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Total No. of Pages: 02
Total No. of Questions: 08

M.TECH (Sem.-1st)
WELDING TECHNOLOGY

Subject Code: PE-504

Paper ID: [E0444]

Time: 3 Hrs.

Max. Marks: 100

INSTRUCTIONS TO CANDIDATE:

*Note: Answers 5 (Five) questions out of 8 (Eight) questions.
Each question carries 20 (twenty) marks.*

1. (i) How welding processes are classified? What is weld ability? Explain.
(ii) Discuss the principle of resistance welding with the help of weld thermal cycle.
(iii) State and explain the solidification mechanism and microstructural products in welding metal. Give schematic illustration of microstructure during solidification of weld zone. 5 + 5 + 10 = 20

2. (i) State and explain the mechanism of arc initiation during arc welding. Give schematic diagram of arc welding on a large plate showing direction of welding, inclination angle of electrode and position of spark in support of your answer.
(ii) Deduce an expression for temperature distribution in the arc when a semi infinite plate is welding.
(iii) Define arc efficiency. Discuss the electrical characteristics of an arc. 8 + 7 + 5 = 20

3. (i) What is heat affected zone (HAZ)? Explain with a schematic diagram showing subdivisions of HAZ for low carbon steel welds and their corresponding temperature ranges.
(ii) How coatings of electrodes for SMAW are classified? Explain with example.
(iii) State and explain the effect of electrode coatings on welding performance characteristics. State the roles of flux ingredients and shielding gases. Give examples in support of your answer. 8+4+ (4+4)=20

4. (i) Explain the working principle of GMAW process. Give a simple sketch of this process.
(ii) Explain submerged arc welding process with suitable sketch. What are the fluxes used in submerged welding process?
(iii) Explain electro slag welding process with a suitable sketch. Write its industrial applications. 20

5. (i) State and explain the basic characteristics of power sources for various arc welding processes.
(ii) Define and explain the significance of the following terms
(a) duty cycle, (b) DC rectifier, (c) thyristor controlled rectifier.
(iii) How arc length is regulated in mechanized welding process? Explain with justification. 7+ 6 + 7 = 20

6. (i) Write the name of the different types of metal transfer during welding. State and explain the mechanism of metal transfer for each case separately.
(ii) State and explain the effect of polarity on metal transfer and melting rate. $12 + 8 = 20$
7. (i) State the basic theory and explain the mechanism of solid state welding. Give examples for solid state welding.
(ii) What is diffusion welding? Explain with a suitable sketch.
(iii) Explain ultrasonic welding. Give simple sketch for this welding process in support of your answer. $9 + 5 + 6 = 20$
8. Write short notes on the followings:
(i) High energy rate welding.
(ii) Welding using radiation energy.
(iii) Effect of alloying elements on welding of ferrous metals.
(iv) Friction welding. $5 \times 4 = 20$

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