

Total No. of Questions : 8]

SEAT No. :

PD-4445

[Total No. of Pages : 2

[6403]-250

T.E. (Robotics & Automation)

ROBOT PROGRAMMING

(2019 Pattern) (Semester - VI) (311508 A)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagram must be drawn wherever necessary.
- 3) Use of Logarithmic Table slide rule is electronic pocket, calculators are allowed.
- 4) Figures to the right indicate full marks.
- 5) Assume suitable data if necessary.

Q1) a) Differentiate between the command structure of VAL-I and VAL- II language in Robot Programming. [8]

b) Explain how the sensory instructions for vision system using VAL-II.[9]

OR

Q2) a) Develop a program using VAL II robot programming language for a PUMA 560 robot when setting output signal at 105th port and 5V voltage supply in controller it unloads a cylindrical part of 10mm diameter, from Machine1 positioned at point P1 with coordinates (200,250,0) mm and orientation (0,90,0)° and load the part on Machine 2 positioned at P2 with coordinates(200,250,50)mm and orientation (0,90,0)°. The speed of robot motion is 40 in/s. However, because of safety precautions, the speed is reduced to 10 in/s while moving to a machine for an unloading or loading operation. [9]

b) Explain the following instruction in VAL-II with example: [8]

i) MOVET

ii) DRIVE

iii) APPRO

iv) DELAY

Q3) a) Develop a program using RAPID robot programming language using RAPID procedure for pick and place operation from point P1(500,100,50)mm to P2(-500,100,50)mm such that, it starts from *home* position and ends at *home* position. While executing the program the orientation of end effector remains same as (0,90,0)°. [9]

P.T.O.

- b) Define Motion Command. Explain at least four Move Motion Commands Used in RAPID language. Explain with examples for each Motion Command. [9]

OR

- Q4)** a) Explain the Position Instructions and Input/Signal Instructions in RAPID with the help of examples of programs. [9]
b) Define function. Explain any four function used in RAPID with the help of examples of programs. [9]

- Q5)** a) Explain the following instruction in AML with example: [9]
i) DECEL ii) STOPMOVE
iii) SETTLE iv) DMOVE
v) DELIO vi) REMONITOR
- b) Explain the following code & output when executed in AML : [9]
i) MONITOR (LED, 2,0,0,1.5, 'passed');
MOVE (ARM, fgoal, LED);
ii) ATTN:SUBR;
MOTPARMS: NEW STOPMOVE;
WAITMOVE;
BREAK (EOL, 'ATTENTION REQUESTED');
APPLY (AMOVE', MOTPARMS);
END;
iii) DMOVE(<4,5,6>,<30, 60,90>)
iv) SPEED (0.8)

OR

- Q6)** a) Define Sensor Instruction Explain any four sensor instructions with examples used in AML. [9]
b) Define Motion Control. Explain any four motion controls with examples used in AML. [9]

- Q7)** a) Define the concept of singularities. Explain the methods of detecting possible collision of robots and what are the features added to avoid it. [9]
b) Write a short note on " Robotic Economics". [8]

OR

- Q8)** a) Explain in details about "Robot cycle time analysis". [9]
b) Explain the "repeatability measurement of robot". [8]

