Hall Ticket Number:

Code No. : 8212

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

M.E. I Year (Mech. Engg.) II-Semester (Main) Examinations, July-2016

(Advanced Design & Manufacturing)

Metal Casting and Welding Processes

Time: **3** hours Max. Marks: **70**

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

1. What is inoculation? Why is the metal inoculated before pouring into the mould?
2. Classify plain carbon steels and mention their composition.
3. State a few heat treatable Aluminum alloys.
4. Discuss the composition and applications of invar.
5. Classify various zones of steel weldment with their temperatures.
6. What is the difference between annealing and normalizing? Why normalized components are harder than annealed ones.
7. What is retained austenite? How it is obtained during fast cooling of weld bead?
8. What are the defects those may occur due to the residual stresses in weldments?
9. Suggest various welding processes for Titanium alloys.
10. What are the sources of hydrogen in welding process? How does hydrogen induce a delayed crack in the weldment?

Part-B (5 × 10 = 50 Marks)
(All bits carry equal marks)

11. a) State the process of producing malleable iron. Discuss its microstructure, properties and applications.

    b) What are various basic and acidic refractories used in melting furnaces? Compare the acidic and basic refractories based on composition and melting temperatures.

12. a) State various design aspects to be considered in designing gating system of Aluminum alloys.

    b) What is Bronze? Explain about various Bronzes with their composition and applications.

13. a) Two pairs of carbon steel specimens with predominantly pearlitic structure *i)* containing 0.6% carbon and another *ii)* with 0.95% carbon are welded with a fusion welding process. A considerable HAZ is observed due to formation of martensite. To reduce the hardness it is decided to carry out annealing process. State the annealing process for the above weldments and also explain where and why the annealing cycles for above two metals differ.

    b) What is the heat treatment process recommended to improve the strength of non-ferrous alloys whose solubility changes the phases widely with temperature? Explain the process in detail.

14. a) Draw the Schaeffler diagram and explain its importance.

    b) Discuss about knife edge attack. How do you prevent it?

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15. a) What are the difficulties in the welding of Ferritic and austenitic stainless steels?
    b) Justify the statement "Aluminium alloys are difficult to weld".

16. a) Describe the various defects that occur in castings due to gas entrapment and absorption. State the remedies.
    b) Describe the composition of Zinc based die casting alloys and their applications.

17. Write short notes on any ***two*** of the following:
    a) Austempering
    b) Welding stresses.
    c) Liquation cracks in weldments.

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