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**B.E / B.Tech (Full Time) DEGREE ARREAR EXAMINATIONS, APRIL / MAY 2014**

**MATERIALS SCIENCE AND ENGINEERING**

Seventh Semester

**ML9403 Welding metallurgy**

(Regulation 2008)

Time: 3 Hours

Answer ALL Questions

Max. Marks 100

1. What are the situations that require preheating of the base material?
2. What will be the effect of inoculation on weldment?
3. Write down the carbon equivalent equation.
4. What will be the purpose of adding manganese during welding of steel?
5. What do you mean by duplex stainless steel?
6. What do you understand by Schaeffler diagram?
7. How do you overcome the brittleness in the weldment region of titanium alloy?
8. Mention the ways by which hot cracking can be minimized in copper based alloys.
9. What are the causes of slag entrapment?
10. Mention the purpose of Transverse Varestraint Test.

**Part – B ( 5 x 16 = 80 marks)**

11. Derive the formula for calculating temperature distribution in a large plate of finite thickness from the basic differential equation of quasi-stationary state of welding.
12. a) Discuss in detail about the formation of different micro-structural zones in the welding of plain carbon steel.

**(OR)**

- b) Write brief note on (i) Formation of acicular ferrite (8)
- (ii) Problems encounter due to the presence of hydrogen (8)

13. a) Discuss in detail about the phase transformation and microstructure resulting in fusion zone and heat affected zone in martensitic stainless steel.

**(OR)**

- b) (i) Suggest the suitable welding process, thermal cycling required in welding ductile cast iron. (10)  
(ii) Write a brief note on weld deposit microstructure of the same. (6)
14. a) Explain the problems encountered during the welding of nickel alloys and its possible solutions.

**(OR)**

- b) Explain the methods by which hot cracking and porosity can be overcome during welding of aluminium and its alloys.
15. a) Write a brief note on the scope of various NDT on weldability testing.

**(OR)**

- b) What are the key issues encountered during joining of dissimilar materials? Provide an appropriate solution for their joining by solid state process.