



School of Manufacturing Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, III Semester,

1st In-Sem. Examination

Course Code: SMS1301

Course Name: CNC Milling

Time: 1 Hour

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. What is the full form of CNC?
 - a) Computer Number Control
 - b) Computer Number Center
 - c) Computer Numerical Control
 - d) Computer Numerical Code
2. MCU stands for-
 - a) Multi-control unit
 - b) Machine Control Unit
 - c) Main Control Unit
 - d) None
3. _____ controls are used to manage multiple NC machines by a central computer.
 - a) NC
 - b) CNC
 - c) DNC
 - d) All of the above
4. Which one is not an element of CNC?
 - a) MCU
 - b) Display Unit
 - c) Input Devices
 - d) None of the above
5. Which one is an Input device?
 - a) Display Unit
 - b) Punch Tape Reader
 - c) Both
 - d) None



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Section – B

03X02 = 06 Marks

6. What do you understand by Feedback system in CNC machines?
7. Define the following:
 - a) CNC
 - b) DNC
8. Write down any four functions performed by MCU.

Section – C

03X03 = 09 Marks

9. Write down any six differences between NC and CNC machines.
10. Explain Open loop and Closed loop system.
11. Draw the block diagram of CNC Machine.



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Answer Key

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5. Which one is an Input device?
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 - c) Both
 - d) None

Section – B

03X02 = 06 Marks

6. What do you understand by Feedback system in CNC machines?

Ans. This system consists of transducers that acts like sensors. It is also called as measuring system. It contains position and speed transducers that continuously monitor the position and speed of the cutting tool located at any instant. The MCU receives the signals from these transducers and it uses the difference between the reference signals and feedback signals to generate the control signals for correcting the position and speed errors.



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7. Define the following:

a) CNC

b) DNC

Ans. CNC means computer numerical control. This means a computer converts the design produced by computer aided design software (CAD), into number. The numbers can be considered to be coordinates of a graph and they control the movement of the cutter. Computer numerical control is a method for automating control of machine tools through the use of software embedded in a microcomputer attached to the tools it is commonly used in manufacturing for machine and plastic parts.

With DNC controls, programs are managed for multiple NC machines by a central computer.

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. Write down any six differences between NC and CNC machines.

S.No.	NC Machines	CNC Machines
1	It is defined as the machine which is controlled by the set of instructions in the form of numbers, letters and symbols. The set of instructions is called as Program.	It is defined as the machine which is used to control the motions of the work piece and tool with the help of prepared program in computer. The program is written in alphanumeric data.
2	In NC machines, the programs are fed into the punch cards.	In CNC machines, the programs are fed directly into the computer by a small keyboard similar to our traditional keyboard.
3	Modification in the program is difficult.	Modification in the program is very easy.
4	High skilled operator is required.	Less skilled operator is required.
5	Cost of the machine is less.	Cost of the machine is high.
6	Maintenance cost is less.	Maintenance cost is high.
7	The programs in the NC machine cannot be stored.	In CNC machines, the programs can be stored in the computer and can be used again and again.
8	It offers less flexibility and computational capability.	It offers additional flexibility and computational capability.



9

Less accuracy.

High accuracy.

10

It requires more time for the execution of the job.

It takes very less time in the execution of the job.

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.

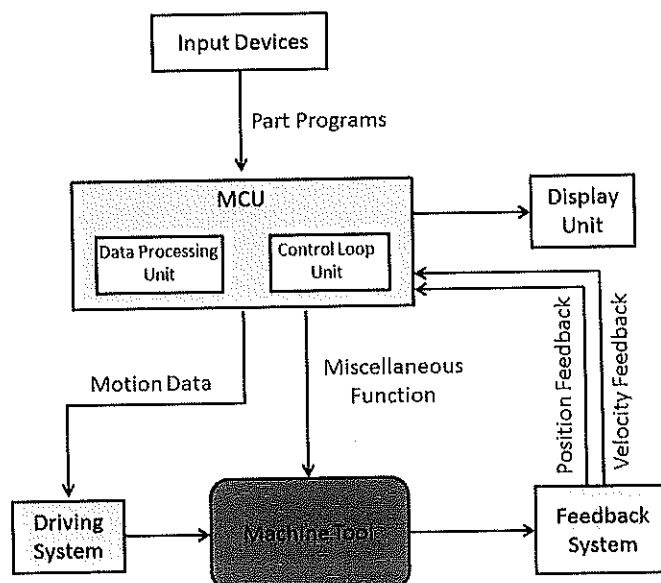
The cumulative number of electrical pulses determines the distance each servo drive will move, and the pulse frequency determines the velocity.

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.







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Registration No.:

School of Manufacturing Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, III Semester,

1st In-Sem. Examination

Course Code: SMS1304

Course Name: Pneumatics

Time: 1 Hour

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. The Fluid use to transmit power in Pneumatics is-
 - a) Air
 - b) Water
 - c) Oil
 - d) Liquid
2. A hydraulic system operates at a pressure up to-
 - a) 10-12 bar
 - b) 7-8 bar
 - c) 400 bar
 - d) 700 bar
3. Fluid power system is based on-
 - a) Bernoulli's principle
 - b) Gas law
 - c) Avogadro's law
 - d) Pascal law
4. The Function of Tank is to-
 - a) maintain a pressure range
 - b) drain water content
 - c) prevents from pressure fluctuation
 - d) remove dust particles from a
5. When $PV=\text{Constant}$, if we increase the volume then pressure will-
 - a) Remains constant
 - b) Decrease
 - c) Increase
 - d) none of these



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Section – B

03X02 = 06 Marks

6. Define Pressure and Pascal Law.
7. Draw the symbol of OR and AND element and explain the difference between them. Also write their another name.
8. Draw the symbol of FRL unit. Also write it's another name and full form.

Section – C

03X03 = 09 Marks

9. What are the types of linear Actuators? Draw symbols and also write their functions.
10. What is Air Production system? Explain all the components of Air production system.
11. Explain any five differences between *Pneumatic System* and *Hydraulic System*



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Course Name: Pneumatics

Time: 1 Hour

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Answer Key

Section – A

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 - a) maintain a pressure range
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 - c) **prevents from pressure fluctuation**
 - d) remove dust particles from a
5. When $PV=Constant$, if we increase the volume then pressure will-
 - a) Remains constant
 - b) **Decrease**
 - c) Increase
 - d) none of these

Section – B

03X02 = 06 Marks

6. Define Pressure and Pascal Law.

- **Pressure** is defined as force per unit area. The standard unit for pressure is the Pascal, which is Newton per square meter.



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$$P = \frac{F}{A} = \frac{N}{mm^2}$$

This unit is small and to avoid huge number, we use bar.

$$100,000 \text{ pa} = 100\text{KPa} = 1\text{bar}$$

A pressure in the pneumatics is over-pressure (above the atmosphere pressure) and referred as gauge pressure.

A pressure below the atmosphere is under pressure or vacuum. **The standard atm. Pr is 1.013 bar.**

Pascal law

- An external pressure applied to a fluid in a closed vessel is uniformly transmitted throughout the fluid.

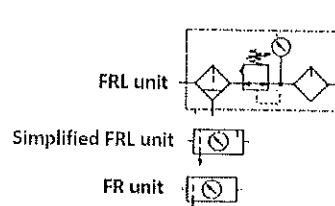
$$P_1 = P_2$$

$$\frac{F_1}{A_1} = \frac{F_2}{A_2}$$

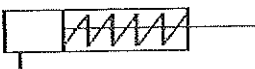
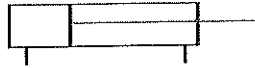
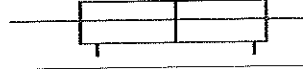


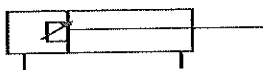
7. Draw the symbol of OR and AND element and explain the difference between them. Also write their another name.

1.	OR element/shuttle valve		It provide output when we gives any input
2.	And element/dual pressure valve		It only provide output when we gives both side input

8. Draw the symbol of FRL unit. Also write it's another name and full form
- It is a combine unit of Filter, Pressure regulator and Lubricator elements
 - It's also known as Air service unit.



9. What are the types of linear Actuators? Draw symbols and also write their functions.

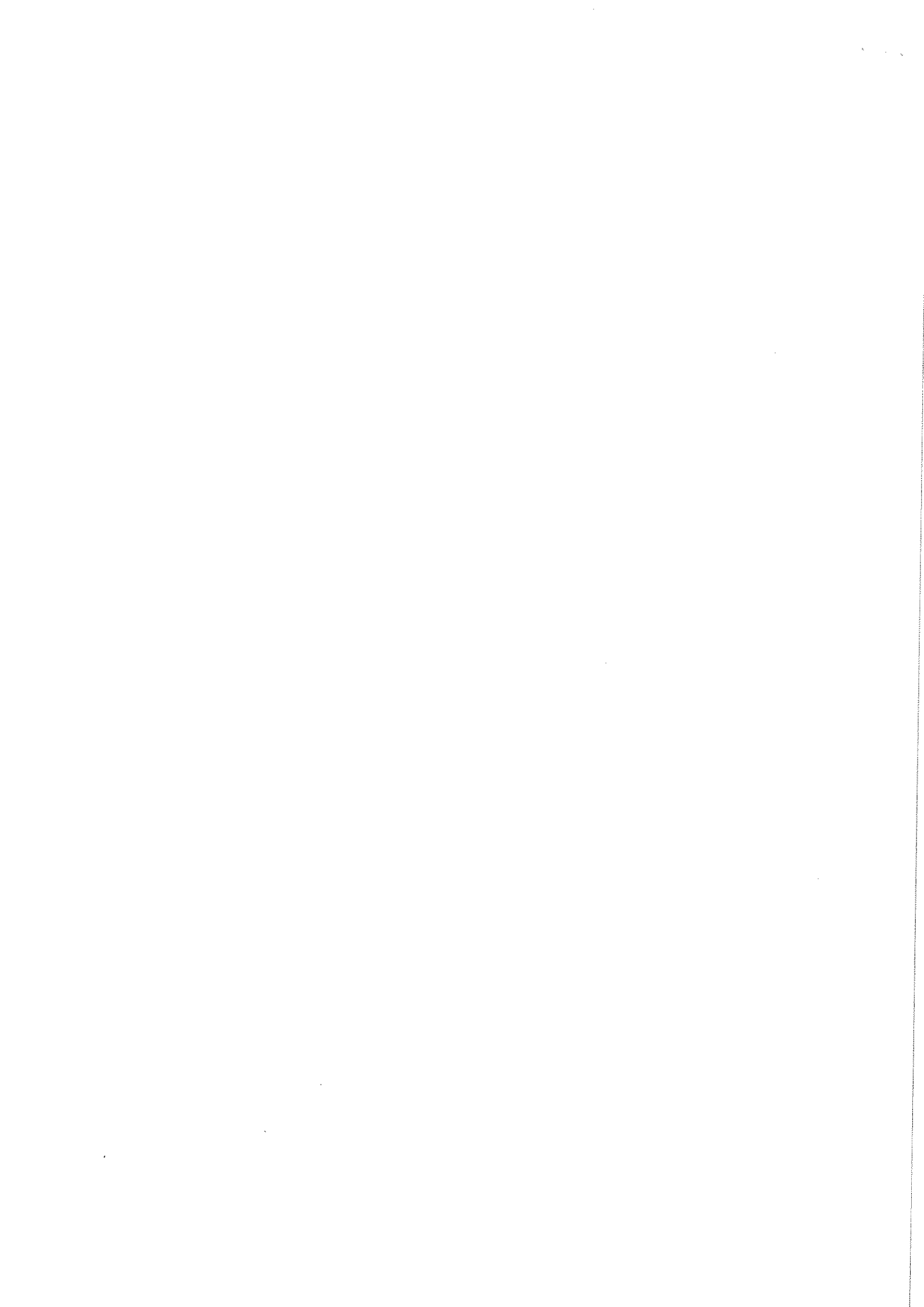
Symbol	Function
	Single acting cylinder with spring return. Air pushes the piston in one direction and piston returns by spring.
	Double acting cylinder –single piston rod: The force exerted by compressed air moves the piston in both directions.
	Double acting cylinder –double piston rod: It has piston rods extending from both ends of the cylinder. It produces equal force and speed on both sides of the cylinder.
	Telescopic cylinder –double acting is used where space is constraint. It is used for long stroke application like in pneumatic cranes, dump trucks, lift fork trucks, dipper wagon, etc.
	Double acting cylinder – Fixed cushion on one side: Cushioning is used in the end position to prevent sudden impact which otherwise may damage parts.
	Double acting cylinder – variable cushion on one side: Fixed cushion on one side, cushioning is variable in one direction by adjusting the orifice opening.

10. What is Air Production system? Explain all the components of Air production system.

Air Compressor	Pressure gauge
Electric motor	Auto/manual drain
pressure switch	Safety valve
check valve	Air dryer
Tank	line Filter

11. Explain any five differences between *Pneumatic System* and *Hydraulic System*

S. No.	Hydraulic System	Pneumatic System
1.	It uses a pressurized liquid as a fluid	It uses compressed gas, usually air, as a fluid
2.	An oil hydraulic system operates at pressure up to 700 bar operates at 10–12 bar	A pneumatic system usually
3.	Generally designed as closed system	Usually designed as open system
4.	Valve operations are difficult	Valve operations are easy
5.	Heavier in weight	Lighter in weight
6.	Pumps are used to provide pressurized liquids compressed gases	Compressors are used to provide





School of Manufacturing Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, III Semester,

1st In-Sem. Examination

Course Code: SMS1305

Course Name: Material Science

Time: 1 Hour

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 What is carbon percentage in steel?
(a) 0.008-0.025%
(b) 2-4%
(c) 2-6.67%
(d) 0-2%
- 2 Which one is an artificial material?
(a) Granite
(b) Glass
(c) Graphite
(d) Wood
- 3 Pig iron is manufactured from which furnace?
(a) Blast furnace
(b) Cupola furnace
(c) Puddling furnace
(d) None of them
- 4 Which one is a mechanical property of material?
(a) Heat conductivity
(b) Corrosion resistance
(c) Thermal conductivity
(d) Brittleness
- 5 What is carbon percentage for low carbon steel?
(a) 2-4%
(b) 4-6.67%
(c) 0.6-2%
(d) 0-0.3%



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Section – B

03X02 = 06 Mark

- 6 What is iron casting alloy?
- 7 Difference between alloy and composite.
- 8 What is Steel?

Section – C

03X03 = 09 Marks

- 9 Write down chemical properties of material.
- 10 What are physical properties of metal?
- 11 Write down mechanical properties of material.



School of Manufacturing Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, III Semester,

1st In-Sem. Examination

Course Code: SMS1305

Course Name: Material Science

Time: 1 Hour

Max. Marks: 20

Answer Key

Section – A

05X01 = 05 Marks

- 1 What is carbon percentage in steel?
(a) 0.008-0.025%
(b) 2-4%
(c) 2-6.67%
(d) **0-2%**
- 2 Which one is an artificial material?
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(a) 2-4%
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Section – B

03X02 = 06 Marks

6 What is iron casting alloy?

IRON CASTING ALLOYS

It is an iron based material. It contains more than 2 % carbon and may contain other elements.



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Alloy cast irons are the casting alloys which are based on the iron (Fe) – carbon (C) – silicon (Si) system. They contain one or more alloying elements intentionally added to improve one or more properties.

Alloying elements, including Si when it exceeds about 3 %, are usually added to increase the strength, hardness, harden ability, or corrosion resistance of the basic iron and are often added in quantities sufficient to affect the occurrence, properties, or distribution of constituents in the micro-structure.

In gray and ductile cast irons, small amounts of alloying elements such as chromium (Cr), molybdenum (Mo), or nickel (Ni) are added primarily to achieve high strength or to ensure the attainment of a specified minimum strength in heavy sections.

7 Difference between alloy and composite.

Alloys-

Alloys are mixture of iron & carbon and may contain other elements also. Carbon percentage in alloys are less than 2 %. Alloys should have iron elements for example steel.

Composite-

Composite are mixture of two or more elements. Composite material doesn't have iron element for example Ceramics, white cement

8 What is Steel?

Steel is an alloy of Iron, Carbon and other elements.

It has high tensile strength and low cost

It is a major component used in buildings, infrastructure, tools, ships, machines etc.

Steel are material whose main component is iron that generally have a carbon content of less than 2%

It is produced by rolling to form semi-finished and finished products.

Section – C

03X03 = 09 Marks

9 Write down chemical properties of material.

Chemical properties concern the material transforming impact of environmental influences and aggressive substances (active media) as well as high temperatures on the materials.

Corrosion Stability:

It describes the behavior of a material under the destructive influence of humid air, industrial atmosphere, polluted water or other aggressive substances. The destruction of a material starting at its surface due to chemical and electrochemical processes is referred to as corrosion.

Materials such as stainless steels as well as many copper and aluminium materials are corrosion resistant. Un alloyed and low alloy steels as well as cast iron are not corrosion resistant when exposed to humid air or industrial atmospheres; they rust.

Corrosion can be prevented for a long period of time by surface treatment, e.g. painting or coating.

Scaling resistance:

It describes the reaction behavior of materials at high temperatures.

Flammability:

The flammability of some materials, such as plastics, may also have to be taken into account when selecting a material.



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10 What are physical properties of metal?

The physical properties describe the material properties irrespective of its shape. They are specified by physical quantities.

Density: The density of a material is equal to the mass of a body divided by its volume.

Density can be visualized as the mass of a cube with each edge having length 1 dm. Units of density include kg/dm^3 , g/cm^3 or t/m^3 for solids and liquids as well as kg/m^3 for gases.

Melting point (melting temperature): The melting point is the temperature at which a material starts to melt.

It is started in degrees Celsius ($^{\circ}\text{C}$) or Kelvin (K). Pure metals have a specific melting point. Alloys, such as steels and CuZn alloys have a melting range

Electric Conductivity: Electric conductivity describes the ability of a material to conduct the electric current.

Silver, copper and aluminium are good electrical conductors. They are used as conductor materials. Substances that do not conduct electricity are referred to as insulators. These include plastics, ceramics and glass.

Thermal Conductivity: Thermal conductivity measures a material's ability to conduct heat.

Metals, especially copper, aluminium and iron or steel, have high thermal conductivity. Plastics, glass and air have low thermal conductivity. They are used for thermal insulation.

11 Write down mechanical properties of material?

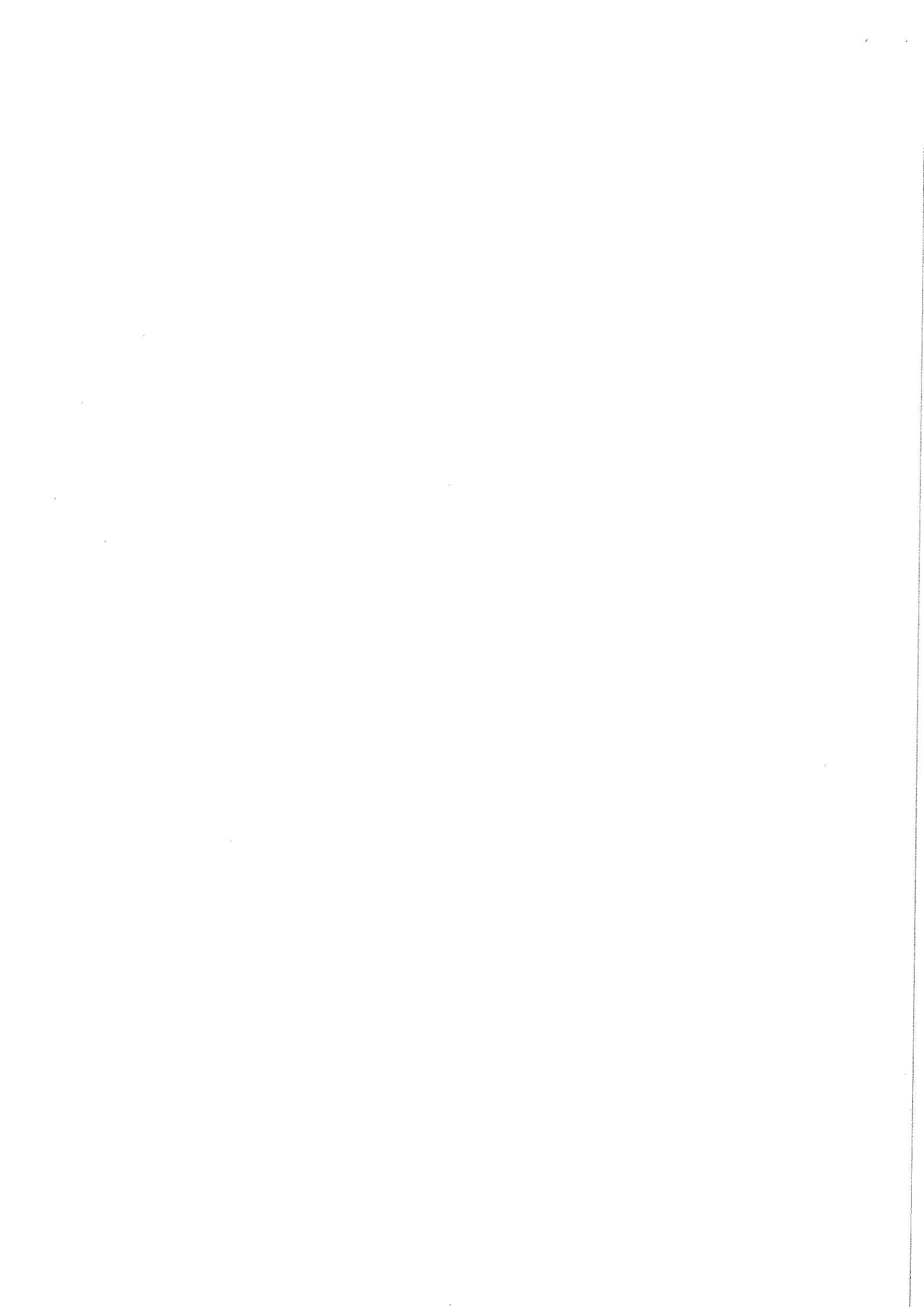
Elastic and plastic deformation:

Different materials deform quite differently when placed under load. For Example, a saw blade made from hardened tool steel can be bent and springs back to its original, straight form after the force is removed. This behaviour is referred to as elastic deformation or material elasticity.

Toughness: Material is referred to as tough if its elastic-plastic deformation under heavy loading remains small and there is extreme resistance to deformation. Structural and stainless steels are examples of tough materials.

Brittleness: A material is referred to as brittle if it fractures into pieces when exposed to impact. Ceramic material and glass as well as some types of cast iron and incorrectly hardened steels are brittle.

Hardness: Hardness refers to the resistance with which a material counters indent formation by a test indenter. Hard materials include hardened steel and hard metals. Soft materials include aluminium and copper.





School of Manufacturing Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, III Semester,

1st In-Sem. Examination

Course Code: SMS1307

Course Name: Manufacturing Processes

Time: 1 Hour

Max. Marks: 20

Instructions:

1. Attempt all questions.
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Section – A

05X01 = 05 Marks

1. Metal forming is a process in which the metal is deformed plastically to get into the desired shape.
 - a. True
 - b. False
2. Which of the following processes is not the type of bulk forming process in the metal forming?
 - a. Bending
 - b. Rolling
 - c. Forging
 - d. Extrusion
3. Rolling is a forming process in which thickness of the metal plate is decreased by increasing its length.
 - a. True
 - b. False
4. Which of the following metal forming processes is best suitable for making the wires?
 - a. Forging
 - b. Extrusion
 - c. Drawing
 - d. Rolling
5. Which of the following casting techniques is the best technique for casting tubes and hollow pipes?
 - a. Die Casting
 - b. Slush Casting
 - c. Centrifugal Casting
 - d. Investment Casting



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Section – B

03X02 = 06 Marks

6. Define Manufacturing Process and Also classify it with neat and clean chart?
7. Define the following:
 - b) Bulk forming
 - c) Sheet metal forming
 - d) Powder metallurgy forming
8. Write the difference between hot working and cold working process (any six)

Section – C

03X03 = 09 Marks

9. Answer the following questions.
 - a. Define metal casting process and write the basic six steps for casting.
 - b. Define the following
 - Pattern
 - Runner
 - Gate
 - Drag & Cope
10. Write the definition of the Joining and Welding Process. Also describe the oxy-fuel welding in details with diagram.
11. Draw the chart for classification of welding process



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Course Code: SMS1307

Time: 1 Hour

Course Name: Manufacturing Process

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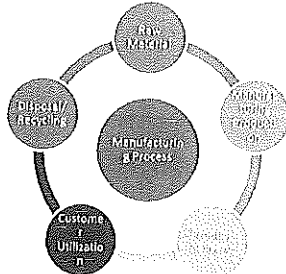
Section – B



6. Define Manufacturing Process and Also classify it with neat and clean chart?

Answer

Manufacturing is the production of goods through the use of labour, machinery, tools and biological or chemical processing or formulation. Manufacturing can either mean transforming raw materials into finished goods on a large scale, or the creation of more complex items by selling basic goods to manufacturers for the production of items such as automobiles, aircraft, or household appliances.



7. Define the following:

- b) Bulk Forming-Bulk deformation refers to the use of raw materials for forming which have low surface area to volume ratio.
- c) Sheet metal Forming-Sheet metal forming processes are those in which force is applied to a piece of sheet metal to modify its geometry rather than remove any material
- d) Powder metallurgy forming- which deals with the powder material.

8. Write the difference between hot working and cold working process (any six)

Hot working	Cold working
Hot working is carried out above the recrystallization temperature but below the melting point, hence deformation of metal and recovery takes place simultaneously	Cold working is carried out below the recrystallization temperature and as such, there is not the appreciable recovery of metal
During the process, residual stresses are not developed in the metal	During the process, residual stresses are developed in the metal
Because of higher deformation the temperature used, the stress required for deformation is less	The stress required to cause deformation is much higher
Hot working refines metal grains, resulting properties.	Cold working leads to distortion of grains
Due to oxidation and scaling, poor surface finish is obtained	Cold worked parts carry better surface finish.

Section – C

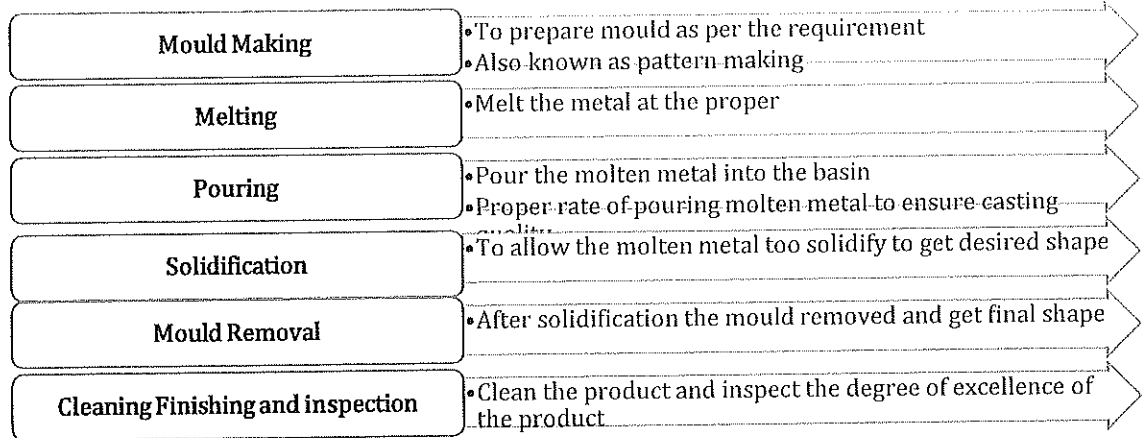
9.

- a. Define metal casting process and write the basic six steps for casting.

Answer



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b. Define the following

- Pattern –It is replica of Mould
- Runner_ It is a way to flow molten metal into the cavity
- Gate- A point of entering into cavity to fill the mould
- Drag & Cope- The complete process of casting is divided into two parts, first is cope and second is drag.

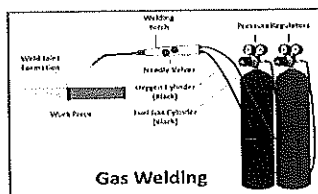
10. Write the definition of the Joining and Welding Process. Also describe the oxy-fuel welding in details with diagram.

Answer

Joining process is one of the manufacturing process by which two or more materials can be permanently or temporarily joined or assembled together with or without the application of external element in order to form a single unit"

Welding is defined as the joining of metals by heat with or without pressure, and with or without the addition of other (filler) materials, to obtain a homogeneous and interlocking or fused joint.

The strength of the joint is often equal to that of the base materials.



11. Draw the chart for classification of welding process

