MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY
WEST BENGAL

ME-704B

ADVANCED WELDING TECHNOLOGY

Time Allotted: 3 Hours | Full Marks

The questions are of equal value.
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.
All symbols are of usual significance.

GROUP A
(Multiple Choice Type Questions)

1. Answer any *ten* questions. 10×1

(i) The weaker portion in the fillet weld is
(A) face (B) toe
(C) throat (D) root

(ii) In which of the following is a type of solid state welding process?
(A) PAW (B) LBW
(C) EBW (D) USW

(iii) In arc welding process temperature is about of
(A) 4000(°C) (B) 3100(°C)
(C) 3200(°C) (D) 4100(°C)

(iv) Function of flux coating in arc welding
(A) alloying element (B) shielding effect
(C) arc stabilization (D) all these

(v) In spot welding, the tip of electrodes is of
(A) copper (B) aluminum
(C) stainless steel (D) brass

(vi) A change in arc length will produce a change in
(A) ampere (B) voltage
(C) a change in both (A) and (B) (D) the energy input

(vii) Which electrode is recommended for welding any type of carbon or low alloy steel to any type of stainless steel?
(A) E6013 (B) E304
(C) E309 (D) None of these

(viii) Pre-heat temperature required for welding of 40 mm thick carbon steel
(A) 50°C (B) 150°C
(C) 30°C (D) Nil

(ix) Xenon flash tube is used for
(A) EBW (B) LBW
(C) GMAW (D) GTAW

(x) Undercut is a
(A) welding process (B) welding defect
(C) corrosion defect (D) none of these

(xi) Welding process using non-consumable electrode is
(A) Laser welding (B) MIG welding
(C) TIG welding (D) Seam welding

(xii) Which of the following is non-destructive testing procedure?
(A) Bend test (B) Tensile test
(C) Dye-penetration test (D) Fatigue test

GROUP B
(Short Answer Type Questions)

Answer any *three* questions. 3×

2. Explain the effect of each of the following on the grain structure of low carbon steel weld metal
   (i) Fast Cooling
   (ii) Slow Cooling

3. (a) What is the function of flux used in SAW process?
   (b) Can dissimilar metals be welded by a welding process? If so, explain the process very briefly.

4. (a) How is an electrode specified?
   (b) Define allotropic transformations with example.

5. What do you mean by Metalizing and Hard facing? Explain the process giving its advantages and applications.

6. What are the reasons for the poor weldability of
   (i) martensitic stainless steel
   (ii) ferritic stainless steel

7. Describe how distortion in welding can be controlled.

GROUP C
(Long Answer Type Questions)

Answer any *three* questions. 3×1

8. (a) Discuss in details on the problem encountered in underwater welding. What are the characteristic of good underwater welding process?
   (b) What do you understand by "Friction Stir Welding"? Mention its application.

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9. (a) What do you mean by non-destructive testing? Briefly describe any two method of non-destructive testing.
   (b) Discuss plasma arc welding (PAW) with neat diagram. Also compare PAW with TIG welding.

10. (a) Draw welding setup and show different part of shielded metal arc welding (SMAW).
   (b) Explain different types of equipment used in arc welding process.
   (c) What do you mean by projection welding?

11. What do you understand by resistance welding? What is the spot welding and how does it differ from projection welding? What are the differences amongst the autogenous, homogeneous and heterogeneous joining process? 4+5

12. (a) Find the best welding speed to be used for the welding of 6 mm steel plates with an ambient temperature of 30°C with the welding transformer set at 25 V and current passing is 300 A. The arc efficiency is 0.9 and possible travel speeds are 6 to 9 mm/s. The limiting cooling rate for satisfactory performance is 6°C/s at a temperature of 550°C.
   (b) Write down the short notes on Dye Penetrant Testing.

13. (a) A single full penetration weld pass is made on steel using the following parameters:
   V = 20 V, I = 200 A, v = 5 mm/s, T_0 = 25°C, T_m = 1510°C, ρ_c = 0.0044 J/mm^3°C, t = 5 mm, f_1 = 0.9, H_{net} = 720 J/mm,
   Calculate the distances of from the weld fusion boundary at
   (i) T_p = 730°C,
   (ii) if the steel plate is preheated to 200°C and was tempered to 430°C,
   (iii) without preheat but tempered to 430°C and
   (iv) finally if the net energy input is increased by 50% to 1.5 × 720 = 1080 J/mm.
   (b) What is inspection of welds?

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