CNC Technology & Programming
Major Examination

Max Marks: 35   **Time: 2 hours**

Use separate answer books for Parts A & B

PART- A

1. Differentiate between   [10]

   (a) Offline and online error compensation
   (b) Quasi-static and dynamic errors
   (c) Geometric and kinematic errors
   (d) Synchronous and asynchronous errors
   (e) Point compensation and Path compensation

2. In a CNC machine error components in x and y direction were found to be given by following expressions. These errors which measure the difference between actual position reached by the tool and the programmed position is measured with respect to origin (0,0). The units here are mm.

$$\varepsilon_X = 0.005 + 0.00009\ x - 0.00001\ y$$
$$\varepsilon_Y = -0.003 - 0.00002\ x - 0.00007\ y$$

   A tool is programmed (G02) to move along a circle of diameter 100 mm with center lying at (80, 60) on above imperfect CNC machine tool. What is the maximum error for any point on the above circle. If maximum permissible error for any point on the circle is 0.004 mm, suggest a methodology to compensate above error.   [9]

3. Mention under what conditions following surfaces become doubly curved surface (non-developable).   [2]

   (a) A bi-parametric surface whose all boundary curves are straight lines
   (b) A surface of revolution obtained by revolving a straight line about an axis.

4. Explain the following terms with reference to automatic CNC program generation from CAD models   [4]

   (a) feature recognition
   (b) feature mapping
   (c) feature interaction
   (d) feature validation

5R

Q1.

60

70

60

15

20

100

200

M.S. Plate
10 MM thick
300×180

30

X10 mm wide
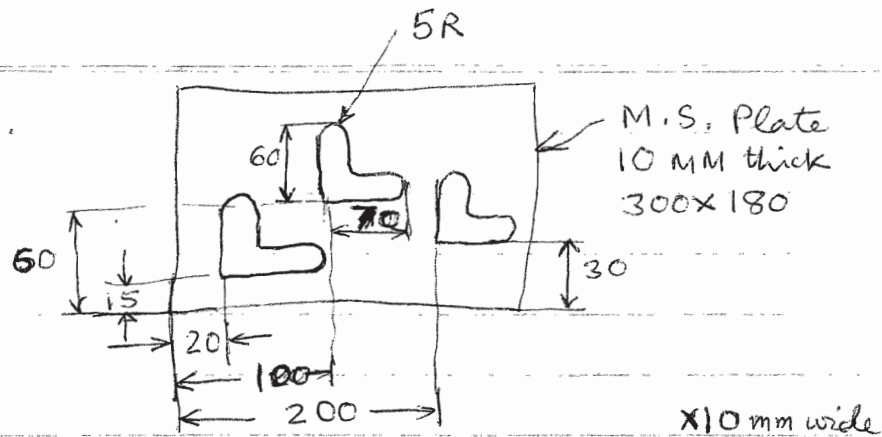
Three 'L' shaped, 60×70×3 deep Slots
are to be cut. Using MACROS, prepare
the part program for the job. Assume
speed $\frac{s}{\phi}$ = 150 rpm & feed rate = 80 mm
per minute.

Q2 (a) State at least FIVE merits of computer
aided programing.

(b) For the job shown,
write statements
as per APT.

45°

90

70

300

10