 + 7 = 12**

**Group - D**

6. (a) Compare between grain growth and grain refined region of HAZ. [(CO4)(Analyze/IOCQ)]  
(b) Analyze the effect of welding current on the characteristics of the weldment. [(CO4)(Analyze/IOCQ)]  
**6 + 6 = 12**

7. (a) Justify three reasons of post welding heat treatment. [(CO4)(Evaluate/HOCQ)]  
(b) Propose the shield metal arc welding method of stainless steel.  
[(CO5)(Create/HOCQ)]  
**6 + 6 = 12**

**Group - E**

8. (a) Explain welding automation. Describe the function of C-Clamp in welding.  
[(CO5)(Apply/IOCQ)]  
(b) Demonstrate the working principle of cylindrical type of robots in welding.  
[(CO5)(Understand/LOCQ)]  
**6 + 6 = 12**
9. (a) Write four differences between X-Ray radiography and gamma ray radiography technique associated with welding.  
[(CO6)(Analyze/IOCQ)]  
(b) Explain magnetic particle test for detecting the welding defects.  
[(CO6)(Understand/LOCQ)]  
**5 + 7 = 12**

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Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	19.8	61.45	18.75

**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.

