

Model Answer

subject : CNC Technology.

Note: 1) Only points are mentioned in answer

2) For CNC program, entire solution is given.

Q.1

a] → Any five points for differentiation. 05
Each point will be for 1 mark.

b] → Interpolator: _____ (2)
: Definition & importance with diagram

Helical Interpolator _____ (3)
÷ Definition
- Explanation with example.

c] → Advantages of Automation in industry (5)
- Any 5 advantages with application
- Each advantages will be for 1 Mark.

d] → Offset setting
- offset meaning _____ (1)

- X - offset setting _____ (2)
- Z - offset setting _____ (2)

e] → G & M codes _____ (2)

- Meaning
- structure
- Need

Basic motion commands _____ (3)

- Rapid Traverse (G00)
- Linear interpolation (G01)
- Circular interpolation (G02/G03)

Explain / example of each command with structure / syntax is needed.

Q.2: a] → asked for 12 marks.

- Explanation of subprogram and macros with example. _____ (07)

This should contain diagram, its program & explanation of subprogram & MACROS with respect to program only.

- Types of CNC system _____ (02)
- Features of point to point system _____ (01)
- Features of straight line system _____ (01)
- Features of contouring system _____ (01)

Q.2 b] → Asked for 08 marks

- Point to point system — (02)
- straight cut system — (03)
- contouring NC system — (03)

Each type should be explained with neat diagram, example and applications.

Q.3 a] → Asked for 08 marks.

- Machine tool maintenance has 5 types. like corrective maintenance, preventive maintenance, periodic maintenance, Total productive maintenance etc.
 - Types of maintenance — (01)
 - Explanation of any 3 type of maintenance is expected.
- Each type will have 02/03 marks.

e.g.

- i) corrective Maintenance — (02)
- ii) preventive Maintenance — (02)
- iii) Total Productive Maintenance — (03)

Q.3 b] → asked for 06 marks.

- standard tool holder diagram — (02)
- structure and Explanation — (02)
- Applications — (02)

Q.3 c] → asked for 06 marks.

i) Transducer ————— (03)

- Definition
- Types
- Need of transducers
- Applications.

ii) Positional Transducer ————— (03)

- Definition
 - Diagram
 - Working principle.
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Q.4 a] → asked for 10 marks.

i) Adaptive control system ————— (04)

- Definition
- Block diagram
- Factors to be controlled
- Working principle.

ii) ACO (Adaptive control with optimisation) — (03)
Type.

- Definition
- Block diagram
- Working
- Application.

iii) ACC (Adaptive control with constraint) — (03)

- Definition
- Block diagram
- Working
- Application

2.4 b] → asked for 10 marks.

i) Encoder _____ (02)

- Definition, types
- Working in short

ii) Applications of Encoder — (03)

- Any 3 applications
- With explanation.

iii) Inductosyn _____ (05)

- It is a type of encoder.
- Inductive position sensing device.
- A modern product from Farrand controls, USA.

Features

- Non-contact, inductive principles
- comprises of a flat, disc shaped rotor & stator.
- Energised & controlled by external set of electronics.
- Working principle.

Q.5. a] → asked for 10 marks.

i) Assumptions: e.g.

- x-finish allowance - 0.2 mm
- x finish allowance - 0.1 mm
- spindle speed - 1000 rpm
- Fanuc control program.

ii) Program:

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O1234;
N00 G21 G18;
N01 G28 G91 X0 X0;
N02 M06 T0101;
N03 M03 S1000;
N04 G00 G90 G56 X55 Z2 M08;
N05 G71 U0.5 R1;
N06 G71 P06 Q08 U0.2 W0.1 F0.8;
N07 G00 X0;
    G01 X0;
    G01 X16;
    G01 X20 Z-2;
    G01 X20 Z-25;
    G02 X30 Z-30;
    G01 Z-60;
    G01 X50 Z-70;
    G01 Z-120;
N08 G01 X55 Z2;
N09 G70 P06 Q08 F0.6;

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— 04 mark (Initialisation)

— 07 mark (G71 canned cycle)

N11 G00 X0;
 N12 G01 X0 Z0 F0.2;
 N13 G01 X16;
 N14 G01 X20 Z-2;
 N15 G01 Z-25;
 N16 G02 X30 Z-30;
 N17 G01 Z-60;
 N18 G01 X50 Z-70;
 N19 G01 Z-120;
 N20 G01 X55;
 N21 G00 X55 Z2;
 N22 G28 G91 X0 Z0;
 N23 M05 M09;
 N24 M30;

— (03)

(Finishing)

2.5 b] → asked for 10 marks.

i) Assumptions:

- assume reference position
- Tool diameter 20 mm.
- Fanuc control

ii) Program:

Milling operation

O1234;

N00 G21 G17;
 N01 G28 G91 X0 Y0 Z0;
 N02 M06 T0303;
 N04 M03 S1200;
 N05 G00 G40 G04 X-10 Y10 Z5 M08;

— (04)

marks

N08 G00 X65 Y0 Z5;
 N09 G01 X65 Y0 Z-10 F0.5;
 N10 G01 X100 Y35 Z-10;
 N11 G01 ~~X0~~ Y⁶⁵ ~~Z0~~ Z-10;
 N12 G01 X65 Y100 Z-10;
 N13 G01 X35;
 N14 G01 X00 Y65;
 N15 G01 X00 Y35;
 N16 G01 Z2;
 N17 G00 G28 G91 X0 Z0;
~~N18 M05~~ ~~M18~~

Drilling operation

N18 M06 T0202; — (drilling tool).
 N19 G00 X25 Y25 Z2;
 N20 G81 G98 Z-10 R2 F20; (drilling cycle)
 N21 X75 Y25;
 N22 X75 Y75;
 N23 X25 Y75;
 N24 G00 G80 Z10;
 N25 G28 G91 X0 Y0 Z0;

(03) Marks

Counter boring operation

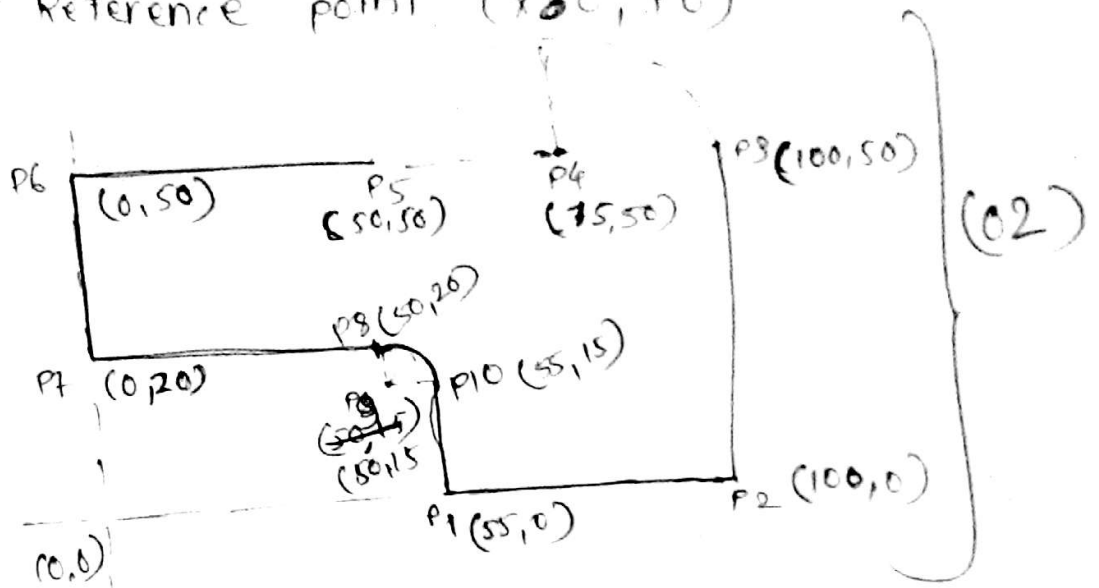
- Same as drilling
- Use G82 cycle.

(03) Marks

Q.6 a] → Asked for 10 marks.

1) Assumptions:

- Reference point (x_{00}, y_0)



Program:-

SETPT = POINT / 0,0,0

P1 = POINT / 55,0

P2 = POINT / 100,0

P3 = POINT / 100,50

P4 = POINT / 75,50

P5 = POINT / 50,50

P6 = POINT / 0,50

P7 = POINT / 0,20

P8 = POINT / 50,20

P9 = POINT / 50,15

P10 = POINT / 55,15

L1 = LINE / P1, P2

L2 = LINE / P2, P3

L3 = LINE / P5, P6

L4 = LINE / P6, P7

L5 = LINE / P7, P8

L6 = LINE / P10, P1

C1 = CIRCLE/CENTRE, P4, RADIUS, 25

C2 = CIRCLE/CENTRE, P9, RADIUS, 05

CUTTER / 150

SPINDL / 1000 CLW

FEDRAT / 60, MPM

SPINDL / ON

COOLANT / ON

~~GOTO~~ GOTO POINT / P1.

~~GORGT~~ GO FWD / L1

GO LFT / L2, TANTO, C1

GO LFT / C1, TO, P5

GO FWD / L3, PAST L4

GO RGT / L4, PAST L5

GO RGT / L5, ~~TO~~ TANTO C2

GO FWD / C2, TO P10

GO FWD / L6, PAST L1

GOTO / SETPT

COOLANT / OFF

SPINDL / OFF

REWIND

FINI

(02)

(02)

Q. 6 b] → asked for 10 marks:

i) Diagram of tool holder — (02)

ii) Any 8 specifications — (08)

Each specification is for
of mark

* END *