REG.NO.:

SLOT: A1

VIT

Vellore Institute of Technology

SCHOOL OF COMPUTER SCIENCE AND ENGINNERING

CONTINUOUS ASSESSMENT TEST - II

WINTER SEMESTER 2024-2025

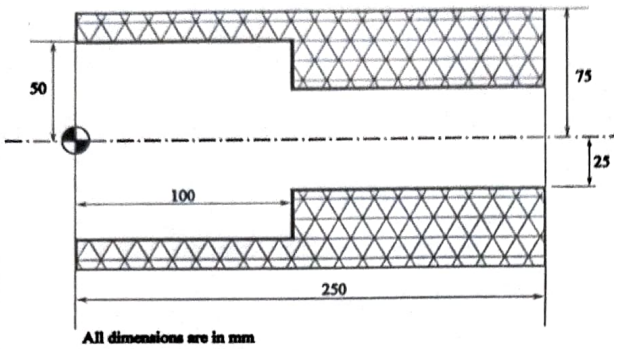
Programme Name & Branch	**: Integrated M. Tech (MIC and MID)**
Course Code and Course Name	**: CSI3016 Robotics: Machines and Controls**
Faculty Name(s)	**: Dr. Keyur Joshi, Dr. Anto S, Dr. Anindita Kundu**
Class Number(s)	**: VL2024250502100, VL2024250502096, VL2024250502102**
Date of Examination	**: 16-03-2025**
Exam Duration	**: 90 minutes** **Maximum Marks: 50**

General instruction(s):

- Answer All Questions
- Books and notes written in own handwriting permitted.

Q. No	Question	M
1.	A pharmaceutical company makes a certain cough syrup in three sizes 150ml, 250ml and 500ml. The syrup must be contained in dark glass bottles to protect it from sunlight. You are assigned to design a packaging plant that receives pallets of empty glass bottles from the supplier; production line has produced the syrup in a big batch in a holding tank and is made available to you in foodgrade steel pipeline, and each bottle is to be packed in 6x4 arrangement in a cardboard box for easy distribution. Suggest types of sensors, actuator, automation, and material handling needed. Also describe sequential flow of instructions for successful operation.	10
2.	Describe levels of automation in a big enterprise. Discuss how a car manufacturer can benefit from Flexible manufacturing system who receives car seats, bumpers, other non-metallic parts and engines from suppliers. Other car parts are forged, spot welded, assembled, and finally painted. These operations happen in different machine centers. Discuss various robot end-effectors that will have to be used in each machine centers and how material handling will be carried out between various machine centers.	10
3.	(a) A company has manual lathe as well as CNC lathe center. Relevant details are given in the table here. Determine what is the minimum batch size for CNC lathe to be advantageous? b) Calculate degree of automation in the following industry. The shop floor has 4 milling centers handled by one operator, 6 lathe centers handled by 1 operator, 1 grinder machine operated by an operator, workshop has a maintenance engineer and has an assistant. c) If maximum MRR (material removal rate) for a given lathe is 50000 mm^3/min. Maximum depth of cut allowed for rough cutting is 2mm and for finishing pass(minimum 2) is 0.15 mm. Maximum feed rate allowed is 100 mm/min. Calculate amount of time	3+2 +5

	Manual lathe (min)	CNC lathe(min)
Initial setup time	0	150
Time per part	25	15

	needed to remove all the hatched material from the stock.  All dimensions are in mm	
4.	Develop a Ladder logic diagram for the following problem. An entrepreneur wants to develop an automated coffee vending machine. - First user has to enter 10 rupee note. - Upon verification of the receipt of 10 rupee note, payment received status is stored in a relay P. - If P is set, switch on a motor connected with a helical screw to drop a paper cup under the nozzle to dispense coffee. - Then, coffee nozzle is to be switched on for 5 sec dispensing 30ml/sec. (total 150ml) - When done dispensing a buzzer beep to indicate that coffee is ready. - Reset payment received relay P.	10
5.	Draw logic circuits for the following expressions. a) $(A + B).\bar{C}$ b) $\overline{A.B} + P$ c) $\bar{A} + (\bar{B}.C + D).E$	3+3 +4

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