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Total No. of Questions : 09]

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**B.Tech. (Sem. - 6<sup>th</sup>)**

**INDUSTRIAL AUTOMATION AND ROBOTICS**

**SUBJECT CODE : PE - 408**

**Paper ID : [A0866]**

[Note : Please fill subject code and paper ID on OMR]

**Time : 03 Hours**

**Maximum Marks : 60**

**Instruction to Candidates:**

- 1) Section - A is **Compulsory**.
- 2) Attempt any **Four** questions from Section - B.
- 3) Attempt any **Two** questions from Section - C.

**Section - A**

**Q1)**

**(10 × 2 = 20)**

- a) How sampling frequency is selected in Analogue to digital conversion?
- b) Covert 101101.101 to its decimal equivalent.
- c) Write De-Morgan theorems.
- d) What is a cushion end cylinder?
- e) Define Automation.
- f) What is pressure regulating valve?
- g) What is pilot operation?
- h) Sketch a non-return type flow control valve.
- i) Name two methods by which path is controlled by robot controller.
- j) What is a work space in robot?

## Section - B

(4 × 5 = 20)

Q2) Simplify the following Boolean expressions

(a)  $Y = A.B.\bar{C} + \bar{A}.B.C + A.B.C + \bar{A}.B.\bar{C} + A.C$

(b)  $Y = A.B.\bar{C} + \bar{A}.B.C + A.B.C + A.\bar{B}.C$

Q3) What are the various transfer mechanisms? Discuss.

Q4) Discuss successive approximation method for Analogue to Digital conversion.

Q5) What is a microprocessor? Discuss the design and architecture of microprocessor with the help of a neat sketch.

Q6) How robots are classified based on coordinate system? Discuss any two of them with the help of neat sketches.

## Section - C

(2 × 10 = 20)

Q7) (a) Write ladder logic diagram for the following functions

- OR
- AND
- NAND
- NOR
- XOR

(b) Design a pneumatic valve ckt to give the sequence A+ followed by B+ and then simultaneously followed by A- and B-

Q8) What are the different fluid power control elements? Discuss.

Q9) Derive expression of voltage output for half bridge strain gauge ckt used as force sensor in robotic systems.

