Set - A

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Manufacturing Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, III Semester,

2nd In-Sem. Examination

Course Code: SMS1301 **Time: 1 Hour**

Course Name: CNC Milling **Max. Marks: 20**

Instructions:

1. Attempt all questions.
2. Use of Calculators is Prohibited.
3. Section A contains 05 Questions. Each question carries 1 Mark.
4. Section B contains 03 Questions. Each question carries 2 Marks.
5. Section C contains 03 Questions. Each question carries 3 Marks.

Section – A

05X01 = 05 Marks

1. **SKIP** the block in CNC ISO programming by using-
   a) &
   b) ?
   c) /
   d) %
2. M01 is used for _____.
   a) Clockwise Rotation
   b) Coolant ON
   c) Optional Stop
   d) Main Program End
3. What does "V" represents in VCGT designation of indexable inserts?
   a) Wedge angle of 80^0
   b) Clearance angle 7^0
   c) Wedge angle of 55^0
   d) Wedge angle of 35^0
4. G94 is used for-
   a) Feed/revolution
   b) Feed/min
   c) Constant spindle speed
   d) None of the above
5. Sub-program ends with-
   a) G99
   b) M30
   c) M99
   d) G30

Section – B

03X02 = 06 Marks

6. What do you understand by G-codes and M-codes?
7. Define the following:
   a) Magnetic Tape Reader
   b) Punch Tape Reader
8. Write down any four functions performed by MCU.

Section – C

03X03 = 09 Marks

9. Define the following with neat and clean figure:
   a) Machine Zero Point.
   b) Tool Mount Reference Point
   c) Workpiece Zero Point
10. Explain Open loop and Closed loop system.
11. Draw the block diagram of CNC Machine.

set - A

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Manufacturing Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, III Semester,

2nd In-Sem. Examination

Course Code: SMS1301 | **Time: 1 Hour**

Course Name: CNC Milling | **Max. Marks: 20**

Answer Key

Section – A

05X01 = 05 Marks

1. **SKIP** the block in CNC ISO programming by using-
   a) &
   b) ?
   c) /
   d) %
2. M01 is used for _____.
   a) Clockwise Rotation
   b) Coolant ON
   c) Optional Stop
   d) Main Program End
3. What does "V" represents in VCGT designation of indexable inserts?
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4. G94 is used for-
   a) Feed/revolution
   b) Feed/min
   c) Constant spindle speed
   d) None of the above
5. Sub-program ends with-
   a) G99
   b) M30
   c) M99
   d) G30

Section – B

03X02 = 06 Marks

6. What do you understand by G-codes and M-codes?

   Ans. G codes: A G code in CNC programming controls the movements of a machine, dictating how and where a machine should move to fabricate a part.
   M codes: An M code in CNC programming controls miscellaneous machine functions, including starting and stopping specific actions or programs.

7. Define the following:

   a) Magnetic Tape Reader

   Ans. Magnetic tape is a medium for magnetic recording, made of a thin, magnetizable coating on a long, narrow strip of plastic film. ... A device that stores computer data on magnetic tape is known as a tape drive. Magnetic tape revolutionized sound recording and reproduction and broadcasting.

   b) Punch Tape Reader

   Ans. Punch tape is used with some early computers as a means to store and input data into the computer. Instead of storing the data on individual cards punch tape stores data on rolls of paper containing punched holes representing the data being inputted or outputted.

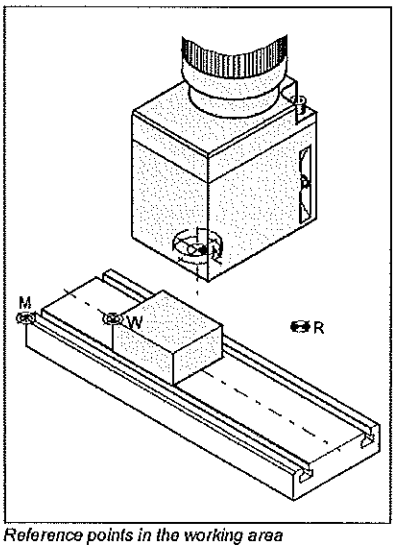
8. Write down any four functions performed by MCU.

   Ans. The various functions performed by MCU are:
   It reads the coded instructions fed into it.
   It decodes the coded instruction.
   It implements interpolation (linear, circular and helical) to generate axis motion commands.
   It feeds the axis motion commands to the amplifier circuits for driving the axis mechanisms.
   It receives the feedback signals of position and speed for each drive axis.
   It implements the auxiliary control functions such as coolant or spindle on/off and tool change.

Section – C

03X03 = 09 Marks

9. Define the following with neat and clean figure:
   a) Machine Zero Point.
   b) Tool Mount Reference Point
   c) Workpiece Zero Point



Reference points in the working area

Reference Points of the EMCO Milling Machines

M = Machine zero point
An unchangeable reference point established by the machine manufacturer.
Proceeding from this point the entire machine is measured.
At the same time "M" is the origin of the coordinate system.

R = Reference point
A position in the machine working area which is determined exactly by limit switches. The slide positions are reported to the control by the slides approaching the "R".
Required after every power failure.

N = Tool mount reference point
Starting point for the measurement of the tools. "N" lies at a suitable point on the tool holder system and is established by the machine manufacturer.

W = Workpiece zero point
Starting point for the dimensions in the part program. Can be freely established by the programmer and moved as desired within the part program.

10. Explain Open loop and Closed loop system.

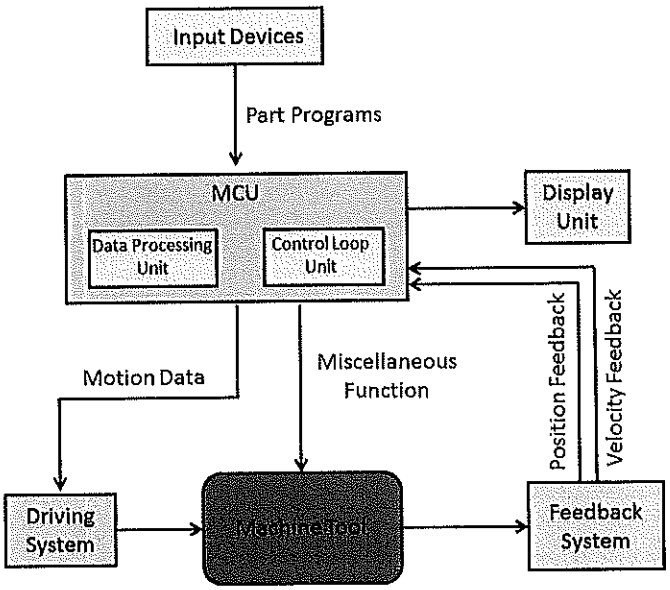
Ans. ***Open Loop System:***

Programmed instructions are fed into the controller through an input device.
These instructions are then converted to electrical pulses (signals) by the controller and sent to the servo amplifier to energize the servo motors.
The cumulative number of electrical pulses determines the distance each servo drive will move, and the pulse frequency determines the velocity.
The primary drawback of the open-loop system is that there is no feedback system to check whether the program position and velocity has been achieved. If the system performance is affected by load, temperature, humidity, or lubrication then the actual output could deviate from the desired output. For these reasons, the open-loop system is generally used in point-to-point systems where the accuracy requirements are not critical. Very few, if any, continuous-path systems utilize open-loop control.

Closed Loop System:

The closed-loop system has a feedback subsystem to monitor the actual output and correct any discrepancy from the programmed input. The feedback system could be either analog or digital. The analog systems measure the variation of physical variables such as position and velocity in terms of voltage levels. Digital systems monitor output variations by means of electrical pulses. Closed-loop systems are very powerful and accurate because they are capable of monitoring operating conditions through feedback subsystems and automatically compensating for any variations in real-time. Most modern closed-loop CNC systems are able to provide very close resolution of 0.0001 of an inch. Closed-looped systems would, naturally, require more control devices and circuitry in order for them to implement both position and velocity control. This, obviously, makes them more complex and more expensive than the open-loop system.

11. Draw the block diagram of CNC Machine.



Set. A

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Manufacturing Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, III Semester,

2nd In-Sem. Examination

Course Code: SMS1302 **Time: 1 Hour**

Course Name: CNC Turning **Max. Marks: 20**

Instructions:

1. Attempt all questions.
2. Use of Calculators is Prohibited.
3. Section A contains 05 Questions. Each question carries 1 Mark.
4. Section B contains 03 Questions. Each question carries 2 Marks.
5. Section C contains 03 Questions. Each question carries 3 Marks.

Section – A

05X01 = 05 Marks

1. Programs are executed in-
   a) Edit mode
   b) Memory mode
   c) MDI mode
   d) All of the above
2. Key used to end the block in program is-
   a) POS
   b) PROG
   c) EOB
   d) RESET
3. Tool mount reference point is denoted by-
   a) M
   b) W
   c) R
   d) N
4. G18 is used for-
   a) XY plane selection
   b) YZ plane selection
   c) XZ plane selection
   d) None of the above
5. G02 is used for-
   a) Circular interpolation clockwise
   b) Circular interpolation anticlockwise
   c) Rapid traverse
   d) Linear interpolation

Section – B

03X02 = 06 Marks

6. What do you understand by Service Life Monitoring?
7. Define Automatic Tool Changer.
8. What is tool breakage monitoring?

Section – C

03X03 = 09 Marks

9. Explain Flexible Manufacturing Cell.
10. Explain G73 Cycle.
11. Draw the block diagram of Transport system in automated manufacturing system.

Set-A

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

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School of Manufacturing Skills

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Course Code: SMS1302 | **Time: 1 Hour**

Course Name: CNC Turning | **Max. Marks: 20**

Answer Key

Section – A

05X01 = 05 Marks

1. Programs are executed in-
   a) Edit mode
   b) Memory mode
   c) MDI mode
   d) All of the above
2. Key used to end the block in program is-
   a) POS
   b) PROG
   c) EOB
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3. Tool mount reference point is denoted by-
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   c) XZ plane selection
   d) None of the above
5. G02 is used for-
   a) Circular interpolation clockwise
   b) Circular interpolation anticlockwise
   c) Rapid traverse
   d) Linear interpolation

Section – B

03X02 = 06 Marks

6. What do you understand by Service Life Monitoring?

   Ans. With **service life monitoring** all tools operating times are recorded by the machine control and compared with the target service life. The remaining tool service life is displayed on the screen and must be longer than the duration of the next tool operation.

7. Define Automatic Tool Changer.

Ans. An Automatic tool changer or ATC is used in computerized numerical control (CNC) machine tools to improve the production and tool carrying capacity of the machine. ... Generally, it is used to improve the capacity of the machine to work with a number of tools. It is also used to change worn out or broken tools.

8. What is tool breakage monitoring?

Ans. Tool breakage monitoring. Optical breakage monitoring makes sense when using fragile tools such as thin drills. The infra-red beam of a transmitter is directed on to the drill bit before and after the drilling process and the reflected infra-red radiation measured. If the infra-red reading differ this indicates a drill breakage and triggers a program for automatic tool change.

Section – C

03X03 = 09 Marks

9. Explain Flexible Manufacturing Cell.

Ans. A flexible manufacturing cell is created if, for example, a machining centre with work piece magazine and an overhead loading robot are connected to form a unit.
The magazine system supplies the machine tool with blanks and receives the finished work pieces over, for example, an 8-hour shift.
Besides individual machines, two identical machines are often used as a flexible manufacturing cell for medium batch sizes.

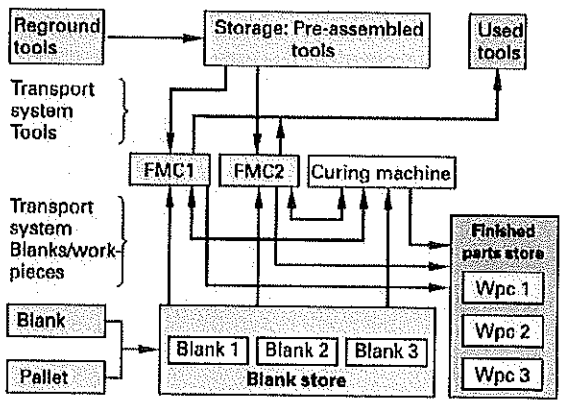
10. Explain G73 Cycle.

G73 Contour turning cycle

Format
N... G73 U_1... R...
N... G73 P... Q... U_2+/-... W+/-... F... S... T...

first block	U_1 [mm]	depth of cut, incremental, without sign, in the drawing shown as U_1
	R [mm]	retract height
second block	P.....	block number of the first block for the programmed shape
	Q.....	block number of the last block for the programmed shape
	U_2 [mm]	distance and direction of finishing offset in X direction (diameter or radius designation), in the drawing shown as $U_2/2$
	W [mm]	Distance and direction of finishing offset in Z direction, incremental, without sign
	F, S, T	Feed, speed, tool

11. Draw the block diagram of Transport system in automated manufacturing system.



Set - B

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Manufacturing Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, III Semester,

2nd In-Sem. Examination

Course Code: SMS1302 **Time: 1 Hour**

Course Name: CNC Turning **Max. Marks: 20**

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Section – A

05X01 = 05 Marks

1. New programs are prepared in-
   a) Edit mode
   b) Memory mode
   c) MDI mode
   d) All of the above
2. Key used to see the absolute and machine coordinates is-
   a) POS
   b) PROG
   c) EOB
   d) RESET
3. Reference point is denoted by-
   a) M
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4. G17 is used for-
   a) XY plane selection
   b) YZ plane selection
   c) XZ plane selection
   d) None of the above
5. G03 is used for-
   a) Circular interpolation clockwise
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   c) Rapid traverse
   d) Linear interpolation

Section – B

03X02 = 06 Marks

6. What do you understand by Service Life Monitoring?
7. Define Automatic Tool Changer.
8. What is tool breakage monitoring?

Section – C

03X03 = 09 Marks

9. Explain Flexible Manufacturing Cell.
10. Explain G73 Cycle.
11. Draw the block diagram of Transport system in automated manufacturing system.

Set B

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Manufacturing Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, III Semester,

2nd In-Sem. Examination

Course Code: SMS1302 **Time: 1 Hour**

Course Name: CNC Turning **Max. Marks: 20**

Answer Key

Section – A

05X01 = 05 Marks

1. New programs are prepared in-
   a) **Edit mode**
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   d) All of the above
2. Key used to see the absolute and machine coordinates is-
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   c) **R**
   d) N
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   a) Circular interpolation clockwise
   b) **Circular interpolation anticlockwise**
   c) Rapid traverse
   d) Linear interpolation

Section – B

03X02 = 06 Marks

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Section – C

03X03 = 09 Marks

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	U_2 [mm]	distance and direction of finishing offset in X direction (diameter or radius designation), in the drawing shown as $U_2/2$
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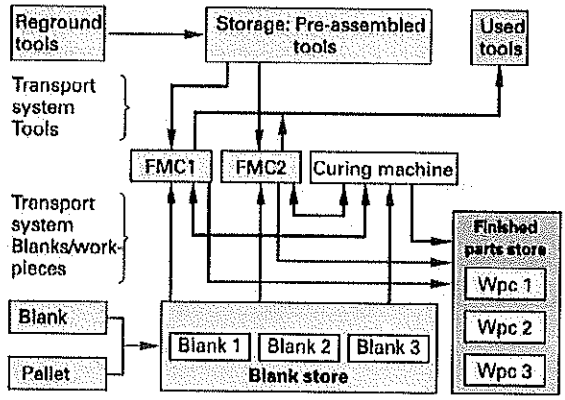
	F, S, T	Feed, speed, tool

11. Draw the block diagram of Transport system in automated manufacturing system.



Set - A

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Manufacturing Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, III Semester,

2nd In-Sem. Examination

Course Code: SMS1305 **Time: 1 Hour**

Course Name: Material Science **Max. Marks: 20**

Instructions:

1. Attempt all questions.
2. Use of Calculators is Prohibited.
3. Section A contains 05 Questions. Each question carries 1 Mark.
4. Section B contains 03 Questions. Each question carries 2 Marks.
5. Section C contains 03 Questions. Each question carries 3 Marks.

Section – A

05X01 = 05 Marks

1. _____ increases strength, toughness & corrosion resistance.
   a. Nickle
   b. Cobalt
   c. Chromium
   d. Manganese
2. "S 235 JRC+C" defines the material-
   a. Mild steel
   b. Copper
   c. Aluminum
   d. Brass
3. Electrical melting process is a type of-
   a. Oxidizing
   b. Refining
   c. Carburizing
   d. None of the above
4. _____ describes the ability of a material to conduct the electric current.
   a. Thermal Conductivity
   b. Density
   c. Electrical Conductivity
   d. None of the above
5. Density of Copper in Kg/dm^3 is-
   a. 1.0
   b. 2.7
   c. 8.9
   d. 11.3

Section – B

03X02 = 06 Marks

6. Define material science and also write the importance of material science.
7. Explain the ferrous and non-ferrous material in detail.
8. Define Yield Point.

Section – C

03X03 = 09 Marks

9. Write the short notes on the following:
    a. Carbon steel
    b. Tool steel
    c. Alloy Steel
    d. Designation of Mild Steel
10. Explain toxic substances and harmful substances.
11. Describe heavy metals and light metals.

SOL-M

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Manufacturing Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, III Semester,

2nd In-Sem. Examination

Course Code: SMS1305 **Time: 1 Hour**

Course Name: Material Science **Max. Marks: 20**

Answer Key

Section – A

05X01 = 05 Marks

1. _____ increases strength, toughness & corrosion resistance.
   - **a. Nickle**
   - b. Cobalt
   - c. Chromium
   - d. Manganese
2. "S 235 JRC+C" defines the material-
   - **a. Mild steel**
   - b. Copper
   - c. Aluminum
   - d. Brass
3. Electrical melting process is a type of-
   - a. Oxidizing
   - **b. Refining**
   - c. Carburizing
   - d. None of the above
4. _____ describes the ability of a material to conduct the electric current.
   - a. Thermal Conductivity
   - b. Density
   - **c. Electrical Conductivity**
   - d. None of the above
5. Density of Copper in Kg/dm^3 is-
   - a. 1.0
   - b. 2.7
   - **c. 8.9**
   - d. 11.3

Section – B

03X02 = 06 Marks

6. Define material science and also write the importance of material science.

Ans. Materials science, the study of the properties of solid materials and how those properties are determined by a material's composition and structure.

Importance of the material science:

1. Material science is important to study about the properties of material
2. to understand the micro structure of the material
3. It is also necessary for better understanding the material composition
4. to understand the extraction and manufacturing process of material

7. Explain the ferrous and non-ferrous material in detail.

Ferrous metals contain iron and non-ferrous metals do not. Non-ferrous metals are rarer, more valuable and resistant to corrosion, than ferrous metals. Ferrous and non-ferrous metals are both recyclable.

Ferrous metals list:

- Cast Iron
- Stainless Steel
- Carbon Steel
- Engineering Steel
- Wrought Iron

Ferrous metals list:

- Aluminum
- Cooper
- Nickel
- Chromium etc.

8. Define Yield Point.

Ans. The tensile stress that exists immediately before the material starts to lengthen is referred to as the Yield point R_e. It is equal to the force Fe divided by the bar cross section S_0 and is a physical parameter (limit value) characteristic of a material's load capacity without significant plastic deformation.

Section – C

03X03 = 09 Marks

9. Write the short notes on the following:

a. Carbon steel

b. Tool steel

c. Alloy Steel

d. Designation of Mild Steel

Ans.

a. Carbon steels are by far the most produced and used, accounting for about 90 percent of the world's steel production.
    1. Low carbon steel
    2. Medium carbon steel
    3. High carbon steel

b. Tool steel: Tool steel refers to a variety of carbon steel and alloy steel that are particularly well-suited to be made into tools. Their suitability comes from their distinctive hardness, resistance to abrasion and deformation, and their ability to hold a cutting edge at elevated temperatures. As a result, tool steels are suited for use in the shaping of other materials

c. Combining carbon steel with one or more alloying element to increase their Characteristics i.e hardness, toughness, brittleness. Some alloying elements are-

a) Chromium:-It is used to increase hardness, toughness or wear resistance of steel.
b) Cobalt:-It improves high temperature resistance of steel.
c) Nickel:-It increase strength, toughness & corrosion resistance.
d) Manganese:-It Increase surface hardness & resistance to strain.
e) Molybdenum:-It increase fatigue strength or resistance to shock & heat.

d. Designation of steel

S 235 JRC+C

S: Type of steel (Structural steel)
235: Min. yield strength (MPa)
JR: Quality grade Impact testing energy
C1: Suitable for cold flanging
C2: Cold work Hardened

10. Explain toxic substances and harmful substances.

Ans. Toxic Substances:
The metals lead (Pb) and cadmium (Cd) are toxic, if for example they are inhaled as a fine dust. Their use must be restricted to a minimum. The exhaust air must be extracted and the work area must be well ventilated if these substances are processed, e.g. when soldering using Pb and Cd containing soft solder. This also applies when welding. The inhalation of cooling lubricant mist must also be avoided when machining using cooling lubricant.
Harmful Substances:
Extremely harmful substances, such as cold cleaner liquids, must be avoided. If this is not possible, they must be stored in locked facilities so that any contact with them is prevented.

11. Describe heavy metals and light metals.

- **Heavy metals (density greater than 5 kg/dm^3):** Heavy metals include copper, zinc, chromium, nickel and lead. They are predominantly used for their special material properties.

— Copper as winding wires for example, due to its good electrical conductivity.

— Chromium and nickel as alloying elements in steel for example, in order to achieve or improve certain properties.

- **Light metals (density less than 5 kg/dm^3):** Light metals include aluminium, magnesium and titanium. In some cases, these may represent light materials with a very high strength. Their main area of application is lightweight components, e.g. for cars and aircraft.