Set - A

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Manufacturing Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, V Semester,

2nd In-Sem. Examination

Course Code: SMS1502 **Time: 1 Hour**

Course Name: Integrated CAD-CAM-CNC **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. Which among the following is the correct full form of CAD?
   a. Computer Aided Drawing
   b. Computer Aided Design
   c. None of these
   d. Both of these
2. Which among the following was the first CAD software in the world (still in use)?
   a. AutoCAD
   b. AutoCADD
   c. Solidworks
   d. CATIA
3. MasterCAM has been developed by which of the following company?
   a. CNC Software Inc.
   b. Dassault
   c. AutoDesk
   d. None of the above
4. Which of the following is not the manual ISO coding platform?
   a. Fanuc
   b. Siemens
   c. Heidenhain
   d. None of the above
5. Modern CAD systems works on:
   a. GUI
   b. BCD
   c. ICG
   d. None of the above

Section – B

03X02 = 06 Marks

6. Write down the full form of CAPP and name the softwares which are used to achieve this in industry?
7. Write down the Full form of AutoCAD and the year in which it was released by Autodesk?
8. Mention the name of any two programming languages which are popularly used as a CAE tool?

Section – C

03X03 = 09 Marks

9. Describe different types of CAM softwares with one example each?
10. Differentiate between drafting and modelling softwares with suitable examples.
11. Describe, how are In-built CAM softwares are different from Standalone CAM software?

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Manufacturing Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, V Semester,

2nd In-Sem. Examination

Course Code: SMS1502 **Time: 1 Hour**

Course Name: Integrated CAD-CAM-CNC **Max. Marks: 20**

Answer Key

Section – A

05X01 = 05 Marks

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   a. Computer Aided Drawing
   b. Computer Aided Design
   c. None of these
   d. Both of these
2. Which among the following was the first CAD software in the world (still in use)?
   a. AutoCAD
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   d. CATIA
3. MasterCAM has been developed by which of the following company?
   a. CNC Software Inc.
   b. Dassault
   c. AutoDesk
   d. None of the above
4. Which of the following is not the manual ISO coding platform?
   a. Fanuc
   b. Siemens
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   d. None of the above
5. Modern CAD systems works on:
   a. GUI
   b. BCD
   c. ICG
   d. None of the above

Section – B

03X02 = 06 Marks

6. Write down the full form of CAPP and name the softwares which are used to achieve this in industry?
   Ans: Computer Aided Process Planning, Microsoft Excel, Dassault 3D experience platform.

7. Write down the Full form of AutoCAD and the year in which it was released by Autodesk?

   Ans: Automate Computer Aided Design, 1982

8. Mention the name of any two programming languages which are popularly used as a CAE tool?

   Ans: Python and MATLAB

Section – C

03X03 = 09 Marks

9. Describe different types of CAM softwares with one example each?

   Ans: Types:

   1. standalone softwares: software which is not built for a particular type of CNC machine, they support ISO programming (G, M codes) e.g.: MasterCAM

   2. in built softwares: these are inbuilt and attached with their CNC machines e.g.: MAZATROL, STAR software, Siemens controller

   3. integrated softwares: these CAM softwares are tightly attached with their PLM e.g.: NX cam and CATIA cam

10. Differentiate between drafting and modelling softwares with suitable examples.

    Ans: Drafting softwares are primarily used for creating 2D drawings while Modelling Softwares are used for modelling purpose i.e. for creating 3D models of physical Objects for e.g.: Autocad is drafting while Solidworks is modelling software

11. Describe, how are In-built CAM softwares are different from Standalone CAM software?

    Ans: Types:

1. standalone softwares:software which is not built for a particular type of CNC machine, they support ISO programming (G,M codes) e.g.:MasterCAM

2. in built softwares: these are inbuilt and attached with their CNC machines e.g: MAZATROL, STAR software, Siemens controller

Set A

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Manufacturing Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, V Semester,

2nd In-Sem. Examination

Course Code: SMS1503 **Time: 1 Hour**

Course Name: Basics of Multi-Axis Machining and Dialog CNC programming **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. Power transmission component includes-
   a) Belts
   b) Shaft
   c) Couplings
   d) All of the above
2. Joining elements include-
   a) Pins
   b) Snap-fits
   c) Both a & b
   d) None of the above
3. Electric motors are driven by _____ forces.
   a) Ferromagnetic
   b) Electromagnetic
   c) Gamma
   d) External
4. Asynchronous motor is an ___ induction motor.
   a) AC
   b) DC
   c) Water
   d) Gas
5. Basic Components of CNC Controllers are-
   a) Power Supply unit
   b) Circuitry protection unit
   c) Motor driver unit
   d) All of the above

Section – B

02X03 = 06 Marks

6. Write down the main difference between synchronous and Asynchronous electric motor.
7. Write down the various popular controllers in use.
8. Explain drive units.

Section – C

03X03 = 09 Marks

9. What do you mean by functional units of a machine tool? Name the various functional units of a CNC lathe.
10. Describe in brief about various types of five axis machining centers along with their application.
11. Write down the differences between Five axis machining and (3+2) axis machining?

Set A

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Manufacturing Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, V Semester,

2nd In-Sem. Examination

Course Code: SMS1503 **Time: 1 Hour**

Course Name: Basics of Multi-Axis Machining and Dialog CNC programming **Max. Marks: 20**

Answer Key

Section – A

05X01 = 05 Marks

1. Power transmission component includes-
   a) Belts
   b) Shaft
   c) Couplings
   d) All of the above
2. Joining elements include-
   a) Pins
   b) Snap-fits
   c) Both a & b
   d) None of the above
3. Electric motors are driven by _____ forces.
   a) Ferromagnetic
   b) Electromagnetic
   c) Gamma
   d) External
4. Asynchronous motor is an ___ induction motor.
   a) AC
   b) DC
   c) Water
   d) Gas
5. Basic Components of CNC Controllers are-
   a) Power Supply unit
   b) Circuitry protection unit
   c) Motor driver unit
   d) All of the above

Section – B

02X03 = 06 Marks

6. Write down the main difference between synchronous and Asynchronous electric motor.

Ans. **Synchronous motor:**
Synchronous motor is a motor that operates at synchronous speed, i.e., speed of the rotor is equal to the stator speed of the motor.
Asynchronous motor:
Asynchronous motor is an AC Induction motor. The rotor of the Asynchronous motor rotates at the speed less than the synchronous speed.

7. Write down the various popular controllers in use.

Ans. Fanuc 21M
Sinumerik Operate 840D
Heidenhain TNC426

8. Explain drive units.

Ans. Drive units provide the mechanical energy required to operate a machine. For machine tools **electric motors** are the drive units and required for:

a. main drive,
b. feed drives,
c. hydraulic pump,
d. lubrication pump,
e. coolant pump and
f. chip conveyor etc.

The complete drive units of a CNC lathe consist of the electric motors and the control units housed in the control cabinet.
The control units ensure the power supply to the motors and enable infinite speed adjustment.

Section – C

03X03 = 09 Marks

9. What do you mean by functional units of a machine tool? Name the various functional units of a CNC lathe.

Ans. 1) Drive Units
2) Power transmission Units
3) Work units
4) Supporting and holding components
5) Joints and fastening units
6) Measuring and control units
7) Units for environmental protection, disposal and safety at work.

10. Describe in brief about various types of five axis machining centers along with their application.

Ans. **1) Rotary table + Pivot Spindle Head**
This machine design is effective for tall workpieces and for cylindrical parts with holes around the periphery.

2) Double rotary table
This is the best machine for the use of long tools or extensions. It is also effective for cylindrical parts with a ring of holes in one face.

3) Double Pivot Spindle Head
This machine is effective for parts that are rectangular instead of round.

4) Rotary Table + Table Trunnion
This machine can take relatively deep cuts for its size.

11. Write down the differences between Five axis machining and (3+2) axis machining?

Ans. **5-Axes Machining**

1. Also called continuous or simultaneous 5-axis machining involves continuous adjustments of the cutting tool along all five axes to keep the tip optimally perpendicular to the part.
2. Machining is faster.
3. Movement at higher speed results in increased wear rate as well as greater need for part crash detection hence it is more difficult from programming point of view.

(3+2) Axes Machining

1. Also called positional 5-axis machining involves executing 3-axis program with cutting tool locked at an angle determined by the two rotational axes. Machining that involves reorienting the tool bit along the rotational axes between cuts is called '5-axis indexed' though it still counts 3+2.
2. Machining is relatively slow due to stopping and starting between each reorientation of the tool.
3. Part programming is relatively simpler.

Set A

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Manufacturing Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, V Semester,

2nd In-Sem. Examination

Course Code: SMS1505 **Time: 1 Hour**

Course Name: Quality Management **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. Mistake proofing is also known as-
   A. Kanban
   B. JIT
   C. POKA YOKE
   D. None of above.

2. What is the full form of SMED in quality management?
   A. Single minute extra dies
   B. Simple management exchange of dollar
   C. A & B both
   D. Single minute exchange of dies.

3. Which of the following comes under ISO 9000?
   A. Quality management systems – Requirements
   B. Quality management systems – Fundamentals and vocabulary
   C. EMS
   D. OHSAS.

4. Which charts are used for variable data?
   A. X bar chart & R chart
   B. P chart & C chart
   C. Np chart & U chart
   D. None of above.

5. Process capability index is denoted by-
   A. A_p
   B. C_p
   C. A_{pk}
   D. C_{pk}

Section – B

03X02 = 06 Marks

6. Draw a neat diagram of the process when natural causes are present.
7. Write three differences between variable and attributes.
8. Write down the control limits for X bar charts when σ is given and when σ is not given.

Section – C

03X03 = 09 Marks

9. What are the steps to create control chart?
10. Explain the process capability ratio and define ISO 14000.
11. What is the difference between 3 Sigma and 6 Sigma?

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Manufacturing Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, V Semester,

2nd In-Sem. Examination

Course Code: SMS1505 | **Time: 1 Hour**

Course Name: Quality Management | **Max. Marks: 20**

Answer Key

Section – A

05X01 = 05 Marks

1. Mistake proofing is also known as?
   C. POKA YOKE

2. What is the full form of SMED in quality management?
   D. Single minute exchange of dies.

3. Which of the following comes under ISO 9000?
   B. Quality management systems – Fundamentals and vocabulary

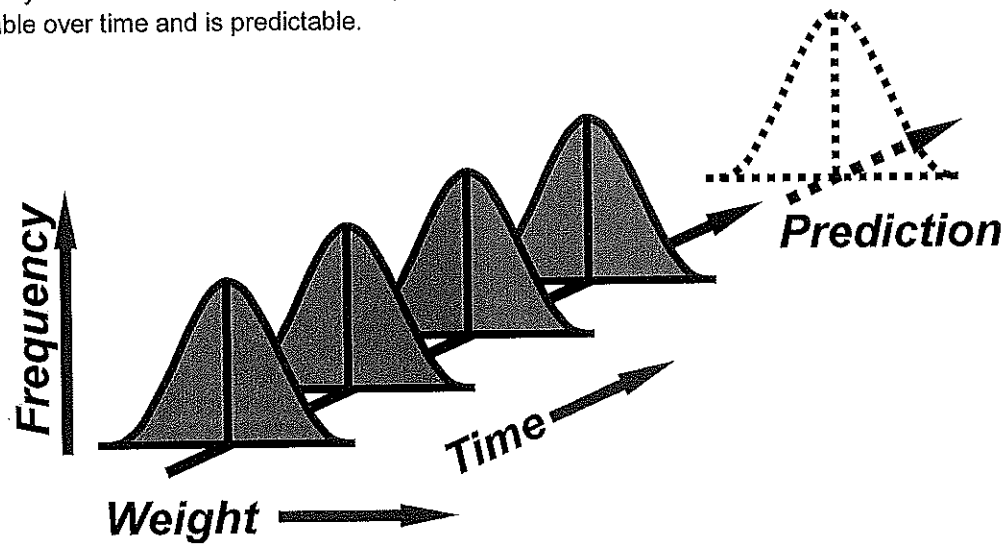
4. Which charts are used for variable data?
   A. X bar chart & R chart

5. Process capability index is denoted by?
   D. C_{pk}

Section – B

03X02 = 06 Marks

6. Draw a neat diagram of the process when natural causes are present.
   Ans.
   If only natural causes of variation are present, the output of a process forms a distribution that is stable over time and is predictable.



7. Write three differences between variable and attributes.
Ans.

Sr. No.	Variable	Attribute
1	Characteristics that can take any real value	Defect-related characteristics
2	May be in whole or in fractional numbers	Classify products as either good or bad or count defects
3	Continuous random variables	Categorical or discrete random variables

8. Write down the control limits for X bar charts when σ is given and when σ is not given.
Ans.
- When σ is not given

$$\textit{Upper control limit (UCL)} = \bar{\bar{x}} + A_2\bar{R}$$
$$\textit{Lower control limit (LCL)} = \bar{\bar{x}} - A_2\bar{R}$$

- When σ is given

$$\textit{Upper control limit (UCL)} = \bar{\bar{x}} + z\sigma_{\bar{x}}$$
$$\textit{Lower control limit (LCL)} = \bar{\bar{x}} - z\sigma_{\bar{x}}$$

Section – C

03X03 = 09 Marks

9. What are the steps to create control chart?
Ans.

I. Take samples from the population and compute the appropriate sample statistic
II. Use the sample statistic to calculate control limits and draw the control chart
III. Plot sample results on the control chart and determine the state of the process (in or out of control)
IV. Investigate possible assignable causes and take any indicated actions
V. Continue sampling from the process and reset the control limits when necessary

10. Explain the process capability ratio and define ISO 14000.
Ans.

$$C_p = \frac{\textit{Upper Specification - Lower Specification}}{6\sigma}$$

- A capable process must have a C_p of at least 1.0
- Does not look at how well the process is cantered in the specification range
- Often a target value of C_p = 1.33 is used to allow for off-centre processes
- Six Sigma quality requires a C_p = 2.0

ISO 14000

ISO 14000 is a series of environmental management standards developed and published by the International Organization for Standardization for organizations. The ISO 14000 standards provide a guideline or framework for organizations that need to systematize and improve their environmental management efforts.

11. What is the difference between 3 Sigma and 6 Sigma?

Ans.

Sr. No.	The 3 sigma Company	The 6 sigma Company
1	Spends 15~25% of sales dollars on cost of failure	Spends 5% of sales dollars on cost of failure
2	Relies on inspection to find defects	Relies on capable process that don't produce defects
3	Does not have a disciplined approach to gather and analyze data	Use Measure, Analyze, Improve, Control and Measure, Analyze, Design
4	Benchmarks themselves against their competition	Benchmarks themselves against the best in the world
5	Believes 99% is good enough	Believes 99% is unacceptable
6	Define CTQs internally	Defines CTQs externally

Set-II

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: 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

05X1= 5 Marks

1. Which of the following is the size of A4 sheet?
   a) 210 x 297 mm
   b) 210 x 300 mm
   c) 250 x 297 mm
   d) None of these
2. Which of the following instruments is used for indirect measurement?
   a) divider
   b) set squares
   c) scale
   d) None of the above
3. What is the difference between the Scale command from the command Zoom?
   a) Scale for single object, while the Zoom whole plan
   b) No difference
   c) Scale can grow / shrink a shape up 10 times, while the Zoom has no limits
   d) Scale changes the size of objects, while the Zoom changes the visibility of the object
4. Which of the following pencil type is used for creating outline in layout?
   a) HB
   b) 2H
   c) 3H
   d) 1H
5. What is meant by roughness?
   a) Minute succession of hills of different height
   b) Minute succession of valleys and hills of different height and varied spacing
   c) Minute succession of valleys and hills of same height and same gap
   d) Minute succession of valleys of different depth

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Section – B

03X02 = 06 Marks

6. Define tolerances.
7. Show difference between broken section view and half section view with diagram.
8. What is isometric projection?

Section – C

03X03 = 09 Marks

9. Differentiate between engineering drawing and artistic drawing.
10. Define projection and component of projection with proper diagram.
11. Calculate the following for 145F6:

    a) Upper deviation b) Minimum size c) Nominal size d) Fundamental deviation e) Upper limit f) Lower deviation

ISO Tolerances for Holes (ISO 286-2)

Nominal hole sizes (mm)																			
over	3	6	10	18	30	40	50	65	80	100	120	140	160	180	200	225	250	280	315	355
inc.	6	10	18	30	40	50	65	80	100	120	140	160	180	200	225	250	280	315	355	400
micrometres																				
E6	+28 +20	+34 +25	+43 +32	+53 +40	+66 +50	+79 + 60	+94 +72	+110 +85	+129 +100	+142 +110	+161 +125									
E7	+32 +20	+40 +25	+50 +32	+61 +40	+75 +50	+90 + 60	+107 +72	+125 +85	+146 +100	+162 +110	+185 +125									
E11	+95 +20	+115 +25	+142 +32	+170 +40	+210 +50	+250 + 60	+292 +72	+335 +85	+390 +100	+430 +110	+485 +125									
E12	+140 +20	+175 +25	+212 +32	+250 +40	+300 +50	+360 + 60	+422 +72	+485 +85	+560 +100	+630 +110	+695 +125									
E13	+200 +20	+245 +25	+302 +32	+370 +40	+440 +50	+520 + 60	+612 +72	+715 +85	+820 +100	+920 +110	+1 015 +125									
F6	+18 +10	+22 +13	+27 +16	+33 +20	+41 +2	+49 + 30	+58 +36	+68 43	+79 +50	+88 +56	+98 +62									
F7	+22 +10	+28 +13	+34 +16	+41 +20	+50 +25	+60 + 30	+71 +36	+83 43	+96 +50	+108 +56	+119 +62									
F8	+28 +10	+35 +13	+43 +16	+53 +20	+64 +25	+76 + 30	+90 +36	+106 43	+122 +50	+137 +56	+151 +62									
G6	+12 +4	+14 +5	+17 +6	+20 +7	+25 +9	+29 +10	+34 + 12	+39 +14	+44 +15	+49 +17	+54 +18									
G7	+16 +4	+20 +5	+24 +6	+28 +7	+34 +9	+40 +10	+47 + 12	+54 +14	+61 +15	+69 +17	+75 +18									
G8	+22 +4	+27 +5	+33 +6	+40 +7	+48 +9	+56 +10	+66 + 12	+77 +14	+87 +15	+98 +17	+107 +18									
H6	+8 0	+9 0	+11 0	+13 0	+16 0	+19 0	+22 0	+25 0	+29 0	+32 0	+36 0									
H7	+12 0	+15 0	+18 0	+21 0	+25 0	+30 0	+35 0	+40 0	+46 0	+52 0	+57 0									
H8	+18 0	+22 0	+27 0	+33 0	+39 0	+46 0	+54 0	+63 0	+72 0	+81 0	+89 0									
H9	+30 0	+36 0	+43 0	+52 0	+62 0	+74 0	+87 0	+100 0	+115 0	+130 0	+140 0									

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: GEN1302 **Time: 1 Hour**

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

Answer Key

Section – A

05X1= 5 Marks

1. Which of the following is the size of A4 sheet?
   a) **210 x 297 mm**
   b) 210 x 300 mm
   c) 250 x 297 mm
   d) None of these
2. Which of the following instruments is used for indirect measurement?
   a) **divider**
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3. What is the difference between the Scale command from the command Zoom?
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   a) **HB**
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5. What is meant by roughness?
   a) Minute succession of hills of different height
   b) **Minute succession of valleys and hills of different height and varied spacing**
   c) Minute succession of valleys and hills of same height and same gap
   d) Minute succession of valleys of different depth

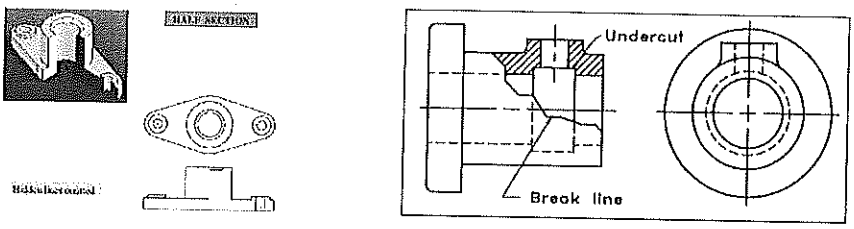
Section – B

03X02 = 06 Marks

6. Define tolerances.

   Ans. Tolerances are the max. permissible deviation within a specified limit.

7. Show difference between broken section view and half section view with diagram.



8. What is isometric projection?

Ans. Isometric projection is a method for visually representing three-dimensional objects in two dimensions in technical and engineering drawings. It is an axonometric projection in which the three coordinate axes appear equally foreshortened and the angle between any two of them is 120 degrees.

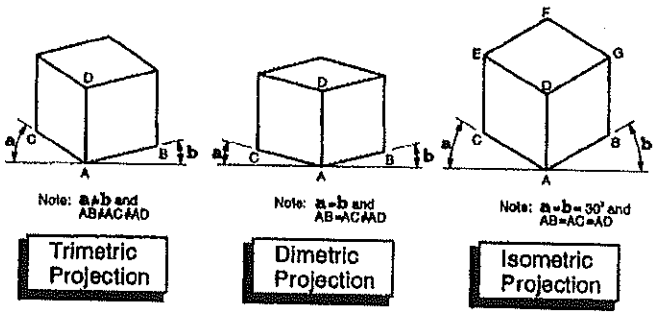


Figure 2.4 *The three types of axonometric projections*

Section – C

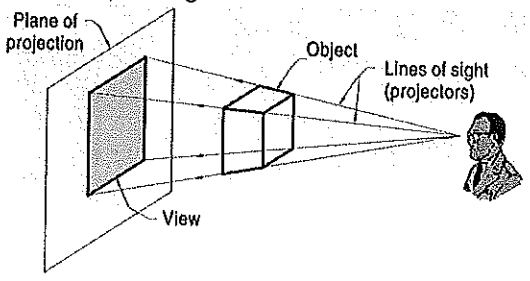
03X03 = 09 Marks

9. Differentiate between engineering drawing and artistic drawing.

Engineering drawing	Artistic drawing
1. Engineering drawing can be manufactured	1. Artistic drawing can't be manufactured
2. Dimensions are given in engineering drawing	2. Dimensions are not given
3. Need not be aesthetically appealing	3. Need to be aesthetically appealing

10. Define projection and component of projection with proper diagram.

- Projection is defined as the act of obtaining image of an object.
  Components of projection are:
  a) Observer
  b) Object
  c) Image



11. Calculate the following for 145F6:

a) Upper deviation b) Minimum size c) Nominal size d) Fundamental deviation e) Upper limit f) Lower deviation

Ans.

a) +0.068 mm or +68µm
b) 144.957 mm
c) 145mm
d) +43 µm
e) 145.068 mm
f) +43 µm