Reg. No. :

Question Paper Code : X 85840

M.E./M.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020
First Semester
Manufacturing Engineering
MF 5103 – ADVANCES IN CASTING AND WELDING
(Regulations 2017)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. Enumerate the reasons for the shrinkage of cast metals.
2. What is "gate ratio" ?
3. Why the section of sprue reduces downwards ?
4. What are the process parameters that are to be controlled for proper solidification ?
5. State any two product applications of centrifugal casting and die casting.
6. State the principle of CO_2 moulding.
7. What is lamellar tearing in weldments ?
8. How residual stresses are generated in weldments ?
9. Enumerate the principle of friction welding.
10. Mention the applications of high frequency induction welding.

PART – B **(5×13=65 Marks)**

11. a) i) With a sketch, describe the heat transfer that occurs between the metal and mould in casting process. **(7)**

ii) Explain the principle and merits of directional solidification in metal casting with a suitable diagram. **(6)**

(OR)

b) i) With an example, discuss the design considerations while designing a casting system. **(7)**

ii) Sketch and compare top gate and bottom gate. **(6)**

12. a) i) Draw the cooling curves of pure metal and an alloy. Compare the solidification process of them. **(6)**

ii) Discuss the castability of (a) Cast iron (b) Aluminium alloys **(7)**

(OR)

b) i) Explain the causes for shrinkage in cast metals. Also discuss how this problem can be avoided. **(6)**

ii) Write the castability aspects of (a) Stainless steel (b) Copper alloys. **(7)**

13. a) i) What is meant by "precision investment casting" ? With help of a suitable diagram, describe "Lost wax method". **(8)**

ii) Discuss the methodology to control the pollution in foundry. **(5)**

(OR)

b) i) Discuss the material handling equipments and their uses in a foundry shop. **(5)**

ii) With a sketch, describe the principle of squeeze casting process. Also enumerate its advantages, limitations and product applications. **(8)**

14. a) i) List out the weldability considerations of stainless steel. Also discuss about any one of the welding process applied for welding stainless steel. **(7)**

ii) Explain magnetic particle inspection method to test weld components. Also discuss the advantages and limitations of this method. **(6)**

(OR)

b) i) What are the aspects to be considered while designing the weld joint ? Discuss this with the help of suitable sketches. **(7)**

ii) Explain briefly the welding procedure employed for aluminium alloys. **(6)**

15. a) i) Describe the principle, advantages, limitations and applications of electroslag. Welding with necessary sketch. **(7)**

ii) With a neat sketch, describe the explosive welding process. Also state its process parameters, advantages and disadvantages. **(6)**

(OR)

b) i) Describe the process mechanism, advantages and product applications of electron beam welding with a suitable diagram. **(7)**

ii) Explain the process mechanism and applications of under water welding. Discuss the different welding machineries and instrumentation used in this process. **(6)**

PART – C **(1×15=15 Marks)**

16. a) With an example and line diagram, explain the working of a mechanized steel foundry. Also discuss the advantages and capital investment of mechanized foundries. **(15)**

(OR)

b) Explain the procedure of automation of welding in the following industries.

i) Aerospace

ii) Surface transport vehicles

Also discuss the advantages and capital investment of automation of welding in the above mentioned industries.

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