SLOT: F1+TF1

REG. NO.:

24BME0225

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Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF MECHANICAL ENGINEERING
CONTINUOUS ASSESSMENT TEST - I
WINTER SEMESTER 2025-2026

Programme Name & Branch	**: B.TECH. (*Mechanical Engineering*)**
Course Code	**: BMEE302L**
Course Name	**: Metal Casting & Welding**
Faculty Name(s)	**: *Dr. Ariful Rahaman, Dr. Venkateshwarlu B, Dr. Arivazhagan N, Dr. Pandivelan C, Dr. Sreekanth M.S, Dr. Devasri Fuloria***
Class Number(s)	**: *VL2025260502813; VL2025260500994; VL2025260502819; VL2025260502821; VL2025260500993; VL2025260500992***
Date of Examination	**: 01/02/2026**
Exam Duration	**: 90 minutes** **Maximum Marks: 50**

General instruction(s):

- **Answer All Questions.**
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- Course Outcome Statements:

CO 1: Interpret the solidification characteristics for designing gating system.

CO 2: Demonstrate working principle of various casting processes.

Q. No	Question	M	CO	BL
1.	i) Sketch and explain the solidification curves for a pure metal and alloy with an example. **(5 marks)** ii) Differentiate dendritic, equiaxed, and planar solidification morphologies with neat sketches. **(5 marks)**	10	CO1	3
2.	For sand-casting of an aluminium plate (15 cm × 10 cm × 1 cm), use Chvorinov's rule with mold constant 12 min/cm^2. The riser is cylindrical (height = 1.2 × diameter). Determine the dimensions of riser to have solidification time 40% longer than the casting.	10	CO1	4
3.	A grey cast iron casting of size 200 mm × 100 mm × 50 mm with a central cylindrical hole of 40 mm diameter is to be cast. Providing the Shrinkage allowance of 10 mm/m, machining allowance of 2 mm on all external surfaces and 1 mm on the hole, and draft allowance of 1° (external), 3° (internal). Determine final dimensions of the wooden pattern.	10	CO2	4

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4.	Explain the key properties of molding sand such as refractoriness, permeability, cohesiveness, adhesiveness, and collapsibility. Discuss their importance in ensuring the defect-free castings during the sand casting process.	10	CO2	3
5.	i) State four key advantages of vacuum die casting over conventional die casting, with specific reference to mechanical properties and porosity reduction. **(5 marks)** ii) Discuss the applications, advantages, and limitations of the vacuum die casting process, including their impact on the production cost. **(5 marks)**	10	CO2	3

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