BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Metal Construction Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, 3rd Semester,

2nd In-Sem. Examination

Course Code: MCS1301 **Time: 1 Hour**

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

Instructions:

1. Attempt all questions.
2. Use of Calculators is allowed.
3. Section A contains 05 Questions. Each question carries 1 Marks.
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

Q.1 In forming process the physical shape is-

A. Partially deformed B. Permanently deformed

C. Un-deformed

Q.2 ratio of location of the neutral line from inside of the bend to the material thickness is called-

a.) Inner radius b.) Outer radius

c.) Bend allowance d.) K- Factor

Q.3 which type of shape can be produced by using bending process?

a.) V-Shape b.) U-Shape

c.) channel shape d.) All of the above

Q.4 One centimeter is equivalent to

a) 10 mm b) 1 mm

c) 0.1 mm d) 100 mm

Q5. What thing allows bent metal to come back towards its original shape?

a.) Spring back b.) bend allowance

c.) bend deduction d.) this is not the case of bending

Section – B

03X02 = 06 Marks

Q.6 What is the sheet metal?

Q.7 What is the roll bending process?

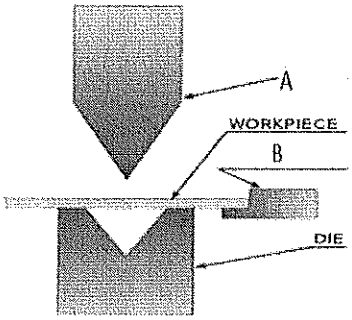
Q.8 Write the advantages of bending process (any two).

Section – C

03X03 = 09 Marks

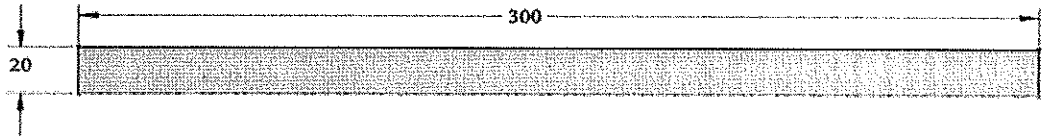
Q.9 What is the bend allowance and bend deduction.

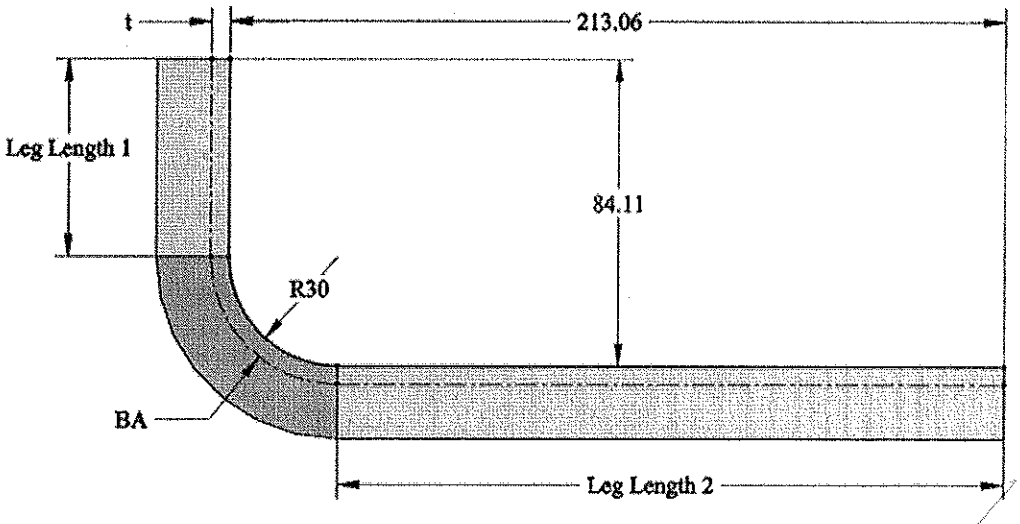
Q.10 Write the name of A and B in the given image.



Q.11 Consider a sheet with a 20 mm thickness and a length of 300 mm as shown in Figure. The bending tool has a radius of 30 mm. Calculate the following:

- Bend Allowance
- K-Factor, and
- Bend Deduction





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Section – A

05X01 = 05 Marks

Q.1 In forming process the physical shape is-

A. Partially deformed B. Permanently deformed

C. Un-deformed

Ans. B

Q.2 ratio of location of the neutral line from inside of the bend to the material thickness is called-

a.) Inner radius b.) Outer radius

c.) Bend allowance d.) K- Factor

Ans. d

Q.3 which type of shape can be produced by using bending process?

a.) V-Shape b.) U-Shape

c.) channel shape d.) All of the above

Ans. d

Q.4 One centimeter is equivalent to

a) 10 mm b) 1 mm

c) 0.1 mm d) 100 mm

Ans. A

Q5. What thing allows bent metal to come back towards its original shape?

a.) Spring back b.) bend allowance

c.) bend deduction d.) this is not the case of bending

Ans. a

Section – B

03X02 = 06 Marks

Q.6 What is the sheet metal?

Ans. Sheet metal is any metal in the sheet form, which is thicker than 0.4 mm and thinner than 6mm.

Q.7 What is the roll bending process?

Ans. In roll bending process, a mechanical jig having three rollers used to bend a metal bar into a circular arc. The rollers freely rotate about three parallel axes, which are arranged with uniform horizontal spacing. Two outer rollers, usually immobile, cradle the bottom of the material while the inner roller, whose position is adjustable, presses on the topside of the material.

Q.8 Write the advantages of bending process (any two).

Ans. 1. Bending is a cost-effective near net shape process when used for low to medium quantities.
2. Parts usually are lightweight with good mechanical properties.

Section – C

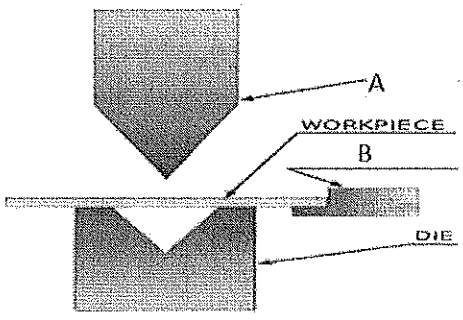
03X03 = 09 Marks

Q.9 What is the bend allowance and bend deduction.

Ans. Bend allowance :- The *bend allowance* (BA) is the length of the arc of the neutral line between the tangent points of a bend in any material.

Bend deduction:- he bend deduction BD is defined as the difference between the sum of the flange lengths (from the edge to the apex) and the initial flat length.

Q.10 Write the name of A and B in the given image.

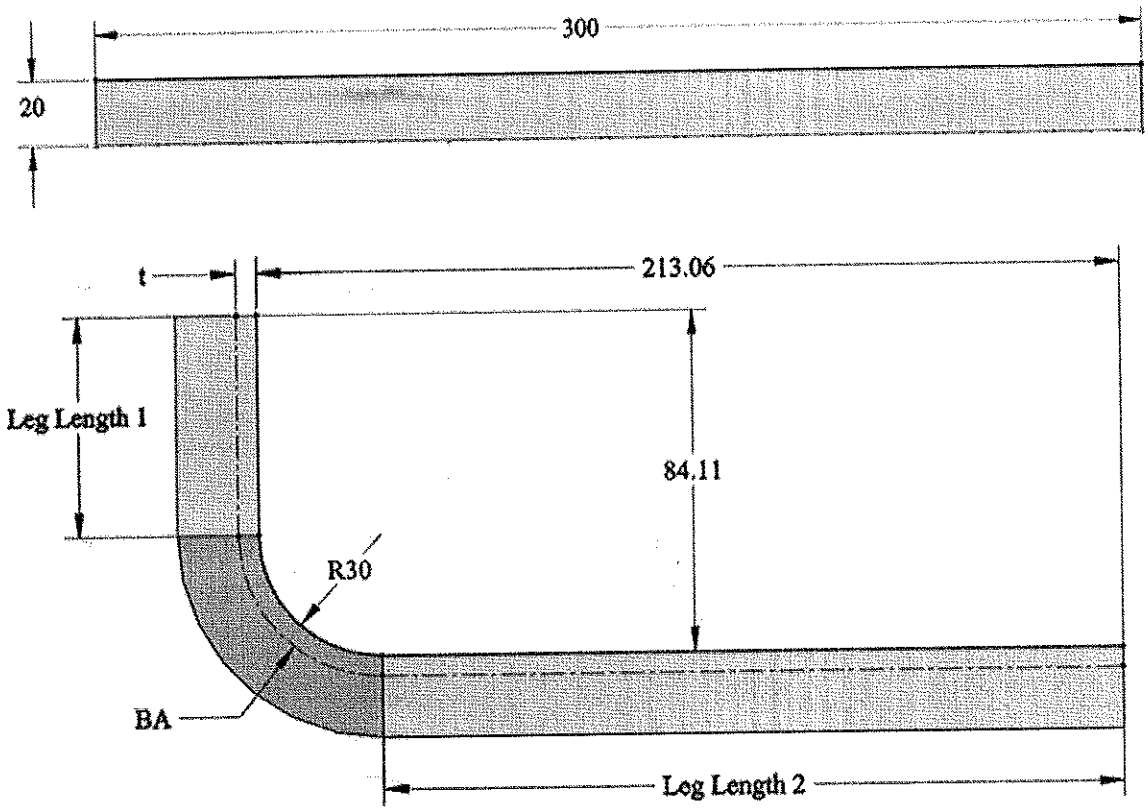


Ans. A is the Punch

B is the back gauge

Q.11 Consider a sheet with a 20 mm thickness and a length of 300 mm as shown in Figure. The bending tool has a radius of 30 mm. Calculate the following:

- Bend Allowance
- K-Factor, and
- Bend Deduction



Ans.

$$Leg\ Legnth\ 1 = 84.11 - R = 84.11 - 30 = 54.11$$

$$Leg\ Legnth\ 2 = 213.06 - R = 213.06 - 30 = 183.06$$

At the neutral axis we have:

$$Initial\ Length = Leg\ Legnth\ 1 + BA + Leg\ Length\ 2$$

In this formula the initial length is 300 mm. By replacing Initial Length, Leg Length 1 and 2 in the above equation we can calculate the Bend Allowance as follows:

$$300 = 54.11 + BA + 183.06$$

$$BA = 62.83$$

We know that BA is the length of the arc on the neutral axis. The length of the arc for this scenario can be calculated as:

$$BA = \frac{2 * \pi * R'}{4}$$

Where R' is the radius of the arc on the neutral axis. By inserting the Bend Allowance value in the above equation we reach to:

$$R' = \frac{2 * BA}{\pi} = \frac{2 * 62.83}{\pi} = 40$$

Now if we subtract R from R' we can find the distance of the neutral axis (t) from the inner face:

$$t = R' - R = 40 - 30 = 10\,mm$$

From the K-Factor equation we have:

$$K = \frac{t}{T} = \frac{10}{20} = 0.5$$

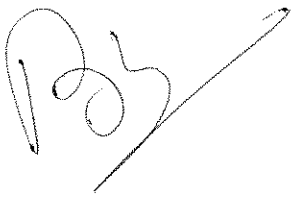
Now we calculate the Bend dedection:

Outside Setback (OSSB) = Bend Radius + Material Thickness

= 30 + 20 = 50 mm

Bend Dedection = 2x OSSB – Bend Allowance.

= 2x50 – 62.83 = 37.17mm



BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Metal Construction Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 3rd Semester,

2nd In-Sem. Examination

Course Code: MCS1302 **Time: 1 Hour**

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

Instruction:

1. Attempt all questions.
2. Use of Calculators is prohibited.
3. Section A contains 05 Questions. Each question carries 1 Marks.
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

Q1. CNC stands for

(a) control numeric center

(b) computer numeric center

(c) computer numeric control

(d) none of the above

Q2. As the thickness of sheet is increased the clearance needed will also?

a) Increase

b) Decrease

c) No effect

d) First decreases and then increase

Q3. The cutting force in punching and blanking operations mainly depends on

a) yield strength of material

b) shear strength of material

c) fracture point

d) bending strength of material

Q4. Arrange the below operations in operator controlled machine tool in correct order.

(A) Operator

(B) Process planning

(C) Machine tool

(D) Component drawing

(E) Completed component

a.) (A) – (D) – (B) – (C) – (E)

b.) (D) – (B) – (C) – (A) – (E)

c.) (B) – (D) – (C) – (A) – (E)

d.) (D) – (B) – (A) – (C) – (E)

Q.5 Which material can be punched by the use of the CNC press punch?

a) Mild Stee

b) Stainless Steel

c) Aluminium

d) All of the above

Section – B

03X02 = 06 Marks

Q6. What is CNC punching?
Q7. Write down the steps for removing the Punching tool.
Q8. Write applications of cnc punching?

Section – C

03X03 = 09 Marks

Q9. Define the following terms-
a. Notching
b. Lancing
c. trimming

Q10. What are advantages and disadvantages of cnc punching?

Q11. Explain the following term:
- Piercing
- Blanking

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Section – A

05X01 = 05 Marks

Q1. CNC stands for

(a) control numeric center

(b) computer numeric center

(c) computer numeric control

(d) none of the above

Ans. c) computer numeric control

Q2. As the thickness of sheet is increased the clearance needed will also?

a) Increase

b) Decrease

c) No effect

d) First decreases and then increase

Ans. a) Increase

Q3. The cutting force in punching and blanking operations mainly depends on

a) yield strength of material

b) shear strength of material

c) fracture point

d) bending strength of material

Ans. b) shear strength of material

Q4. Arrange the below operations in operator controlled machine tool in correct order.

(A) Operator

(B) Process planning

(C) Machine tool

(D) Component drawing

(E) Completed component

a.) (A) – (D) – (B) – (C) – (E)

b.) (D) – (B) – (C) – (A) – (E)

c.) (B) – (D) – (C) – (A) – (E)

d.) (D) – (B) – (A) – (C) – (E)

Ans. b) (D) – (B) – (A) – (C) – (E)

Q.5 Which material can be punched by the use of the CNC press punch?

a) Mild Stee

b) Stainless Steel

c) Aluminium

d) All of the above

Ans. d)

Section – B

03X02 = 06 Marks

Q6. What is CNC punching?

Ans. Computer numerically controlled (CNC) punching is a sheet metal manufacturing process that is carried out by CNC punch presses. These machines can be either a single head and tool rail (Trumpf) design or multi-tool turret design.

The processing range for most CNC punch presses is 0.5mm to 6.0mm thick in a range of materials including steel, zinc, galv. steel, stainless steel and Aluminium. The choice of hole punched can be as simple as a circle or rectangle right through to special shapes to suit a specific cut out design.

Q7. Write down the steps for removing the Punching tool.

Ans. Removing tools

1. Remove the punch from the upper turret disk.
2. Loosen the bolt fixing the upper die holder.
3. Remove the upper die holder from the lower turret disk.
4. Lightly tap the upper part of the die with the standard accessory brass bar. The die is loosened for easy removal.
5. Remove the die from the upper die holder.

Q8. Write applications of cnc punching?

Ans. By using a combination of single hits and overlapping geometries, complex sheet metal component shapes can be produced. The machine may also punch 3D forms such as dimples,

taptite® screw thread plunges, and electrical knockouts etc. on either side of the sheet, which are often employed in sheet metal enclosure design. Some modern machines may have the ability to tap threads, fold small tabs, punch sheared edges without any tool witness marks making the machine very productive within the component cycle time. The instruction to drive the machine to create the desired component geometry is known as the CNC program.

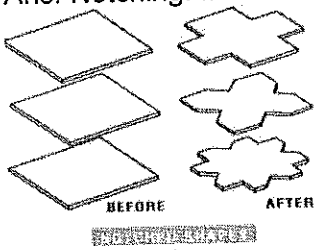
Section – C

03X03 = 09 Marks

Q9. Define the following terms-

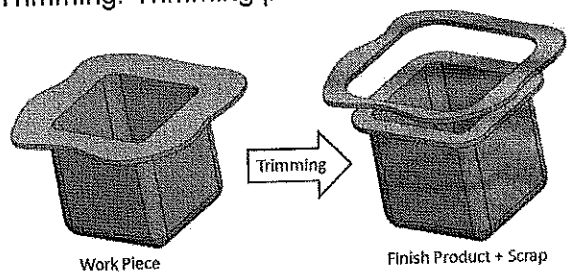
a. Notching
b. Lancing
c. Trimming

Ans. Notching: In notching, material is removed from the side of a sheet material.



Lancing: Lancing process makes partway through the metal without producing any scrap.

Trimming: Trimming process refers to the removal of the excess material in a flange or flash.



Q10. Write down three advantages of CNC punching.

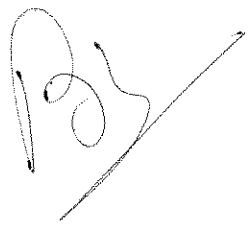
Ans. Advantages of CNC Punching:

- Increased Productivity
  Once a design has been chosen and created, it can be used over and over again – This repeatability increases productivity by removing technical and intensive manual processes.
- Speed and Accuracy
  This automation and repeatability also make this method fast, no matter how complex the design, the overall production time is reduced. Accuracy is not compromised either, in fact CNC machines are commonly used for the most precise and complicated shapes and machining.
- Efficiency
  CNC punching machines reduce the amount of waste that is produced whilst being fast and accurate. With an internal quality detector installed in many machines, when a deficiency is detected, the machine will stop punching to avoid any further wastage.
- Safe and Cost-Effective

As the waste is kept to a minimum, this saves money in the long run as no raw materials will be thrown away. Also, as the whole process is automated, the operator is kept safe providing a hazard-free environment.

Q11. Explain the following term:

- Piercing
- Blanking
- Ans.
- **Piercing:** Piercing is a shearing process in which raw metal is pierced with a machining tool, resulting in the creation of a circular or other shaped hole. As the raw metal is pierced, the metal from the newly created hole is considered scrap. The piercing machine forces a tool, known as a blanking punch, through the sheet metal.
- **Blanking:** Blanking is often confused with piercing because both processes involve cutting holes into raw metal. However, they aren't necessarily the same. With blanking, the metal from the hole is saved and used rather than discarded. In other words, manufacturing companies perform blanking to create small pieces of metal, whereas manufacturing companies perform piercing to create metal objects with a single hole.



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School of Metal Construction Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 3rd Semester,

2nd In-Sem. Examination

Course Code: MCS1303 **Time: 1 Hour**

Course Name: CNC LASER CUTTING **Max. Marks: 20**

Instruction:

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

Q1. What is the full form of LASER?

a) Light absorbent and stimulated emission of radiation
b) Light absorbing solar energy resource
c) Light Amplification by Stimulated Emission of Radiation
d) Light amplification of singular emission of radiations

Q2. Which of the following is not a characteristic of LASERS?

a) Monochromatic
b) Coherent
c) Divergent
d) Intense

Q3. What is the relationship between E1 and E2? Where E1 is ground state and E2 is Excited state.

a) E2 > E1
b) E2 < E1
c) E2 = E1
d) No specific relation

Q4. Which is not a gas laser?

a) Co2 laser
b) He-ne laser
c) Ruby laser
d) None of the above

Q5. Nd:YAG is-

a) Solid state laser
b) Gas laser
c) Chemical laser
d) All of the above

Section – B

Q6. Define the absorption?

Q7. What is pumping system?

Q8. What is population inversion?

03X02 = 06 Marks

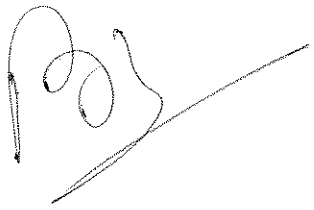
Section – C

03X03 = 09 Marks

Q9. Write the application of laser.

Q10. Describe the Nd:YAG laser.

Q11. What are the advantages and disadvantages of he-Ne laser?



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Section – A

05X01 = 05 Marks

1. What is the full form of LASER?

a) Light absorbent and stimulated emission of radiation
b) Light absorbing solar energy resource
c) Light Amplification by Stimulated Emission of Radiation
d) Light amplification of singular emission of radiations

Ans. c) Light Amplification by Stimulated Emission of Radiation

Q2. Which of the following is not a characteristic of LASERS?

a) Monochromatic
b) Coherent
c) Divergent
d) Intense

Ans. c) Divergent

Q3. What is the relationship between E1 and E2? Where E1 is ground state and E2 is Excited state.

a) E2 > E1
b) E2 < E1
c) E2 = E1
d) No specific relation

Ans. a) E2 > E1

Q4. Which is not a gas laser?

a) Co2 laser
b) He-ne laser
c) Ruby laser
d) None of the above

Ans. c) Ruby laser

Q5. Nd:YAG is-

a) Solid state laser
b) Gas laser
c) Chemical laser
d) All of the above

Ans. a) Solid state laser

Section – B

03X02 = 06 Marks

Q6. Define the absorption?

Ans. Absorption of radiation is the process by which electrons in the ground state absorbs energy from photons to jump into the higher energy level.

Q7. What is pumping system?

Ans. The pumping system imparts energy to the atoms or molecules of the lasing medium enabling them to be raised to an excited "metastable state" creating a population inversion. Optical pumping uses photons provided by a source such as a Xenon gas flash lamp or another laser to transfer energy to the lasing material. The optical source must provide photons which correspond to the allowed transition levels of the lasing material.

Q8. What is population inversion?

Ans. Practically speaking, the process of stimulated emission will not produce a very efficient or even noticeable amplification of light unless a condition called "population inversion" occurs. If only a few atoms of several million are in an excited state, the chances of stimulated emission occurring are small. The greater the percentage of atoms in an excited state, the greater the probability of stimulated emission. In the normal state of matter the population of electrons will be such that most of the electrons reside in the ground or lowest levels, leaving the upper levels somewhat depopulated. When electrons are excited and fill these upper levels to the extent that there are more atoms excited than not excited, the population is said to be inverted

Section – C

03X03 = 09 Marks

Q9. Write the application of laser.

Ans. **Applications of Lasers**

Laser is an optical device that generates intense beam of coherent monochromatic light by stimulated emission of radiation.

Laser light is different from an ordinary light. It has various unique properties such as coherence, monochromacity, directionality, and high intensity. Because of these unique properties, lasers are used in various applications.

The most significant applications of lasers include:

- Lasers in medicine
- Lasers in communications
- Lasers in industries
- Lasers in science and technology
- Lasers in military

Lasers in Medicine

- Lasers are used for bloodless surgery.
- Lasers are used to destroy kidney stones.
- Lasers are used in cancer diagnosis and therapy.
- Lasers are used for eye lens curvature corrections.
- Lasers are used in fiber-optic endoscope to detect ulcers in the intestines.
- The liver and lung diseases could be treated by using lasers.
- Lasers are used to study the internal structure of microorganisms and cells.
- Lasers are used to produce chemical reactions.
- Lasers are used to create plasma.
- Lasers are used to remove tumors successfully.
- Lasers are used to remove the caries or decayed portion of the teeth.
- Lasers are used in cosmetic treatments such as acne treatment, cellulite and hair removal.

Lasers in Communications

- Laser light is used in optical fiber communications to send information over large distances with low loss.
- Laser light is used in underwater communication networks.
- Lasers are used in space communication, radars and satellites.

Lasers in Industries

- Lasers are used to cut glass and quartz.
- Lasers are used in electronic industries for trimming the components of Integrated Circuits (ICs).
- Lasers are used for heat treatment in the automotive industry.
- Laser light is used to collect the information about the prefixed prices of various products in shops and business establishments from the bar code printed on the product.
- Ultraviolet lasers are used in the semiconductor industries for photolithography. Photolithography is the method used for manufacturing printed circuit board (PCB) and microprocessor by using ultraviolet light.
- Lasers are used to drill aerosol nozzles and control orifices within the required precision.

Lasers in Science and Technology

- A laser helps in studying the Brownian motion of particles.
- With the help of a helium-neon laser, it was proved that the velocity of light is same in all directions.
- With the help of a laser, it is possible to count the number of atoms in a substance.
- Lasers are used in computers to retrieve stored information from a Compact Disc (CD).
- Lasers are used to store large amount of information or data in CD-ROM.
- Lasers are used to measure the pollutant gases and other contaminants of the atmosphere.
- Lasers helps in determining the rate of rotation of the earth accurately.
- Lasers are used in computer printers.
- Lasers are used for producing three-dimensional pictures in space without the use of lens.
- Lasers are used for detecting earthquakes and underwater nuclear blasts.
- A gallium arsenide diode laser can be used to setup an invisible fence to protect an area.

Lasers in Military

- Laser range finders are used to determine the distance to an object.
- The ring laser gyroscope is used for sensing and measuring very small angle of rotation of the moving objects.
- Lasers can be used as a secretive illuminator for reconnaissance during night with high precision.
- Lasers are used to dispose the energy of a warhead by damaging the missile.
- Laser light is used in LIDAR's to accurately measure the distance to an object.

Q10. Describe the Nd:YAG laser.

Ans. **Nd:YAG laser definition**

Neodymium-doped Yttrium Aluminium Garnet (Nd: YAG) laser is a solid-state laser in which Nd: YAG is used as a laser medium.

These lasers have many different applications in the medical and scientific field for processes such as Lasik surgery and laser spectroscopy.

Nd: YAG laser is a four-level laser system, which means that the four energy levels are involved in laser action. These lasers operate in both pulsed and continuous mode.

Nd: YAG laser generates laser light commonly in the near-infrared region of the spectrum at 1064 nanometers (nm). It also emits laser light at several different wavelengths including 1440 nm, 1320 nm, 1120 nm, and 940 nm.

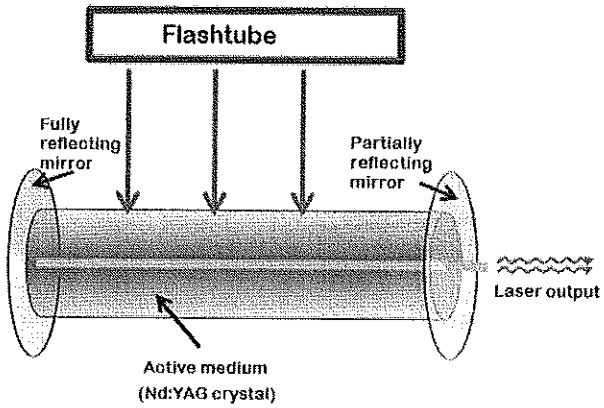
Nd: YAG laser construction

Nd:YAG laser consists of three important elements: an energy source, active medium, and optical resonator.

Energy source

The energy source or pump source supplies energy to the active medium to achieve population inversion. In Nd: YAG laser, light energy sources such as flashtube or laser diodes are used as energy source to supply energy to the active medium.

In the past, flashtubes are mostly used as pump source because of its low cost. However, nowadays, laser diodes are preferred over flashtubes because of its high efficiency and low cost.



Active medium

The active medium or laser medium of the Nd:YAG laser is made up of a synthetic crystalline material (Yttrium Aluminum Garnet (YAG)) doped with a chemical element (neodymium (Nd)). The lower energy state electrons of the neodymium ions are excited to the higher energy state to provide lasing action in the active medium.

Optical resonator

The Nd:YAG crystal is placed between two mirrors. These two mirrors are optically coated or silvered. Each mirror is silvered or coated differently. One mirror is fully silvered whereas, another mirror is partially silvered. The mirror, which is fully silvered, will completely reflect the light and is known as fully reflecting mirror.

On the other hand, the mirror which is partially silvered will reflect most part 9of the light but allows a small portion of light through it to produce the laser beam. This mirror is known as a partially reflecting mirror.

Working of Nd:YAG laser

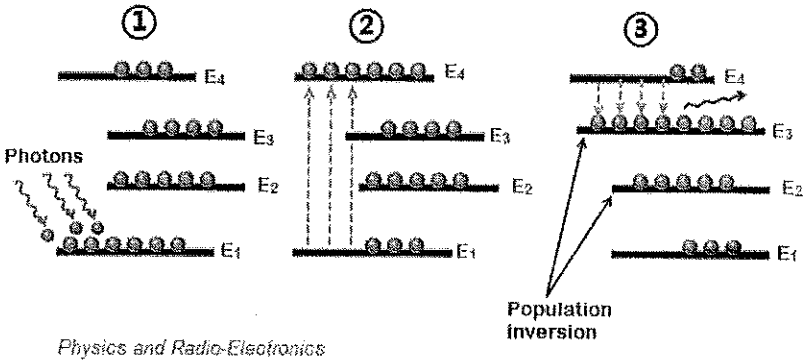
Nd: YAG laser is a four-level laser system, which means that the four energy levels are involved in laser action. The light energy sources such as flashtubes or laser diodes are used to supply energy to the active medium.

In Nd:YAG laser, the lower energy state electrons in the neodymium ions are excited to the higher energy state to achieve population inversion.

Consider a Nd:YAG crystal active medium consisting of four energy levels E_1, E_2, E_3, and E_4 with N number of electrons. The number of electrons in the energy states E1, E_2, E_3, and E_4 will be N_1, N_2, N_3, and N_4.

Let us assume that the energy levels will be $E_1 < E_2 < E_3 < E_4$. The energy level E_1 is known as ground state, E_2 is the next higher energy state or excited state, E_3 is the metastable state or excited state and E_4 is the pump state or excited state. Let us assume that initially, the population will be $N_1 > N_2 > N_3 > N_4$.

When flashtube or laser diode supplies light energy to the active medium (Nd:YAG crystal), the lower energy state (E_1) electrons in the neodymium ions gains enough energy and moves to the pump state or higher energy state E_4.

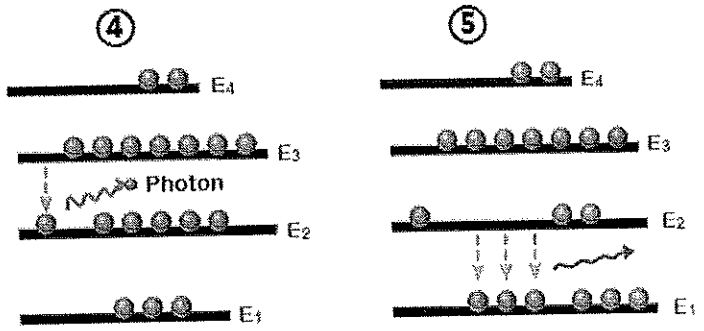


Physics and Radio-Electronics

The lifetime of pump state or higher energy state E_4 is very small (230 microseconds (Âµs)) so the electrons in the energy state E_4 do not stay for long period. After a short period, the electrons will fall into the next lower energy state or metastable state E_3 by releasing non-radiation energy (releasing energy without emitting photons).

The lifetime of metastable state E_3 is high as compared to the lifetime of pump state E_4. Therefore, the electrons reach E_3 much faster than they leave E_3. This results in an increase in the number of electrons in the metastable E_3 and hence population inversion is achieved.

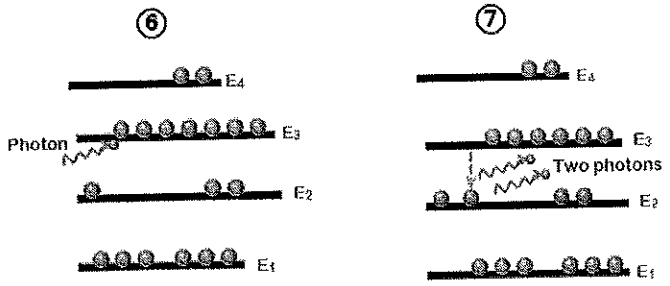
After some period, the electrons in the metastable state E_3 will fall into the next lower energy state E_2 by releasing photons or light. The emission of photons in this manner is called spontaneous emission.



Physics and Radio-Electronics

The lifetime of energy state E_2 is very small just like the energy state E_4. Therefore, after a short period, the electrons in the energy state E_2 will fall back to the ground state E_1 by releasing radiation less energy.

When photon emitted due to spontaneous emission is interacted with the other metastable state electron, it stimulates that electron and makes it fall into the lower energy state by releasing the photon. As a result, two photons are released. The emission of photons in this manner is called stimulated emission of radiation.



Physics and Radio-Electronics

When these two photons again interacted with the metastable state electrons, four photons are released. Likewise, millions of photons are emitted. Thus, optical gain is achieved.

Spontaneous emission is a natural process but stimulated emission is not a natural process. To achieve stimulated emission, we need to supply external photons or light to the active medium.

The Nd:YAG active medium generates photons or light due to spontaneous emission. The light or photons generated in the active medium will bounce back and forth between the two mirrors. This stimulates other electrons to fall into the lower energy state by releasing photons or light. Likewise, millions of electrons are stimulated to emit photons.

The light generated within the active medium is reflected many times between the mirrors before it escapes through the partially reflecting mirror.

Q11. What are the advantages and disadvantages of he-Ne laser?

Ans. **Advantages of helium-neon laser**

- Helium-neon laser emits laser light in the visible portion of the spectrum.
- High stability
- Low cost
- Operates without damage at higher temperatures

Disadvantages of helium-neon laser

- Low efficiency
- Low gain
- Helium-neon lasers are limited to low power tasks

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Metal Construction Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 3rd Semester,

2nd In-Sem. Examination

Course Code: MCS1306 **Time: 1 Hour**

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

Instruction:

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

Q1. Body centered cubic (BCC) materials are harder than face centered cubic (FCC) materials. Which of the following reasons look appropriate?

a) BCC has a smaller number of slip systems

b) BCC has more slip systems, but slip systems are not as closed pack as FCC

c) BCC unit cells have less atoms than FCC

d) None of the above.

Q2. Which of the following grades of steels belong to austenitic stainless steels?

a) SS 304 b) SS 410

c) SS 405 d) SS 441

Q3. Which class of steels are used as cutting tool material?

a) High strength steels (HSS) b) Alloy steels

c) Plain carbon steel d) Stainless steel

Q4. The heat treatment used for stress relieving in steel is—

a) Tempering b) Annealing

b) Carburizing d) All

Q.5 Which of the following has the highest density?

a) Metals b) Composites

b) Ceramics d) Polymers

Section – B

03X02 = 06 Marks

Q6. Classify the material according to their structure.

Q.7 What is Element?

Q.8 Write down two drawbacks of using polymers.

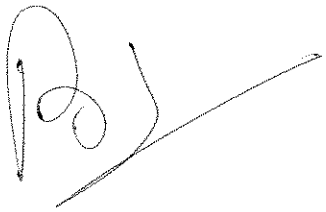
Section – C

03X03 = 09 Marks

Q.9 Explain the different crystal structures.

Q.10 Define the following terms. 1) Metals, 2) Polymers, 3) Ceramics.

Q.11 What is the ferrous and non-ferrous metal?



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Course Code: MCS1306 **Time: 1 Hour**

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Section – A

05X01 = 05 Marks

Q1. Body centered cubic (BCC) materials are harder than face centered cubic (FCC) materials. Which of the following reasons look appropriate?

a) BCC has a smaller number of slip systems

b) BCC has more slip systems, but slip systems are not as closed pack as FCC

c) BCC unit cells have less atoms than FCC

d) None of the above.

Ans. b) BCC has more slip systems, but slip systems are not as closed pack as FCC

Q2. Which of the following grades of steels belong to austenitic stainless steels?

a) SS 304 b) SS 410

c) SS 405 d) SS 441

Ans. a) SS 304

Q3. Which class of steels are used as cutting tool material?

a) High strength steels (HSS) b) Alloy steels

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Ans. a) High strength steels (HSS)

Q4. The heat treatment used for stress relieving in steel is—

a) Tempering b) Annealing

c) Carburizing d) All

Ans. b) Annealing

Q.5 Which of the following has the highest density?

a) Metals
b) Ceramics
b) Composites
d) Polymers

Ans. a) Metals

Section – B

03X02 = 06 Marks

Q6. Classify the material according to their structure.

Ans. According to the structure of the material, then can be classified as:

1. ***Crystalline*** (where they have a repeating grid-like structure) or
   A crystal or crystalline solid is a solid material whose constituents (such as atoms, molecules, or ions) are arranged in a highly ordered microscopic structure, forming a crystal lattice that extends in all directions.
2. ***Amorphous*** (where the elements don't have a repetition in their structure).

Q.7 What is Element?

Ans. An element is a substance that is made entirely from one type of atom.

Q.8 Write down two drawbacks of using polymers.

Ans.

1. They are not as stiff nor as strong as these other material types.
2. Polymers get soft and decompose at modest temperatures.

Section – C

03X03 = 09 Marks

Q.9 Explain the different crystal structures.

Ans. **Simple Cubic Crystal Structure (SC):**
In this type of crystal structure, one atom is situated at each corner of the unit cell as shown in the figure. In the simple cubic crystal structure, the total number of atoms is equal to eight.
Simple cubic crystal structure does not have an atom at the center of the unit cell or faces of the unit cell. Now we can say that the average number of atoms per unit in a simple cubic crystal structure one. This type of crystal structure does not exist in any engineering material.
Body-Centered Crystal Structure (BCC) :
In body centered crystal structure, one atom is placed at each corner of the unit cell like a simple cubic crystal structure but, in addition to this, there is one atom at the center of the unit cell. A body-centered crystal structure is more complex as compared to the simple cubic crystal structure.
Center atom in the body centered crystal structure does not come in contact with another atom, hence it remains unshared. An average number of atoms per unit cell in body centered crystal structure is two. Metals like Li, K, Na, V, Ta, etc. has this type of crystal structure.

Face Centered Crystal Structure (FCC) :
In the face-centered crystal structure, an atom is placed at each corner of the unit cell that is eight corner atoms. One atom is placed at each face center that is six face atoms. In Face centered crystal structure, there is no center atom. In this type of crystal structure, an average number of atoms per unit cell is four. Metals like Cu, Ag, Al, Ca, Pt, etc. contain this type of crystal structure.
Hexagonal close packed structure (HCP) :

In Hexagonal close packed structure, crystal structure shows one atom at each corner of the hexagon. Therefore, there are 12 corner atoms in the hexagonal close packed structure. Also, there is one atom on each face of the hexagon.
Interior three atoms in the hexagon remain unshared. In hexagonal close packed structure, an average number of atoms per unit cell is six. Metal like Zn, Co, Cd, Mg, Be, Ca, etc. has this type of crystal structure.

Q.10 Define the following terms. 1) Metals, 2) Polymers, 3) Ceramics.

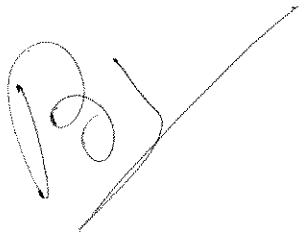
Ans. **Metals:** Metals have good electrical and thermal conductivity and capable of malleable (*able to be hammered or pressed into shape without breaking or cracking*). In periodic table out of 118 elements, 90 are metals only.

Polymers: Polymers include the familiar plastic and rubber materials. Many of them are organic compounds that are chemically based on carbon, hydrogen, and other non-metallic elements (i.e., O, N, and Si). Furthermore, they have very large molecular structures, often chainlike in nature, that often have a backbone of carbon atoms.

Ceramics: Ceramics are compounds between metallic and non-metallic elements; they are most frequently oxides, nitrides, and carbides. For example, common ceramic materials include aluminium oxide (or alumina, Al2O3), silicon dioxide (or silica, SiO2), silicon carbide (SiC), silicon nitride (Si3N4).

Q.11 What is the ferrous and non-ferrous metal?

Ans. **Ferrous metals:** Ferrous metals are rich in iron. Iron such as cast iron wrought iron, steel is the main constituents in ferrous metals. Ferrous metals are magnetic and capable of little resistance to the corrosion too.
Examples for ferrous metals are cast iron, carbon steels, alloy steels, stainless steels, tool steels and die steels.
Non-Ferrous Metals: -
Non-ferrous metals include aluminium, copper, lead, zinc and tin, as well as precious metals like gold and silver. Their main advantage over ferrous materials is their malleability. They also have no iron content, giving them a higher resistance to rust and corrosion, and making them ideal for gutters, liquid pipes, roofing and outdoor signs. Lastly, they are non-magnetic, which is important for many electronic and wiring applications.



BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.:.....

School of Metal Construction Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 3rd Semester,

2nd In-Sem. Examination

Course Code: GEN1302 **Time: 1 Hour**

Course Name: Computer Aided Drawing **Max. Marks: 20**

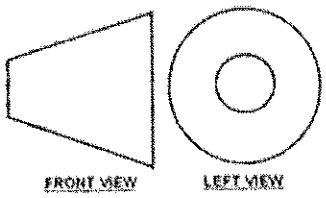
Instructions:

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

Q.1 What does this symbol represent?

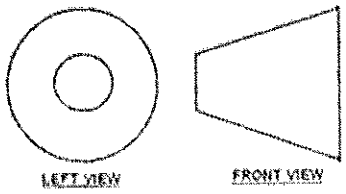


a) 4th angle projection
b) 3rd angle projection
c) 2nd angle projection
d) 1st angle projection

Q.2 Which measuring instrument is required to measure angle?

a) Vernier caliper
b) Bevel protector
c) ring gauge
d) Micrometer

Q.3 What does this symbol represent?



a) 4th angle projection
b) 3rd angle projection
c) 2nd angle projection
d) 1st angle projection

Q.4 Distance from the observer to the object is finite and the object is viewed from single point, is a characteristic of which view?

a) parallel view
b) prospective view
c) both (a) and (b)
d) none of the above

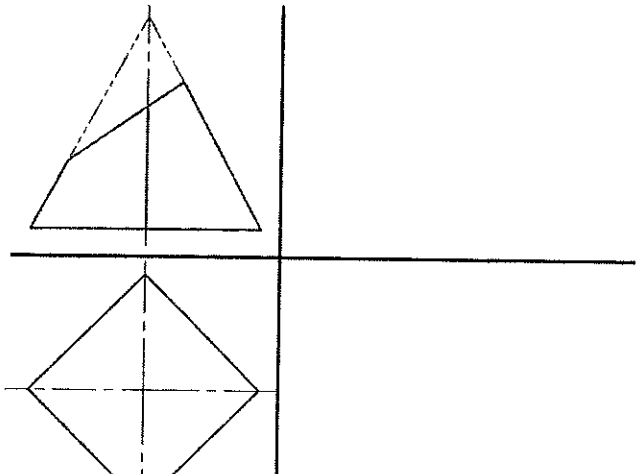
Q.5 Which line type is use to show the cutting plane line?

a) Long chain thick at the end and thin elsewhere
b) to show the hollow areas
c) none of the above
d) long chain thin at the end and thick elsewhere

Section – B

03X02 = 06 Marks

Q.6 Draw the missing view from given figure?



Q.7 Explain what is orthographic projection?

Q.8 Draw different types of lines and write down their application?

Section – C

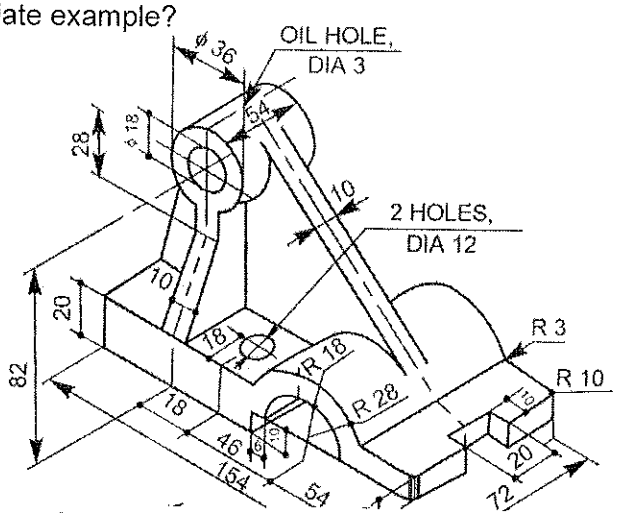
03X03 = 09 Marks

Q.9 Explain 1st angle projection with an appropriate example?

Q.10 Explain 2nd angle projection with an appropriate example?

Q.11 Draw the orthographic projection

(i) the view from the front,
(ii) the view from the right and
(iii) the view from the left of the object



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BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.:.....

School of Metal Construction Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 3rd Semester,

2nd In-Sem. Examination

Course Code: GEN1302 **Time: 1 Hour**

Course Name: Computer Aided Drawing **Max. Marks: 20**

Instructions:

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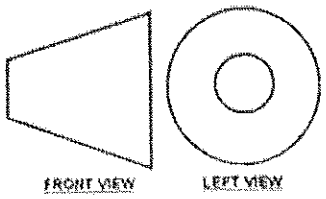
Section – A

05X01 = 05 Marks

Q.1 What does this symbol represent?

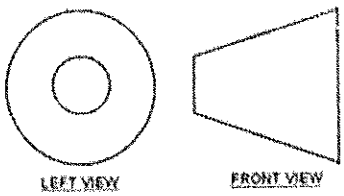


a) 4th angle projection
b) 3rd angle projection
c) 2nd angle projection
d) 1st angle projection

Q.2 Which measuring instrument is required to measure angle?

a) Vernier caliper
b) Bevel protector
c) ring gauge
d) Micrometer

Q.3 What does this symbol represent?



a) 4th angle projection
b) 3rd angle projection
c) 2nd angle projection
d) 1st angle projection

Q.4 Distance from the observer to the object is finite and the object is viewed from single point, is a characteristic of which view?

a) parallel view
b) prospective view
c) both (a) and (b)
d) none of the above

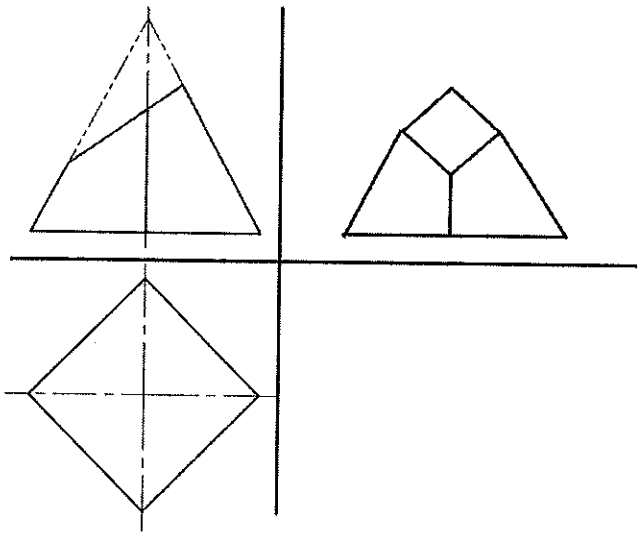
Q.5 Which line type is use to show the cutting plane line?

a) Long chain thick at the end and thin elsewhere
b) to show the hollow areas
c) none of the above
d) long chain thin at the end and thick elsewhere

Section – B

03X02 = 06 Marks

Q.6 Draw the missing view from given figure?



Q.7 Explain what is orthographic projection?

Ans Orthographic projection is a Parallel Projection Technique in which the plane of projection is perpendicular to the parallel line of sight.

There are two ways of drawing in orthographic - First Angle and Third Angle.

Q.8 Draw different types of lines and write down their application?

Ans

Illustration	Application
Thick	Outlines, visible edges, surface boundaries of objects, margin lines
Continuous thin	Dimension lines, extension lines, section lines leader or pointer lines, construction lines, boarder lines
Continuous thin wavy	Short break lines or irregular boundary lines – drawn freehand
Continuous thin with zig-zag	Long break lines
Short dashes, gap 1, length 3 mm	Invisible or interior surfaces
Short dashes	Center lines, locus lines Alternate long and short dashes in a proportion of 6:1,
Long chain thick at end and thin elsewhere	Cutting plane lines

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Section – C

03X03 = 09 Marks

Q.9 Explain 1st angle projection with an appropriate example?

- Ans In this the object in assumed to be positioned in the first quadrant
- The object is assumed to be positioned in between the projection planes and the observer. The views are obtained by projecting the images on the respective planes.
- Note that the right hand side view is projected on the plane placed at the left of the object.
- After projecting on to the respective planes, the bottom plane and left plane is unfolded on to the front view plane. i.e. the left plane is unfolded towards the left side to obtain the Right hand side view on the left side of the Front view and aligned with the Front view. The bottom plane is unfolded towards the bottom to obtain the Top view below the Front view and aligned with the Front View.

Q.10 Explain 2nd angle projection with an appropriate example?

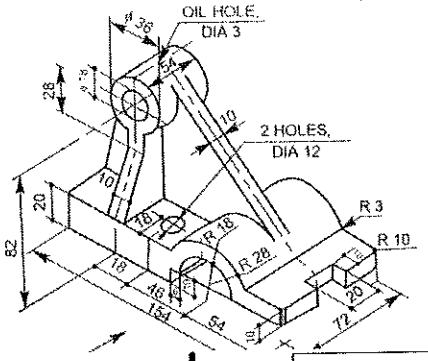
- Ans In the third angle projection method, the object is assumed to be in the third quadrant. i.e. the object behind vertical plane and below the horizontal plane.
- In this projection technique, Placing the object in the third quadrant puts the projection planes between the viewer and the object.

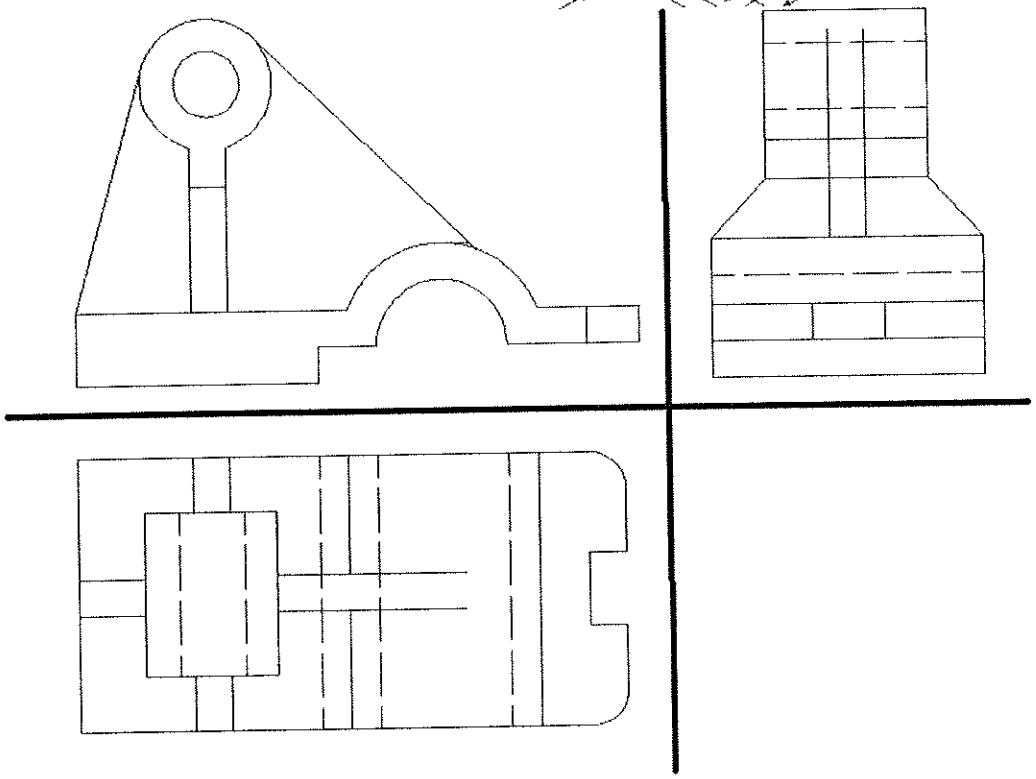
Q.11 Draw the orthographic projection

(i) the view from the front,

(ii) the view from the right and

(iii) the view from the left of the object





15/12/21

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.:.....

School of Metal Construction Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 3rd Semester,

2nd In-Sem. Examination

Course Code: GEN1302 **Time: 1 Hour**

Course Name: Computer Aided Drawing **Max. Marks: 20**

Instructions:

1. Attempt all questions.
2. Use of Calculators is Prohibited.
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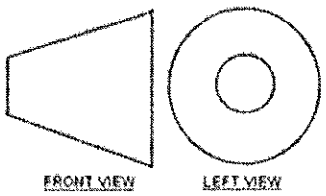
Section – A

05X01 = 05 Marks

Q.1 What does this symbol represent?



a) 4th angle projection
b) 3rd angle projection
c) 2nd angle projection
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Q.2 Which measuring instrument is required to measure angle?

a) Vernier caliper
b) Bevel protector
c) ring gauge
d) Micrometer

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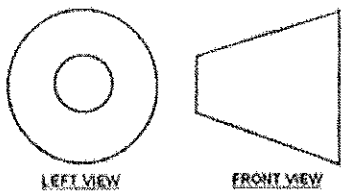

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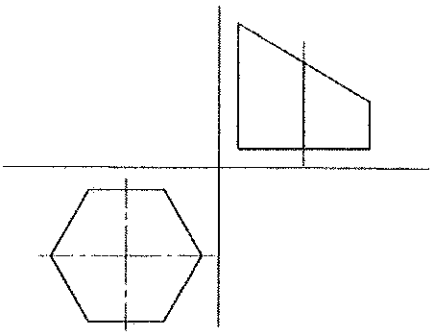
Section – B

03X02 = 06 Marks

Q.6 Draw the missing view from given figure?



Q.7 Explain what is orthographic projection?

Q.8 Draw different types of lines and write down their application?

Section – C

03X03 = 09 Marks

Q.9 Explain 1st angle projection with an appropriate example.

Q.10 Explain 2nd angle projection with an appropriate example.

Q.11 Draw the orthographic projection of given object

(i) the view from the front,

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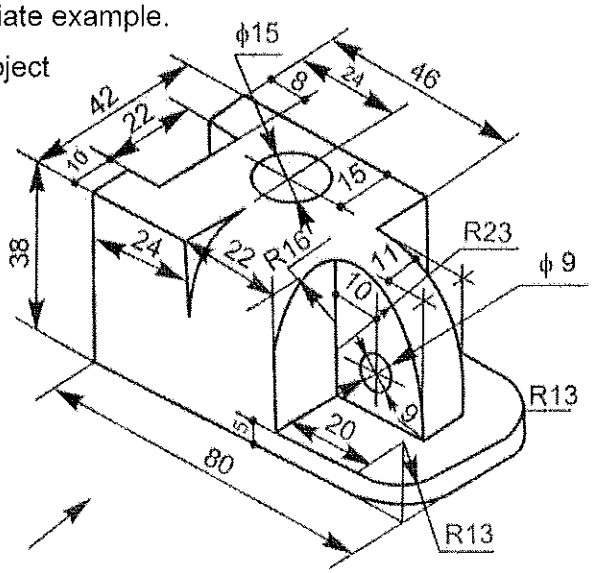
(iii) the view from the left of the object



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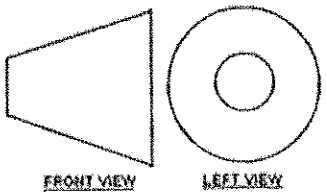
Section – A

05X01 = 05 Marks

Q.1 What does this symbol represent?



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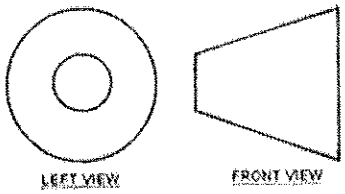

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b) 3rd angle projection
c) 2nd angle projection
d) 1st angle projection

Q.4 Distance from the observer to the object is finite and the object is viewed from single point, is a characteristic of which view?

a) parallel view
b) prospective view
c) both (a) and (b)
d) none of the above

Q.5 Which line type is use to show the cutting plane line?

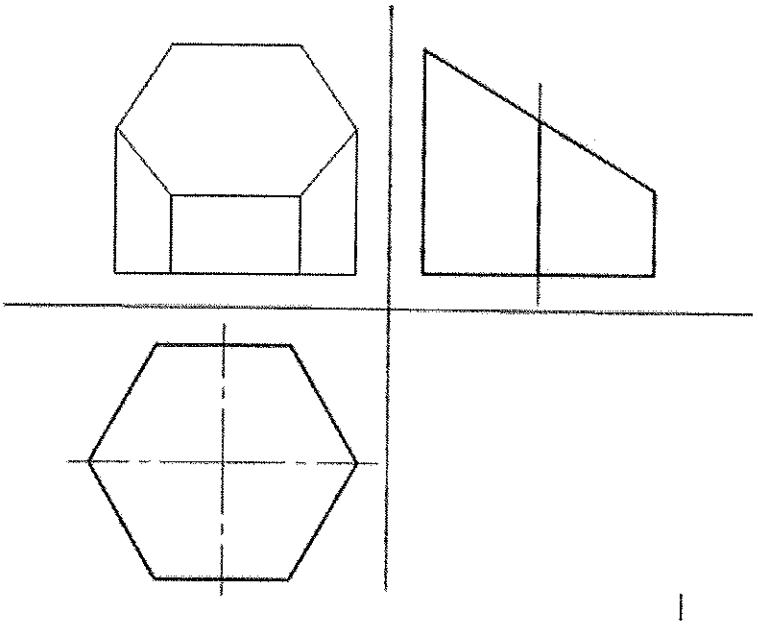
a) Long chain thick at the end and thin elsewhere
b) to show the hollow areas
c) none of the above
d) long chain thin at the end and thick elsewhere

Section – B

03X02 = 06 Marks

Q.6 Draw the missing view from given figure?

Ans.



Q.7 Explain what is orthographic projection?

Ans Orthographic projection is a Parallel Projection Technique in which the plane of projection is perpendicular to the parallel line of sight.

There are two ways of drawing in orthographic - First Angle and Third Angle.

Q.8 Draw different types of lines and write down their application?

Ans

Illustration	Application
Thick	Outlines, visible edges, surface boundaries of objects, margin lines
Continuous thin	Dimension lines, extension lines, section lines leader or pointer lines, construction lines, boarder lines
Continuous thin wavy	Short break lines or irregular boundary lines – drawn freehand
Continuous thin with zig-zag	Long break lines
Short dashes, gap 1, length 3 mm	Invisible or interior surfaces
Short dashes	Center lines, locus lines Alternate long and short dashes in a proportion of 6:1,
Long chain thick at end and thin elsewhere	Cutting plane lines

Section – C

03X03 = 09 Marks

Q.9 Explain 1st angle projection with an appropriate example?

Ans

- In this the object in assumed to be positioned in the first quadrant
- The object is assumed to be positioned in between the projection planes and the observer. The views are obtained by projecting the images on the respective planes.
- Note that the right hand side view is projected on the plane placed at the left of the object.
- After projecting on to the respective planes, the bottom plane and left plane is unfolded on to the front view plane. i.e. the left plane is unfolded towards the left side to obtain the Right hand side view on the left side of the Front view and aligned with the Front view. The bottom plane is unfolded towards the bottom to obtain the Top view below the Front view and aligned with the Front View.

Q.10 Explain 2nd angle projection with an appropriate example?

Ans

- In the third angle projection method, the object is assumed to be in the third quadrant. i.e. the object behind vertical plane and below the horizontal plane.
- In this projection technique, Placing the object in the third quadrant puts the projection planes between the viewer and the object.

Q.11 Draw the orthographic projection

(i) the view from the front,

(ii) the view from the right and

(iii) the view from the left of the object