

Name :

Roll No. :

Invigilator's Signature :

CS/M.Tech (PE-OLD)/SEM-2/PEM-201/2011

2011

**AUTOMATION IN MANUFACTURING SYSTEMS
AND PROCESSES**

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

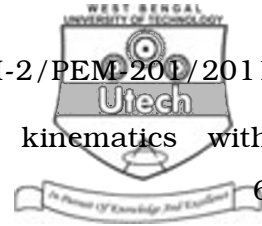
*Candidates are required to give their answers in their own words
as far as practicable.*

Answer any five questions. $5 \times 14 = 70$

1. a) With examples briefly discuss the level of automation with which self-feeding, repeat cycles and feedback are achieved. 5
- b) Explore flexibility giving reasons of the following : 6
 - i) A transfer machine
 - ii) A Swiss lathe
 - iii) A machining centre
 - iv) An FFMS.
- c) State the use of Geneva wheel giving a sketch of it. 3



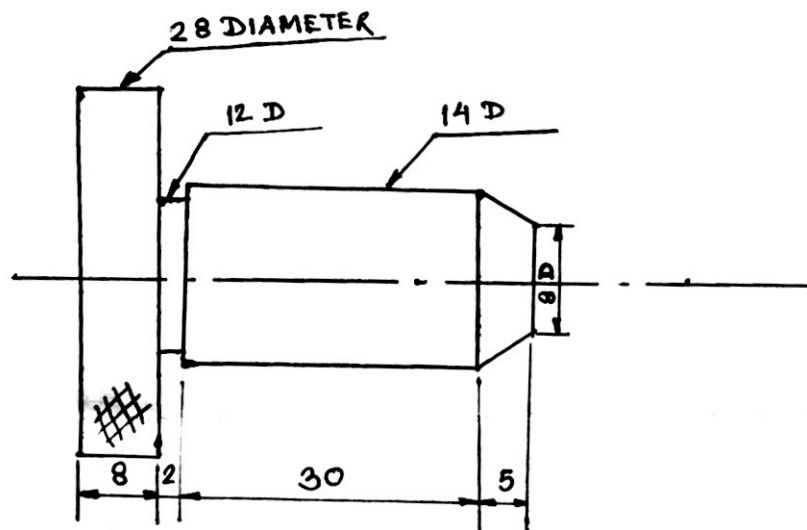
2. a) With a schematic diagram, show the advantages of using a multi-spindle drilling machine. 6
- b) Discuss about the tooling usually used in different tool stations in turret lathe. Give suitable sketches for making a knurled headed threaded bolt with tapped hole. 8
3. a) State different types of DNC systems, and compare their characteristics. 4
- b) Why are nowadays machining centres preferred over FMS ? 4
- c) Describe the uses of APC and ATC in a CIM set-up, mentioning their types. 6
4. a) Write brief notes on adaptive control systems. 6
- b) Describe any one typical process monitoring system. 6
- c) What is the use of AS/RS ? 2
5. a) "FMS implementation is dependent on group technology." Justify. 4
- b) Discuss the basic principles of operation for making a process plan by generative type CAPP system. 5
- c) Write down the steps for generating a part programme from a CAD object model. 5
6. a) State the principles of working of a CMM. 4
- b) What are the sensors used in robotics ? State reasons. 6
- c) Write a short note on drives used in robotics. 4



7. a) With examples, compare forward kinematics with inverse kinematics. 6
- b) What is the use of D – H notation in a robot ? Give example. 5
- c) Draw the work envelop of a 3 D.O.F. robot. 3
8. a) Make the process plan, and write part programme using APT or G and M code. The raw material supplied is a 30 mm diameter long rod (MS). The job to produce is detailed in figure.

(Use of standard codes is allowed.)

3 + 6



- b) How are robot and position control systems applied to a CNC machine tool ? 5