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(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2978 Roll No. | | | | | | | | | | |

B.Tech.

(SEM. VII) THEORY EXAMINATION 2011-12

COMPUTER AIDED MANUFACTURING

Time : 3 Hours *Total Marks : 100*

Note :—Attempt **all** questions.

1. Attempt any **four** parts of the following : **(5×4=20)**

   (a) Explain what is meant by levels of automation in manufacturing ? NC belongs to what level of automation ?

   (b) Give a list of manufacturing automation strategies. What strategy would you recommend for achieving high overall output from an automated manufacturing system ?

   (c) What are basic reasons for automating a production system ? Discuss, what type of automation would be most suitable for manufacturing a large variety of parts in small lots ?

   (d) Name some of the important devices used in MCU of an NC machine. What important functions are performed by CLU and DPU of a NC machine ? Discuss.

   (e) Compare the important features of NC and CNC systems.

   (f) Discuss the reasons for higher accuracy and productivity obtainable from NC machines.

2. Attempt any **four** parts of the following : **(5×4=20)**

(a) Discuss the advantages and disadvantages of :

(i) Incremental and absolute programming

(ii) Floating and fixed zero.

(b) What is the purpose of using canned cycles ? Three holes of diameter 15 mm are to be drilled as follows :

Absolute locations :	A	25, 40 (mm)
	B	60, 55 (mm)
	C	80, 75 (mm)
feed	150 mm/min	
drill speed	1400 rpm	
R-plane	2 mm above the work surface	
over-run	1 mm.	
Work thickness	20 mm	

Prepare a part programming manuscript for canned drilling cycle.

(c) Discuss the advantages and disadvantages of using paper tape for NC's. What instructions are normally included in a block of part program in WAF ?

(d) Write down the APT geometry statements for the following

(i) Line : Tangent to two circles C_1 and C_2.

(ii) Circle of radius R : Tangent to two lines L_1 and L_2.

(e) With the help of a suitable sketch illustrate the following :

(i) part surface

(ii) drive surface

(iii) and check surface

With the help of an example explain how these are incorporated in APT motion statement ?

(f) Discuss the utility of MACRO in APT part programming. Illustrate your answer with the help of a suitable example.

3. Attempt any **two** parts of the following : **(10×2=20)**

(a) Explain the purpose of position and speed control of NC machines.

The work table of a NC machine is driven by a stepper motor coupled directly to the lead screw of pitch 5.00 mm. The table is required to move 300 mm form its present position at a speed of 600 mm/min. How many pulses are required to move the table and the required pulse rate ? Stepper motor has step angle of 180.

(b) What is meant by accuracy and repeatability of a NC machine ? Explain.

Given the following data (i) perform CCW circular interpolation (ii) find the number of chords and specify the coordinates of the vertices of polygon approximating the desired circle.

Circle radius	50 mm
Center point	25, 25 (mm)
Inner tolerance	2.5 mm

(c) Explain the difference between adaptive control and feed-back control. What three functions must be performed by an adaptive controller ? Illustrate these by means of a neat sketch.

4. Attempt any **two** parts of the following : **(10×2=20)**

(a) What are the advantages and disadvantages of CAPP ? A company specializes in producing gears. Based on in-house study, 85% of the gears produced over the past 10 years belong to 11 families. Most of the drawings and process plans for these are available in files. What approach would you recommend for automating the process planning function ? Justify your recommendation.

(b) What is G.T. ? Discuss in brief, its applications in manufacturing. Give a list of the methods used for coding and classification of parts. Describe the two important types of coding schemes.

(c) What is an FMS ? Differentiate between dedicated and random-order FMS. What functions are performed by materials handling and storage systems of an FMS ?

5. Attempt any **two** parts of the following : **(10×2=20)**

(a) Describe in brief, the characteristics of robot controllers used for (i) Limited sequence control and (ii) play-back with continuous path control.

(b) List the general characteristics of the industrial work environment that tend to promote substitution of robots for human labour. What are typical material handling applications of robots in industry ?

(c) Define the term AI. Describe the forward and backward reasoning methods used in expert systems. Give an example of the same.