Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.Tech (PE)/SEM-2/PEM-201/2010

2010

AUTOMATION IN MANUFACTURING SYSTEMS AND PROCESSES

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.

Answer any *five* questions. 5 × 14 = 70

1. a) How does the Group Technology (GT) play an important role in implementation of integrated automation less system ? 3

   b) With example, discuss about the method of GT using graphical techniques. 6

   c) Compare retrieval type CAPP with generative type CAPP. 5

2. a) Briefly describe different components of computer aided production planning and control. 7

   b) What are the differences between a single machine tool and a machine tool system ? 3

   c) Discuss from economic point of view the applicability of a universal machine tool and a mass production machine tool. 4

3. a) State the differences between hard automation and flexible automation. 3

   b) What are the special features of a Swiss lathe ? Show also a skematic diagram of it. 6

   c) Compare the bar feeding mechanisms of a semiautomatics with an automatic machine. 5

4. a) "Full flexible manufacturing systems are no longer popular; but some modular and cellular versions of the FMS are applied nowadays." – Explain. 5

   b) Draw the basic building block of an FMS. 3

   c) Briefly describe the tool handling block and its working. 6

5. a) What is meant by B-T-R type DNC ? 2

   b) Compare the uses of RTV and AS/RS. 3

   c) Prepare a process plan (including the tooling list) and make a part programme to make the below – mentioned job out of a ϕ 100 × 100 mm low carbon steel rolled bar. 9

Fig. 1

6. a) State the use of CNC in EDM and forging process. 3

   b) Draw a control scheme of an Adaptive control system. 4

   c) List the toolings used and make the part programme (APT) to manufacture the plate shown in Fig. 2 from a MS plate of ϕ 200 × 10 mm size. 7

Fig. 2

7. a) State the uses of CMM. Describe its working principle. 2 + 5

   b) How does monitoring of a process line be effected when the pipings are to maintain some specified pressure and flow rate ? 7

8. a) Show the work envelop of a typical 4-D-O-F robotic system. 3

b) Describe the forward and inverse kinematics of the robotic system shown in Fig. 3 8

Fig. 3

c) Design a gripper to handle a piece of rexin cloth. 3

9. Write short notes on any *four* of the following : $4 \times 3\frac{1}{2}$

i) AGV

ii) CAT

iii) Robot vision

iv) D-H principle

v) Expert system application in manufacturing

vi) Canned cycle.