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Paper Code : ME-704B

ADVANCED WELDING TECHNOLOGY

Time Allotted : 3 Hours | *Full Marks* : 70

The figures in the margin indicate full marks.

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

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

   i) The selection of electrode diameter in arc welding depends upon

   a) Material thickness

   b) Current used

   c) Both (a) & (b)

   d) None of these.

ii) In mechanized welding process, type of power source used is

a) Drooping characteristic power source

b) Flat characteristic power source

c) Both of these

d) none of these.

iii) In which welding process the two pieces to be joined are overlapped and placed between two pointed electrodes ?

a) Arc welding process

b) Spot resistance welding process

c) Seam welding process

d) Friction stir welding process.

iv) The temperature in arc welding is approximately

a) 4000°C b) 5500°C

c) 3500°C d) 1800°C.

v) Ruby rod is used in

a) Electron beam welding

b) Laser beam welding

c) Plasma arc welding

d) None of these.

vi) Too low current in arc welding results in

a) Excess piling up of weld metal

b) Excessive electrode consumption

c) Poor penetration

d) All of these.

vii) Gases used in tungsten inert gas welding are

a) Argon and atomic hydrogen

b) Hydrogen and neon

c) Helium and Argon

d) Argon and neon.

viii) Welding of stainless steel is difficult because of

a) Crack formation

b) Rust formation

c) Hydrogen embrittlement

d) Oxide film formation.

ix) Sonotrode is used in

a) Thermit welding b) Friction stir welding

c) Ultrasonic welding d) Stud welding.

x) In reverse polarity welding

a) Electrode holder is connected to positive and work to negative

b) Work is positive and electrode holder is connected to negative

c) Electrode holder is connected negative and work is earthed

d) None of these.

xi) Heat input for welding aluminium is comparatively more due to

a) Thin film of oxide is always present on the aluminium surface

b) Being a very good conductor of heat

c) Low melting point

d) None of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following : $3 \times 5 = 15$

2. Explain Plasma Arc Welding. Write down the advantage of PAW over TIG.

3. Write down the advantages of Flux cored arc welding process over shielded metal arc welding and metal inert gas welding.

4. Write down about weldability of stainless steel.

5. Write down the advantages and limitations of robotic welding.

6. Explain the welding technology used to weld ceramics.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Explain with diagram Electron Beam Welding.

   b) Explain different welding defects with their causes and remedies.

   c) Write about arc blow with its causes and remedies.

   5 + 7 + 3

8. a) Write down various arc welding parameters. Explain the effect of any two parameters.

   b) Write about underwater welding with its types. What are the problems normally encountered during underwater Welding ?

   c) Explain stud arc welding. 5 + 6 + 4

9. a) Write down the uses of jigs and fixtures in welding.

   b) Explain about the advantages of automation in welding.

   c) Two metallic sheets, each of 2.0 mm thickness, are welded in a lap joint configuration by resistance spot welding at a welding current of 10 kA and welding time of 10 millisecond. A spherical nugget extending up to the full thickness of each sheet is formed. The properties of the metallic sheet are given as :

      Ambient temperature = 293 K

      Melting temperature = 1793 K

      Density = 7000 kg/m^3

      Latent heat of fusion = 300 kJ/kg

      Specific heat = 800 J/kg K.

   Assume : (i) Contact resistance along sheet to sheet interface is 500 micro-ohms and along electrode to sheet interface is zero

   (ii) No conductive heat loss through the bulk sheet material

   (iii) The complete weld fusion zone is at the melting temperature.

   Find out the melting efficiency (in %) of the process.

   4 + 4 + 7

10. a) Discuss about various non-destructive testing of welding structure. Explain any one of them.

    b) What are the jigs and fixtures ? What advantage does it provide to get quality welding structure ?

    c) Compare between soldering and brazing processes. State up to what extent they are related with welding process. 6 + 5 + 4

11. Write short notes on any *five* of the following : 5 × 3

    a) Plastic welding

    b) Diffusion welding

    c) Weldability of cast iron

    d) Straight polarity and reverse polarity power supply system

    e) Safe welding practices

    f) Friction Stir Welding

    g) Ultrasonic Welding.