



VIT

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

REG.NO.: 24BEC0367

SCHOOL OF ELECTRONICS ENGINEERING
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2025-2026

SLOT: C2 + TC2

Programme Name & Branch : B.Tech. & Electronics and Communication Engineering
Course Code and Course Name : BECE312L-Robotics and Automation
Faculty Name(s) : Dr. Vijendra Babu D, Dr. Kathirvelan J &
Dr. Budhaditya Bhattacharyya
Class Number(s) : VL2025260102895, 0455,0519.
Date of Examination : 07 October 2025
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 Outcomes
 - 3- Distinguish and interpret the sensors for various applications in robotics and automation.
 - 4- Determine the mathematical model of Robotic systems and analyze their kinematic behaviour.

Q. No	Question	M	CO	BL
✓ 1.	✓ a) A 2880 pulse/revolution incremental encoder is connected to a shaft. It phase A, outputs 934 pulses. When the shaft is moved to a new position, what is the change in angle (deg)?	5	3	2
	✓ b) You're designing a voice-activated robotic assistant for a noisy industrial environment with frequent vibrations and fluctuating temperatures. Given the trade-offs in sensitivity, size, power consumption, and environmental robustness, would you choose a MEMS microphone, a traditional condenser microphone, an electret condenser microphone, or a piezoelectric microphone for optimal performance? Justify your choice by comparing signal fidelity, integration ease, and resilience to ambient conditions with a neat architecture diagram of the proposed acoustic sensor	5	3	2
2.	Consider a 10bits/pack is used for a data transmission. ✓ c) Compute the time require to transmit the image of 1200 x 800 pixel with 16 bits of gray level of each pixel of using 80Mbps/sec modem. ✓ d) What would be the time required for a 6Mbps/sec DSL connection. ✗ e) Repeat the part of a) & b) with when the image is RGB coloured with a frame rate of 25f/sec.	10	3	3



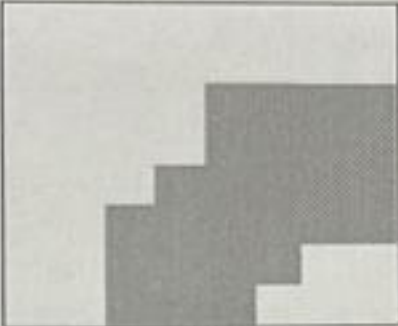
VIT

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

REG.NO.:

SCHOOL OF ELECTRONICS ENGINEERING
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2025-2026

SLOT: C2 + TC2

3. ✓	Apply Split and Merge technique to segment the 8×8 image as illustrated in Figure 4. The logical predicate $P(R_i) = \text{TRUE}$, when all the pixels in the region R_i have the same intensity. Give the result after each split and merge step. 	10	3	3
4. ✓	Identify x, y, z from the matrix and confirm the properties of the rotation matrix. $\begin{vmatrix} 0.322 & y & 0.65 & 0 \\ 0.15 & 0.755 & z & 0 \\ x & 0 & 0.4 & 0 \\ 0 & 0 & 0 & 1 \end{vmatrix}$	10	4	3
5. ✓	Are the Euler angles the same as that of roll, pitch and yaw? Find the rotation matrix equivalent to the ZYX Euler angles $(45^\circ, 45^\circ, 45^\circ)$ and prove whether ZYX Euler angles are identical to XYZ Roll-Pitch-Yaw angles.	10	4	3
