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MBS-003-015401 Seat No. _____

M. Sc. (Electronics) (Sem. IV) (CBCS) Examination

April / May - 2018

Paper - 13 : Robotics

(Old Course)

Faculty Code : 003

Subject Code : 015401

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

1 Answer any **seven** from the following : **14**

(1) What are robots? What do you understand by "group" component? Explain.

(2) Explain the terms: CAD, CAM and CIM with their variants.

(3) List the various components of a robot.

(4) Write the definition of robot based on the mechanical links. Draw and explain revolute pair.

(5) What is work envelope? Explain the work envelope of Cartesian coordinate system.

(6) What is a robot end-effector? List the gripping methods you know. Write on the mechanical type of gripper.

(7) With a schematic diagram explain the working of pneumatic power supply.

(8) What are the functions of check valve, accumulator, relief valve and direction control valve ?

(9) Write the difference between servo and non-servo system.

(10) What is a teach pendant ? How it works ?

2 Answer any **two** from the following :

(a) Classify the robots Based on their characteristics, coordinate systems and the pair of joints. **7**

(b) What is "'Flexible Manufacturing Module", "Flexible Manufacturing Cell" and "Flexible Manufacturing Group"? Explain with proper diagrams. **7**

(c) Draw three DOF 2-D manipulator and discuss its forward and reverse kinematics. **7**

3 Answer the following :

(a) What is the effect of air dissolved in the fluid ? What is the measure of lubricating property of fluid? Explain how higher load (force) can be generated by the inlet of low air pressure. **7**

(b) What different types of piston pumps are available ? Write in detail on axial piston pump. **7**

OR

3 Answer the following :

(a) Write on linear hydraulic actuator. **7**

(b) Write on the rack and pinion actuator. Draw the diagram of check valve and explain the same. **7**

4 Answer the following :

(a) Draw a (two position) four-way directional control valve along with its symbol and explain. Draw and explain the working of solenoid directional control valve. **7**

(b) Draw the diagram of needle valve with its symbol and explain its working. Draw and explain the diagram of the pressure control valve and its symbol. **7**

5 Answer any **two** from the following :

(a) What is pneumatic system? Write the advantages and disadvantages of this system. Write about positive displacement compressor or reciprocating piston type compressor. **7**

(b) Write on iron core permanent magnet DC motor and surface wound permanent magnet DC motor. **7**

(c) Draw the diagram of positional feedback system for the control of a robot and explain the principle of servo control. Explain the principle of operation of stepper motor. **7**

(d) What do you understand by the pivoting or swinging type two fingered gripper ? List their types and explain each one with proper diagrams. **7**
