Code: 20ME6401

II B.Tech - II Semester – Regular Examinations – MAY 2023

ADVANCED METAL CASTING
(HONORS in MECHANICAL ENGINEERING)

Duration: 3 hours   Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

BL – Blooms Level   CO – Course Outcome

			BL	CO	Max. Marks
		UNIT-I			
1	a)	Classify the Casting? Briefly explain the steps involved in making a sand casting.	L2	CO1	7 M
	b)	Describe the different parts of an automobile that involve metal casting. For each part, list major functional requirements and identify the most suitable cast metal.	L2	CO1	7 M
		OR			
2	a)	Discuss the desirable properties of moulding sand.	L2	CO1	7 M
	b)	Classify and discuss the various types of moulding sand. What are the main factors which influence the selection of particular moulding sand for specific use?	L2	CO1	7 M

		UNIT-II			
3	a)	Classify the types of cores? Explain them with the help of sketches specifying their common applications.	L2	CO2	6 M
	b)	With the help of diagrams discuss the following types of patterns: Loose piece pattern, follow board pattern, Gated pattern and Match plate pattern.	L2	CO2	8 M
		OR			
4	a)	Differentiate between removable pattern sand mould casting process and disposable patterns and mould casting process.	L2	CO2	7 M
	b)	Discuss the following types of sand moulds : Green sand moulds, Dry sand moulds and Skin-drysand moulds.	L2	CO2	7 M
		UNIT-III			
5	a)	A 200 mm long down sprue has an area of cross-section of 650 mm^2 where the pouring basin meets the down sprue (i.e at the beginning of the down sprue). A constant head of molten metal is maintained by the pouring basin. The molten metal flow rate is 6.5×10^5 mm/s. Considering the end of down sprue to be open to atmosphere and an acceleration due to gravity of 10^4 mm/s, the area of the down sprue in mm^2 at its end (avoiding aspiration effect) should be.	L2	CO3 CO1	7 M

	b)	A sphere-shaped casting solidifies in 10 min. What will be the solidification time in minutes for another sphere of the same material, which is 8 times heavier than the original casting?	L3	CO3 CO1	7 M

<div align="center">OR</div>

6	a)	Given a mould size of 400 mm x 300 mm x (7t + 7t) mm, and a 4-cavity layout, calculate the metal-to-sand weight ratio. Assume casting yield per mould = 60%.	L3	CO3 CO1	7 M
	b)	Illustrate the macro shrinkage, centerline shrinkage, and corner crack in terms of temperature, thermal gradient, and cooling rate.	L2	CO3 CO1	7 M

<div align="center">UNIT-IV</div>

7	a)	What are different types of gates? Explain them with the help of sketches stating the relative merits and demerits of each.	L2	CO3 CO1	7 M
	b)	With neat sketch explain the Elements of Gating System?	L2	CO3 CO1	7 M

<div align="center">OR</div>

8	a)	The height of the down-sprue is 175 mm and its cross-sectional area at the base is 200 mm^2. The cross-sectional area of the horizontal runner is also 200 mm^2. Assuming	L3	CO3 CO1	7 M

		no losses, indicate the correct choice for the time (in seconds) required to fill a mold cavity of volume 106 mm^3 (Use g = 10 m/s^2)			
	b)	What are some of the undesirable consequences that could result from turbulence of the metal in the gating system and mould cavity? Explain.	L2	CO3 CO1	7 M

UNIT-V

9	a)	Briefly explain the concept of process planning.	L2	CO4 CO1	7 M
	b)	What are the main considerations in selecting a suitable casting process for a given product?	L2	CO4 CO1	7 M
OR					
10	a)	How will you determine the man, machine and material requirement of an industry to a particular Casting product?	L2	CO4 CO1	7 M
	b)	Apply the castability guidelines on additional exercises given in the appendix and suggest suitable modifications to the part geometry.	L2	CO4 CO1	7 M