

[This question paper contains 3 printed pages.]

Your Roll No. ....

3195

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MEM (PE)

Paper—ME.603

WELDING PROCESS AND METALLURGY

Time : 3 Hours

Maximum Marks : 100

(Write your Roll No. on the top immediately  
on receipt of this question paper.)

Attempt any five questions.

1. (a) Describe the different welding procedure of gas welding and joint design for non-ferrous metals.  
10
- (b) How is submerged arc flux made? Name two types. What is meant by a low-hydrogen coating?  
10
2. (a) Describe the explosive welding process with a neat sketch. What are applications of high velocity impact welding (explosive welding, magnetic pulse welding and laser impact welding) at varied different length scales?  
10
- (b) What is surface bonding mechanisms used in metal flame spraying? Differentiate between two-wire arc and HVOF metal spray system with applications.  
10

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3. (a) Derive the formula for calculating temperature distribution in a large plate of finite thickness from the basic differential equation of the quasi stationary state of welding. 12
- (b) Explain the electroslog and submerged arc welding techniques of pressure vessel welding in detail. 8
4. (a) Distinguish between the distortions and residual stresses in welding and differentiate between the longitudinal and transverse distortions? 10
- (b) How does the weld thermal cycle and shrinkage leads to the development of residual-stresses? What design measures help in limiting the welding distortions stresses. 10
5. (a) What is meant by HAZ? Explain with the help of a neat sketch. What is the significance of partially transformed zone in HAZ? 10
- (b) How does under bead zone differs from a grain refined zone? Represent the different zones of steel weldment on Iron-carbon equilibrium. 10
6. (a) What is meant by liquid penetrant test? Which types of defects can be inspected through liquid penetrant test? 10

- (b) How is residual life assessment of welded structures carried out? What are the factors that affect the life of welded structures? 10
7. (a) What are various welding symbols? Why are they used? Explain its salient features. Explain general weld design principles with neat sketches. 12
- (b) What are the different parts of a butt weld and fillet weld? Show it with the help of sketches. 8