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

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

B.Tech.

EIGHTH SEMESTER EXAMINATION, 2004-2005

ADVANCED WELDING TECHNOLOGY

Time : 3 Hours *Total Marks : 100*

Note : *(i) Answer ALL questions.*

(ii) There are internal choices in the questions

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

(a) Define welding metallurgically. Name some joining processes other than welding. List the criterion for selection of welding process. Justify the use of following welding processes.

(i) Spot welding for automobile body

(ii) Laser beam welding in electronics industry

(b) Explain the difference between constant current and constant voltage characteristics of welding power sources for arc welding. List the different types of commercially available arc welding power sources.

(c) Explain the process of electroslag welding (with the help of a neat sketch). What are the properties of the flux used in the process ? When would this process be most useful (give example) ?

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

(a) Explain the keyhole technique of welding used in LBW and E.B.W. What are the advantages, disadvantages and typical application of L.B.W AND E.B.W. ?

(b) Name some of the common lasing material used for laser production. What safety precautions need to be taken against laser beam hazards during L.B.W ? Explain what is the effect of vacuum (in the work space) on the weld produced by Electron Beam Welding.

(c) Draw the setup for ultrasonic welding (USW) and explain the use of various components of the setup. What are the advantages and limitations of U.S.W. ?

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

(a) Explain the following terms in context to Explosive welding.

(i) Buffer plate

(ii) Flyer plate

(iii) Standoff distance

(iv) Surface jetting

(v) Critical velocity

(vi) Impact velocity

(b) List the various steps involved in metal surfacing. What are the various methods of depositing metal ? Explain any one in detail.

(c) What surface preparation is needed for spray welding ? With the help of a neat sketch explain the process of electric arc wire spray process. List the other processes of spray welding.

4. Attempt *any four* of the following : **(4x4=20)**

(a) Describe the following defects commonly found in welding (giving details of how they look like, causes and remedy for avoiding them)

(i) Porosity

(ii) Under cut

(iii) Hot tears

(b) Explain the differences between non-destructive and destructive testing of welds. What are the advantages of each ?

(c) Describe how will you perform the Magnetic Particle Inspection (MPI) on a weld. What are its limitations ?

(d) Describe the various types of welded joints used in weld design. List some of the types of edge preparation for Butt welds.

(e) Explain in brief how residual life assessment of welded structures is done.

(f) Explain with the help of a neat sketch, the various regions of heat affected zone in a weld.

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

(a) What is the effect of cooling rate on the formation of Heat Affected Zone (HAZ). Predict the mechanical properties in different regions of the heat affected zone on the basis of their microstructure.

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(b) Explain the effect of alloying elements (S, P & Mn) in parent metal on the weld and explain how the weldability of steel can be increased.

(c) Explain how dendritic structure is formed in the weld metal. What structure will result if the cooling rate is slow.

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