Ref. No. : Ex/PG/MetIM/T/129A/2024

M.E. METALLURGICAL ENGINEERING FIRST YEAR SECOND SEMESTER – 2024
Subject: CASTING TECHNOLOGY

Time: 3hrs. **Full Marks: 100**

Instructions: Answer each group following the instruction

CO I (Answer any two questions from CO I)

1. a) Why casting process is more important than other shaping process? b) Explain the green sand-casting process. 5+5=10
2. a) Define general properties of the molding sand: i) Hot strength, ii) Thermal stability, iii) Collapsibility. 2+2+2=6

   b) How the different types of molding sand can differentiate with each other? Write down the chemical composition of the Montmorillonite class IA type sand. 2+2=4
3. a) How to prepare an AFS standard cylindrical specimen? b) How green compression test can be performed? 5+5=10

CO II (Answer any three questions from the CO II)

4. a) Explain the freezing process of pure metal. b) Explain the nucleation and growth process during solidification of pure metal poured in the mould. 5+5=10
5. a) Explain the solidification of steel containing different percentage of carbon with schematic diagram.

   b) A mould having the length of 1m, breadth of 0.5m and height of 0.25m. The cross-sectional area of gate is $10cm^2$. The total height (sprue + basin) is 0.3m. Calculate the time to filling the mould cavity for this gating system. 5+5=10
6. a) What are the different types of devices may contain in the parting gate? Explain with their uses. 1+4=5

   b) In a gating system design, a down sprue of 180mm length has a diameter of 20mm at its top end. The liquid metal in the pouring cup in mentioned up to 60 mm height. What is the diameter (in mm) of the down sprue at lower end to avoid the aspiration effect? 5
7. a) Why the Gray cast iron requires the less feeding than other alloys? What is the important of riser shape in casting? 2+3=5

   b) What are the precautions maintained during uses of external chills? Why the use of internal chills is more critical than the external chill? 3+2=5

[Turn over

CO III (Answer any two questions from the CO III)

8. Explain with suitable figure: a) Gated pattern and b) Match plate pattern. 5+5=10
9. Why the machine finish allowances and distoration allowances are important for producing the perfect casting. 5+5=10
10. a) Explain the important of use of core. 5
    b) Explain the different types of core boxes are used in the casting process. 5

CO IV (Answer any three questions from the CO IV)

11. a) What are the different types of molding uses for the steel casting process? Is the investment molds and graphite molds are suitable for the steel casting? Give answer with proper reason. 1+2+2=5
    b) What are the different types of casting defects can be observed in the steel? What are the reasons for developing this types defects? Explain. 1+4=5
12. a) Explain about the white cast iron and Nodular cast iron with their compositional details. 5
    b) Write down the advantages of Al casting and use of Mg casting. 5
13. a) What types of casting process is used to cast the high material roundness? Explain. 1+4=5
    b) Explain the plaster casting process? 5
14. Why mathematical model is important in foundry practice? What are different topics on which mathematical model can be designed? What are the classifications of mathematical model? 5+3+2=10