	Utech
<i>Name</i> :	
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Invigilator's Signature :	

# CS/M.TECH(PE)/SEM-2/PEM-201/2012

#### 2012

### **AUTOMATION IN MANUFACTURING**

Time Allotted: 3 Hours Full Marks: 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Q. No. 7 and 8 of Group-B are compulsory. Answer any *three* questions from Group-A.

## **GROUP - A**

Answer any three questions.

- 1. State advantages and disadvantages of automation. 2 a) b) Differentiate between automatic and semi-automatic machine tools with suitable examples. Discuss the bar feeding mechanism for a Turret or a c) Capstan Lathe. 5 d) How is indexing of turret lathe done? 2. Discuss the role of Group Technology a) manufacturing facility. State the basic aspects of design and manufacturing based on which part classification is
  - b) What is the need of CAD-CAM interfacing? State with examples. How is this interface done? 4 + 3

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- 3. a) How does an Expert system play an important role in generative CAPP system? Give an example.
  - b) State the importance of monitoring of an automated plant. Briefly describe about the sensors or transducers to employ in an automated manufacturing facility for specific purposes. Show the process schematic of a monitoring system.

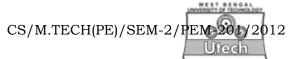
    2 + 4 + 2
- 4. a) What is meant by interchangeable tool magazine?

  Briefly state its principle of operation.
  - b) Discuss about ATC, APC and AS/RS systems and compare between each type of these systems. 6 + 4
- 5. a) Schematically show a 5 D.O.F. mobile robot with label and show the work envelope of this robot.
  - b) Write a short note on different derives for actuation of robots.
  - c) What is known as *D-H* principle ? Discuss its applications in a robotic system.
- 6. a) For a 3-D.O.F. humanoid arm type robot, show the forward kinematics and reverse kinematic equation deriving from the first principle. 3 + 7
  - b) Differentiate between cellular manufacturing with modular manufacturing. In the light of this, discuss FMC and FMM.

#### **GROUP - B**

Answer question Nos. 7 and 8 compulsorily.

- 7. Write short notes on any *four* of the following:  $4 \times 3\frac{1}{2}$ 
  - a) Swiss lathe
  - b) Tooling design in hard automation like tool compounding and multiple cuts of tooling
  - c) Use of CNC control applied to ED Ming
  - d) Principle of operation of CMM



- e) Adaptive control constraint type system
- f) B-T-R DNC system
- g) Economic viability of using transfer machines
- h) Flexibility of vertical machining centre.
- 8. a) State the importance of tool offset in CNC programming and operations in a CNC machine. How is it set?
  - b) Write a part program either using G and M-codes or APT, for making a job (A or B) as detailed in figure A and B, from a raw workpiece of 200 mm  $\times$  120 mm  $\times$ 10 mm aluminium block or Ø 50  $\times$ 200 mm Al rod. Show the tooling list and selection of process parameters. [ Use of G and M codes from respective CNC machine are allowed.]

