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Printed Pages—3 **ME—033**

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 4066 **Roll No.** | | | | | | | | | | |

B.Tech.

EIGHTH SEMESTER EXAMINATION, 2005-2006

ADVANCED WELDING TECHNOLOGY

Time : 3 Hours *Total Marks : 100*

Note : *(i) Attempt ALL questions.*
(ii) All questions carry equal marks.
(iii) In case of numerical problems assume data wherever not provided.
(iv) Answer briefly, neatly and draw wherever required.
(v) Be precise in your answer.

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1. Write short notes on all of the following : **(2x10=20)**

(a) Faying Surface
(b) Autogeneous weld
(c) Define and draw groove weld
(d) Distinguish heat transfer efficiency and melting efficiency.
(e) Define pressure gas welding.
(f) Explain Gravity welding
(g) Use of Coffer Dam
(h) Define Angle of contact. Generally recommend Angle of contact for welding.
(i) Draw the symbol for (a) Single-Bevel Butt Weld (b) Single - J Butt Weld (c) Square Butt Weld (d) Seam Weld.
(j) Difference between Electrical Arc and Electrical Spark.

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2. Attempt *any four* parts of the following : **(5x4=20)**

(a) A fillet weld has a cross-sectional area $A_W = 20\ mm^2$ and is 200 mm long (i) What quality of heat (in J) is required to accomplish the weld if the metal to be welded is austenitic stainless steel (ii) How much heat must be generated at the welding source if the heat transfer efficiency = 0.8 and the melting efficiency = 0.6 T_m of S.S. = 1670 K.

(b) By what process stainless steel gets welded to Cast Iron ?

(c) Describe and distinguish, the basic types of friction welding.

(d) Identify the factors that affect weldability.

(e) Write on modes of metal transfer in arc welding.

(f) Draw and Explain the curve - Joint strength with respect to thickness.

3. Attempt *any two* parts of the following : **(10x2=20)**

(a) Under what circumstances would brazing or soldering be preferred over welding ?

(b) What are the measures that should be taken to reduce distortion of sheets ?

(c) An EBM operation is to be accomplished to butt weld two sheet-metal parts that are 3 mm thick. The unit melting energy = 5 J/mm^3. The weld joint is to be made 0.35 mm wide, so the c-s of the fused metal is 0.35 mm by 3 mm. If accelerating voltage = 25 kV, beam current = 30 mA, heat transfer efficiency $f_1 = 0.85$ and melting efficiency $f_2 = 0.75$, determine the travel speed at which this weld can be made along the seam.

(d) Draw and explain the principles of Ultrasonic welding of Aluminium rings. Also the two special forms of ultrasonic welding used for spot welding in Microelectronic assembly.

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4. Attempt *any two* parts of the following : **(10x2=20)**

(a) Explain the Wet Welding process. Bring out also the advantage and Disadvantages of this process.

(b) Explain the economical process by which Titanium alloys are to be weld to Cr-Ni Steel.

(c) In cemented industries, the components are coated with noble metals. Explain the process with both advantages and disadvantages.

5. Attempt *any four* parts of the following : **(5x4=20)**

(a) Comment on HAZ in corrosion-resistant stainless steel.

(b) Derive Rosenthal's approach on analysis of Heat flow during welding.

(c) What are the causes of residual stress in welding ? Write any 3 measuring Techniques.

(d) Explain the following defects and their remediation :

(i) Liquation cracking

(ii) Strain Age cracking

(iii) Quench cracking

(e) Explain any 3 Hydrogen - cracking test methods with necessary figures.

(f) Comment on cooling of fusion weld with respect to metallurgical phase transformation.

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