

BHARTIYA SKILL DEVELOPMENT UNIVERSITY
SCHOOL OF MANUFACTURING SKILLS
3rd SEMESTER, SECOND IN-SEM. EXAMINATION
WINTER SEMESTER, B.VOC. PROGRAM
SESSION 2018-2019

Course Code: SMS3003

Time (Minutes): 60

Course Name: Electropneumatics

Maximum Marks: 20

Instructions:

1. Attempt all questions.
2. Use of Calculators is prohibited.
3. Section A contains 10 Questions. Each question carries 0.5 Mark.
4. Section B contains 06 Questions. Each question carries 1 Mark.
5. Section C contains 03 Questions. Each question carries 3 Marks.

Section- A

1. What is Electricity?
 - a) Rate of flow of electron
 - b) Force of attraction between unlike charges
 - c) The form of energy contained in an atom
 - d) The product of the voltage and current.

2. In an electrical circuit, Direction of electrons is from:
 - a) The positive to the negative terminal of the source
 - b) The negative to the positive terminal of the source
 - c) The higher resistance the lower resistance
 - d) None of above.

3. In a solenoid the core material is:
 - a) Plastic
 - b) Magnet
 - c) Copper
 - d) Ferro magnet

4. A proximity sensor is a:
 - a) Reed switch consists of two tiny leaf springs, hermetically sealed into a glass tube.
 - b) Relay switch
 - c) Rocker switch
 - d) Switch, which gives a switching signal when objects pass at a close distance to it, or within rated sensing distance



5. The total resistance in parallel connection is:

- a) $\frac{1}{R_{total}} = \frac{1}{R_1} + \frac{1}{R_2} + \dots + \frac{1}{R_n}$
- b) $R_{total} = R_1 + R_2 + \dots + R_n$
- c) $R_{total} = R_1 \cdot R_2 \cdot R_3 \dots R_n$
- d) $R_{total} = R_1 - R_2 - \dots - R_n$

6. Which sensor/switch cannot be used in environments subjected to magnetic fields

- a) Reed switch
- b) Inductive sensor
- c) Capacitive sensor
- d) Optical sensor

7. Optical sensor is also known as:

- a) Inductive sensor
- b) Photoelectric sensor
- c) Capacitive sensor
- d) None of the above.

8. How many coils are used in a transformer?

- a) 4
- b) 3
- c) 2
- d) 1

9. Dynamo works on the phenomenon of:

- a) Magnetism
- b) Electromagnetism
- c) Electromagnetic Induction
- d) Kirchhoff's law

10. According to ohm's law:

- a) Current is directly proportional to voltage
- b) Voltage is inversely proportional to current
- c) Current is directly proportional to resistance
- d) Voltage is directly proportional to resistance



Section B

- 11) Write down the difference between direct current and alternating current with diagram.
- 12) Name the three types of push buttons.
- 13) Define rocker switch.
- 14) Write down any two advantages and disadvantages of capacitive sensor.
- 15) Write down any four functions of relay.
- 16) Draw a diagram of an elementary electrical circuit consist of three essential elements.

Section C

- 17) What is timer? Explain on delay timer with its internal circuit diagram.
- 18) Explain counter. Write down difference between Up counter and Down counter.
- 19) Describe relays and its principle.

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Course Code: SMS3003
Time (Minutes): 60

Course Name: Electropneumatics
Maximum Marks: 20

Answer Key

Section- A

1. What is Electricity? *Max Marks = 0.5*
c) The form of energy contained in an atom

2. In an electrical circuit, direction of electrons is from: *Max Marks = 0.5*
b) The negative to the positive terminal of the source

3. In a solenoid the core material is: *Max Marks = 0.5*
d) Ferro magnet

4. A proximity sensor is a: *Max Marks = 0.5*
d) Switch, which gives a switching signal when objects pass at a close distance to it, or within rated sensing distance.

5. The total resistance in parallel connection is: *Max Marks = 0.5*
a) $\frac{1}{R_{total}} = \frac{1}{R_1} + \frac{1}{R_2} + \dots + \frac{1}{R_n}$

6. Which sensor/switch cannot be used in environments subjected to magnetic fields *Max Marks = 0.5*
a) Reed switch

7. Optical sensor is also known as: *Max Marks = 0.5*
b) Photoelectric sensor

8. How many coils are used in a transformer? *Max Marks = 0.5*
c) 2



9. Dynamo works on the phenomenon of:

c) Electromagnetic Induction

Max Marks = 0.5

10. According to ohm's law:

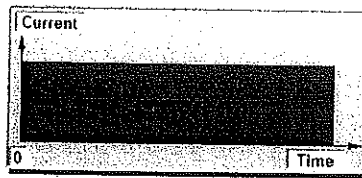
a) Current is directly proportional to voltage

Max Marks = 0.5

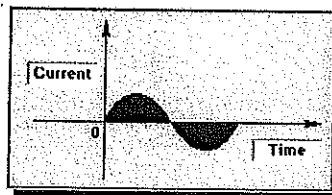
Section B

11) Write down the difference between direct current and alternating current with diagram. **Max Marks = 0.5 X 2 = 1**

Ans. **DIRECT CURRENT** - A direct current is a flow of electrons, always in the same direction and with the same strength. e.g. Battery, power supply of electrical and electronic equipment.



ALTERNATING CURRENT - An alternating current changes direction at regular intervals.



12) Name the three types of push buttons.

Max Marks = 0.33 X 3 = 1

Ans.

1. Normally open (NO) type
2. Normally closed (NC) type
3. Change over (CO) type.

13) Define rocker switch.

Max Marks = 1

Ans. Latching type switches are also called rocker switch, that is, after actuating the switch, contacts are mechanically latched. Pressing the rocker again releases the latch and switch returns to its original state.



14) Write down any two advantages and disadvantages of capacitive sensor.

Max Marks = 0.25 X 4 = 1

Ans. Advantages:

1. They are widely used because of their ability to react with wide range of materials.
2. They are suitable for detecting non-metallic objects.
3. They can be used to sense and monitor level in storage containers.

Disadvantages:

1. They are sensitive especially in humid environment.
2. Without the compensator ring, the sensor would be very sensitive to dirt, oil and other contaminants that might stick to the sensor.

15) Write down any four functions of relay.

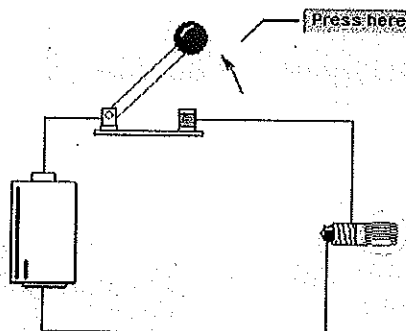
Max Marks = 0.25 X 4 = 1

- Ans. 1. Changing from a N.C. to a N.O. contact (inversion)
2. Multiplying contacts from one to any reasonable number of contacts
3. Power Amplification
4. Voltage Change
5. Memory function

16) Draw a diagram of an elementary electrical circuit consist of three essential elements.

Max Marks = 1

Ans.



Section C

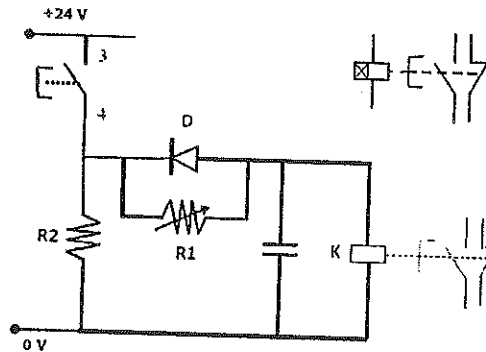
17) What is timer? Explain on delay timer with its internal circuit diagram.

Max Marks = 1 X 3 = 3

Ans. Timers are required in control systems to effect time delay between work operations. This is possible by delaying the operation of the associated control element through a timer. Most of the timers we use is Electronic timers.

- In the on-delay timer, when push button PB is pressed (ON), capacitor C is charged through potentiometer R1 as diode D is reverse-biased.
- The time taken to charge the capacitor, depends on the resistance of the potentiometer (R1) and the capacitance(C) of the capacitor.

- By adjusting the resistance of the potentiometer, the required time delay can be set. When the capacitor is charged sufficiently, coil K is energised, and its contacts are operated after the set time delay.
- When the push button is released (OFF), the capacitor discharges quickly through a small resistance (R2) as the diode by passes resistor R1, and the contacts of relay (K) return to their normal position without any delay.



18) Explain counter. Write down difference between Up counter and Down counter.

Max Marks = 1.5 X 2 = 3

Ans. An electric counter consists of a coil, associated circuits and contacts, a reset coil, manual reset, release button and a display window. Pressure the release button of the counter and entering the desired count value set the pre-determining counter. The pre-determined count value is displayed in the window.

Up counter: An up counter counts electrical signal upwards from zero. For each electrical counting pulse input to an up-counter coil, the counter value is incremented by 1. When the predetermined value has been reached, the relay picks up and the contact set is actuated.

Down counter: A down counter counts electrical signal downwards from preset value. If the count value of zero is reached the relay picks up and the contact set is actuated.

19) Describe relays and its principle.

Max Marks = 1.5 X 2 = 3

Ans. Relay is an electrically operated switch. It consists of a coil with an iron core and one or more contacts, switched by the magnetic field of the coil assembly. An electrical device, typically incorporating an electromagnet, which is activated by a current or signal in one circuit to open or close another circuit.

Principle:

When the voltage is applied to the coil, an electric current flows through the coil; a magnetic field builds up and causes the armature to be pulled into the core of winding. The switching position is maintained as long as the voltage is applied. When the voltage is removed, the armature is restored to its original position by the return spring.



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SESSION 2018-2019

Course Code: SMS3005
Time (Minutes): 60

Course Name: CNC Milling
Maximum Marks: 20

Instructions:

1. Attempt all questions.
2. Use of Calculators is prohibited.
3. Section A contains 10 Questions. Each question carries 0.5 Mark.
4. Section B contains 06 Questions. Each question carries 1 Mark.
5. Section C contains 03 Questions. Each question carries 3 Marks.

Section- A

1. Who invented NC machine?
2. CNC Stands for.....
3. What is the full form of MCU?
4. Name any input device for CNC machines.
5. What is Cartesian Coordinate system?
6. Name any type of tool holder which is being used in Vertical Milling machine.
7. G01 is named as.....
8. G94 is named as.....
9. Write only one difference between HMC (Horizontal Milling machine) and VMC (Vertical Milling Machine).
10. What do you understand by point to point tool movement.

Section- B

11. Define Climb Milling (Up Milling).
12. Define Conventional Milling (Down Milling).
13. Calculate the Spindle RPM and Feed in mm/min for the given data:
Tool- Facemill $\phi 50$ with 5 insert
 $V_c = 80$ m/min
Feed per tooth = 0.07 mm/rev.
14. Describe G83 cycle for Milling with all parameters.
15. What does dwell time in cycle means?



16. What does Cutter Radius Left hand Compensation means? Also write the same.

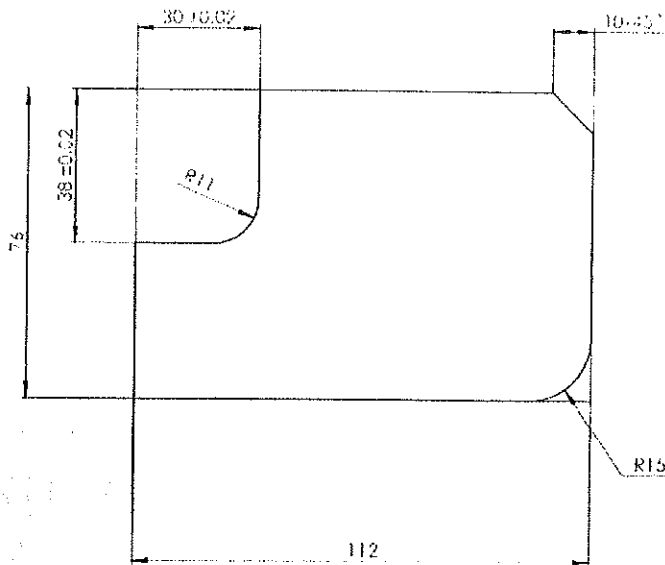
code for the

Section C

17. Write a program for the given drawing.

Total Depth: 5 mm

Depth of Cut: 0.5 mm



18. If we have done facing on workpiece of 1 mm and drilled a hole of 10 mm, now we want to chamfer that hole for 2 mm, Calculate the value of z if zero is taken on the face of the workpiece.

19. Write down the steps for setting zero at left-bottom corner.



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SESSION 2018-2019

Course Code: SMS3005
Time (Minutes): 60

Course Name: CNC Milling
Maximum Marks: 20

Instructions:

1. Attempt all questions.
2. Use of Calculators is prohibited.
3. Section A contains 10 Questions. Each question carries 0.5 Mark.
4. Section B contains 06 Questions. Each question carries 1 Mark.
5. Section C contains 03 Questions. Each question carries 3 Marks.

Section- A

- | | |
|--|-----------------|
| 1. Who invented NC machine? | 0.5 Mark |
| Ans: John Person | |
| 2. CNC Stand for..... | 0.5 Mark |
| Ans: Computer Numerical Control | |
| 3. What is the full form of MCU? | 0.5 Mark |
| Ans: Machine Control Unit | |
| 4. Name any input device for CNC machines. | 0.5 Mark |
| Ans: Keyboard | |
| 5. What is Cartesian Coordinate system? | 0.5 Mark |
| Ans: In this Coordinate system the point is specified in a plane by a pair of coordinates which are signed distance to the point from two perpendicular lines, measured in same unit length. | |
| 6. Name any type of tool holder which is being used in Vertical Milling machine. | 0.5 Mark |
| Ans: Collet type tool holder/ Weldon type / Arbor Type | |
| 7. G01 is named as..... | 0.5 Mark |
| Ans: Linear interpolation | |
| 8. G94 is named as..... | 0.5 Mark |
| Ans: Feed in mm/min | |



9. Write only one difference between HMC (Horizontal Machining Centre) and VMC (Vertical Machining Centre). 0.5 Mark

Ans:

HMC	VMC
Has horizontal spindle	Has vertical spindle
More expensive than equivalent capacity VMC but have several advantages.	Less expensive than equivalent capacity horizontal machines.

10. What do you understand by point to point tool movement? 0.5 Mark

Ans: Primary function of the PTP control system is to move a tool from one point location to another specified point, generally to do hole operations such as drilling, boring, reaming, tapping and punching.

Section- B

11. Define Conventional Milling (Up Milling). 1 Mark

Ans: In up-milling (conventional milling), the feed direction of the cutting tool is opposite to its rotation.

12. Define Climb Milling (Down Milling). 1 Mark

Ans: In down-milling (climb milling), the cutting tool is fed with the direction of rotation.

13. Calculate the Spindle RPM and Feed in mm/min for the given data: 0.5x2=1 Mark

Tool- Facemill $\phi 50$ with 5 insert

$V_c = 80$ m/min

Feed per tooth = 0.07 mm/rev.

Ans:
$$N = \frac{V_c \times 1000}{\pi \times D} = \frac{80 \times 1000}{3.14 \times 50} = 510 \text{ RPM}$$

Feed = Feed per tooth $\times N \times$ Number of cutting insert

$$= 0.07 \times 510 \times 5$$

$$= 178 \text{ mm/min}$$

14. Describe G83 cycle for Milling with all parameters. 1 Mark

Ans: G98/G99 G83 X Y Z P Q R F;

G98: Return upto start plane

G99: Return upto Withdrawal plane

X, Y: Drilling Position

Z: Drilling Depth

P: Dwell time in Microsecond

Q: Depth per cut in mm



R: Retract value

F: Feed in mm/min

14. What does dwell time in cycle means?

1 Mark

Ans: Dwell time mean tool will stop at the end position for the defined time.

15. What does Cutter Radius Left hand Compensation means? Also write the code for the same. 1 Mark

Ans: If the tool is at the left side of the contour to be worked, G41 has to be programmed.

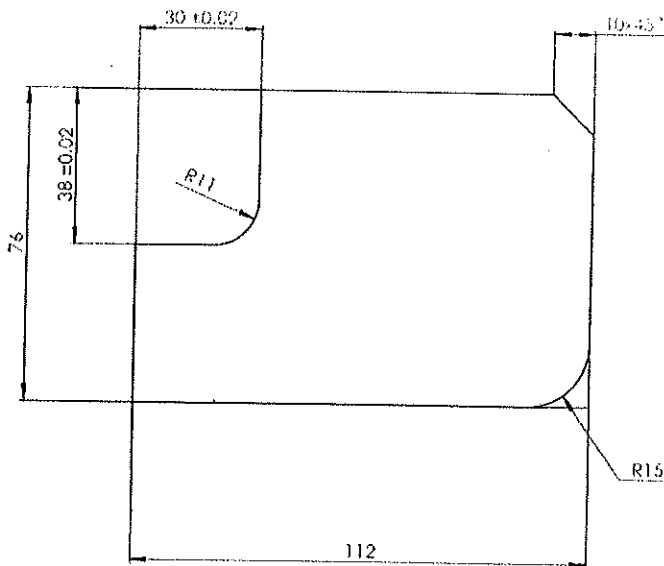
Section C

16. Write a program for the given drawing.

3 Marks

Total Depth: 5 mm

Depth of Cut: 0.5 mm



O0001;

G00 G90 G54 G40 G80 G64 F0;

T01 M06 (ENDMILL 16);

S2000 M03;

G43 H01 X-10 Y-10 Z50;

Z0

O0002 (SUB PROGRAM);

G91 Z-0.5;

G01 G90 G41 D21 X0 Y-10 F300;

Y38;

X30 R11;

Y76;

X112 C10

Y0 R15;

X-10;

G00G40 Y-10;

M99;



M98 P100002;

G00 Z50;

G91 G28 Z0;

G90 X200 Y120;

M30;

18. If we have done facing on workpiece of 1 mm and drilled a hole of 10 mm, now we want to chamfer that hole for 2 mm, Calculate the value of z if zero is taken on the face of the workpiece. **3 Marks**

Ans: Drill Diameter = 10 mm

Material removed in facing: 1 mm

Chamfer to be done: 2 mm

$$Z = 1 + \left(\frac{10+4}{2} \right) \\ = 8 \text{ mm}$$

17. Write down the steps for setting zero at left-bottom corner. **3 Marks**

Step1: clamp the edge finder in spindle

Step2: write a short program in MDI mode to rotate the spindle at 400 rpm

Step3: Touch the side face of the workpiece in x direction on which zero is to be taken

Step4: put the -5 in X relative coordinate.

Note: Edge finder diameter=10mm

Step5: Move the spindle to relative X0.

Step6: Input X Machine Coordinate in X workshift.

Step7: Touch Y side face of the workpiece with edge finder

Step8: Put -5 in Y Relative Coordinate

Step9: Move the Spindle to Relative Y0

Step10: Input Y Machine Coordinate into Y Workshift.

Step11: Verify X, Y Zero point



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Course Code: SMS3006
Time (Minutes): 60

Course Name: CNC Turning
Maximum Marks: 20

Instructions:

1. Attempt all questions.
2. Use of Calculators is prohibited.
3. Section A contains 10 Questions. Each question carries 0.5 Mark.
4. Section B contains 06 Questions. Each question carries 1 Mark.
5. Section C contains 03 Questions. Each question carries 3 Marks.

Section- A

1. Define Axis of the machine.
2. NC Stand for.....
3. Define feed.
4. Write any one block code.
5. What is polar Coordinate system?
6. M52 is named as.....
7. M01 is named as.....
8. G95 is named as.....
9. What is the unit of Cutting Velocity?
10. Name any one model code.

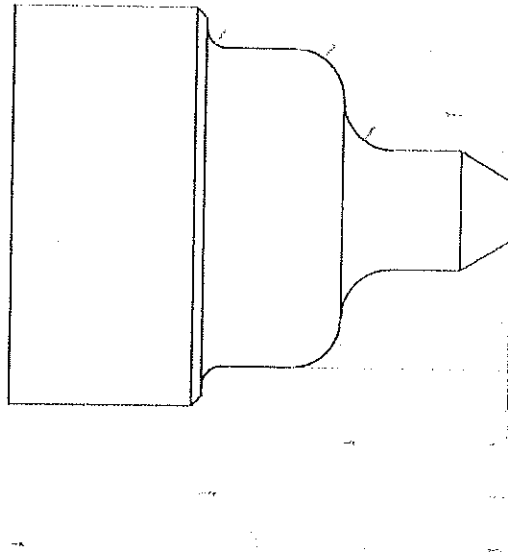
Section- B

11. What is the difference between G72 and G73?
12. What do you mean by workshift value?
13. Describe Facing cycle (G74) with all parameters.
14. Describe G83 cycle for Turning with all parameters.
15. What do you mean by model code?
16. What will be the tool position number for Right hand turning tool?



Section C

17. Write a program for the following drawing.



18. Describe grooving cycle.

19. Describe Threading Cycle (G78) with all the parameters.



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SESSION 2018-2019

Course Code: SMS3006
Time (Minutes): 60

Course Name: CNC Turning
Maximum Marks: 20

Instructions:

1. Attempt all questions.
2. Use of Calculators is prohibited.
3. Section A contains 10 Questions. Each question carries 0.5 Mark.
4. Section B contains 06 Questions. Each question carries 1 Mark.
5. Section C contains 03 Questions. Each question carries 3 Marks.

Section- A

- | | |
|---|-----------------|
| 1. Define Axis of the machine. | 0.5 Mark |
| Ans: Any movement under control of NC input is called an Axis | |
| 2. NC Stand for..... | 0.5 Mark |
| Ans: Numerical Control | |
| 3. Define feed. | 0.5 Mark |
| Ans: Distance traveled by tool in one revolution is called feed. | |
| 4. Write any one block code. | 0.5 Mark |
| Ans: G00/G01/G02/G03/G90..... | |
| 5. What is polar Coordinate system? | 0.5 Mark |
| Ans: A point is specify in a plane by a distance from the reference point and the angle from the reference direction. | |
| 6. M52 is named as..... | 0.5 Mark |
| Ans: C-Axis ON | |
| 7. M01 is named as..... | 0.5 Mark |
| Ans: Optional Stop | |
| 8. G95 is named as..... | 0.5 Mark |
| Ans: Feed mm/rev. | |
| 9. What is the unit of Cutting Velocity? | 0.5 Mark |
| Ans: m/min | |



10. Name any one model code.

0.5 Mark

Ans: G04/G28

Section- B

11. What is the difference between G72 and G73?

1 Mark

Ans: G73 :Turning Cycle

G73 U R;

G73 P Q U W F;

G72: Finishing Turning Cycle

G72 P Q F;

12. What do you mean by workshift value?

1 Mark

Ans: It is the distance between machine zero point and workpiece zero point.

13. Describe Facing cycle (G74) with all parameters.

1 Mark

Ans: G74 W R;

G74 P Q U W F;

Where:

W= Depth of Cut

R= Retract

P= Block number from which the profile will start

Q= Block number where the profile will end

U= Finishing Allowance in X direction

W= Finishing Allowance in Z direction

F= Feed in mm/rev

13. Describe G83 cycle for Turning with all parameters.

1 Mark

Ans: G98/G99 G83 X Z P Q R F;

Where:

G98= Retract up to starting plane

G99= Retract up to Withdrawal plane;

X= Drilling position

Z= Drilling Depth

P= Dwell time in microsecond

Q= Depth per Cut in micron

F= feed in mm/rev



14. What do you mean by model code?

1 Mark

Ans: these codes remain activated until it does not cancel

15. what will be the tool position number for Right hand turning tool?

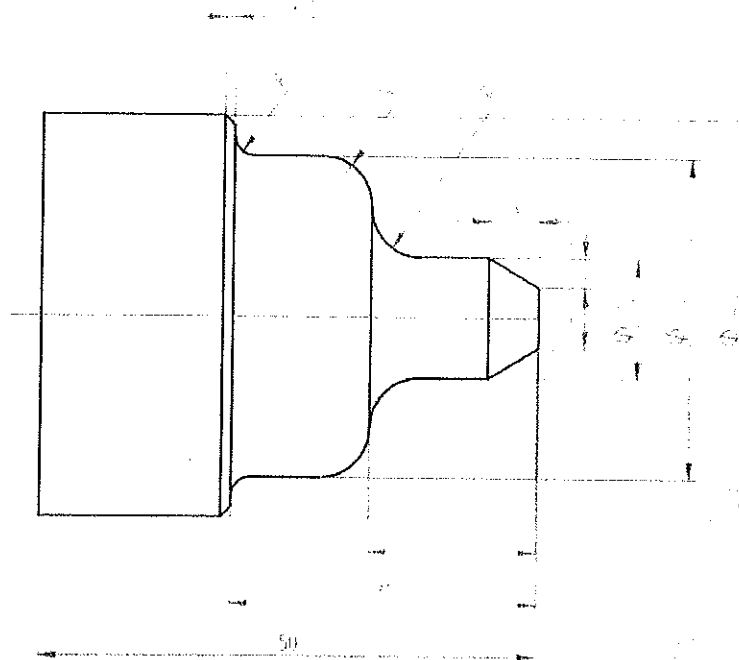
1 Mark

Ans: 4

Section C

17. Write a program for the following drawing.

3 Marks



```
O0001;
```

```
G00 G90 G80 G40 G95 F0;
```

```
T0202(Left hand 55);
```

```
G92 S4000
```

```
G96 S200 M4;
```

```
X41 Z0;
```

```
G01 X-1 F0.12;
```

```
Z0.5;
```



G00 X41 Z1;

G73 U0.5 R0.5;

G73 P30 Q70 U0.1 W0.05 F0.2;

N30 G00 X6;

N35 G01 Z0;

N40 X12 Z-5;

N45 Z-17 R5;

N50 X32 R5;

N55 Z-31 R2;

N60 X40 C1;

N65 Z-50;

N70 X41;

G97 S4000 M4;

G72 P30 Q70 F0.08;

G28 U0 W0;

M30;

18. Describe grooving Cycle

Ans: G77: Grooving Cycle

3 Marks

G77 R1;

G77 X Z P Q R2 F;

Where:

R1= retract in X direction

X= Groove Depth in diameter

Z= Groove Endpoint

P= Depth per cut in micron in X Direction

Q= Depth infeed in Z direction

R2=Retract in Z

F= Feed in mm/rev



19. Describe Threading Cycle (G78) with all the parameters.

3 Marks

Ans: G78: Threading Cycle

G78 PXXXXXX Q R;

G78 X Z R Q P F;

PXXxxx= Number of Finishing cut

PxxXXxx= Chamfer value

PxxxxXX= Thread Angle

Q= thread depth per cut in micron

R= Finishing allowance in mm

X= Minor Diameter

Z= Thread length

R= Taper Value

Q= First depth of cut in micron

P= Thread depth radial in micron

F= thread pitch

