



NBU-003-015401 Seat No. _____

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

April / May - 2017

Robotics : Paper - XIII

Faculty Code : 003

Subject Code : 015401

Time : 3 Hours]

[Total Marks : 70

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

- (1) Define "Humanoid" and "Tele-operated system".
- (2) Write the definition of robot based on mechanical links. What is revolute pair ?
- (3) List the coordinate systems used in robotics. What is work envelope ?
- (4) With a schematic diagram, explain the working of a pneumatic power supply.
- (5) Draw the block diagram of servo control loop with positional and velocity feedback and explain the same.
- (6) Draw and explain the working of sensor based end effector.
- (7) Make a list of non-tactile sensors.
- (8) Write a task-based list of robots.
- (9) With a diagram, explain Flexible Manufacturing Cell.
- (10) Where the safety sensors be fixed in work cell ? Explain with diagram.

2 Answer any two from the following :

- (1) Define Robot. What are the laws of Robots ? How the word Robot came into existence ? List the various components of a typical robot. **7**

- (2) Write on different types of joint pairs. Explain the work envelope of Cartesian coordinate system. 7
- (3) Write on remote center compliant (RCC) devices. 7
- 3** Answer the following :
- (1) Draw three DOF 2-D manipulator and discuss its forward and reverse kinematics. 7
- (2) Draw a schematic of the hydraulic piston pump and explain its working. Draw and explain gear pump. 7
- OR**
- 3** Answer the following :
- (1) Write on double acting cushioned type cylinder. Explain rack and pinion actuator. 7
- (2) Draw the diagram of pilot operated check valve and explain the same. Also explain counter-balance valve. 7
- 4** Answer the following :
- (1) Draw and explain reciprocating type single and double stage compressor. 7
- (2) Draw and explain air pressure regulator and air lubricator. 7
- 5** Answer any two from the following
- (1) Write on PM DC motor, disc armature DC motor and brushless DC motor. 7
- (2) Draw and explain three-fingered mechanical gripper. Write the advantages and disadvantages of magnetic gripper. 7
- (3) What is robot vision ? Explain a typical robot vision system. Also write on CCD. 7
- (4) Write on thresholding and region growing. 7