SET-A

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Metal Construction Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 5th Semester,

End-Sem. Examination

Course Code: MCS1501 **Time: 2 Hours**

Course Name: Advanced CNC laser/ punching/ Bending **Max. Marks: 50**

Instruction:

1. Attempt all questions.
2. Use of Calculators is prohibited.
3. Section A contains 10 Questions. Each question carries 1 Marks.
4. Section B contains 04 Questions. Each question carries 4 Marks.
5. Section C contains 04 Questions. Each question carries 6 Marks.

Section – A

10X01 = 10 Marks

Q1. G41 Code use for_____.

a) Cutter compensation left

b) Cutter compensation right

c) Cutter compensation off

d) None of the above

Q2. In Cnc Milling 'M09' code use for _____.

a) Coolant on- mist coolant/ coolant thru spindle

b) Coolant on- flood coolant

c) Coolant off

d) None of the above

Q3. G02 code for _____

a) Circular interpolation CW

b) Circular interpolation CCW

c) Rapid Traverse

d) Liner interpolation

Q4. Sub program code is ___

a) M96

b) M30

c) M02

d) none of the above

Q5. Optional stop code is _____

a) M30

b) M02

c) M01

d) M99

Q6. In CNC Laser M102 code use for _____

a) indicate sheet thickness

b) laser on

c) piercing

d) define material

Q7. In laser E001, E002, E003 ------ E010 is

a) feed

b) speed

c)rapid motion

d) cutting conditions

Q8. G42 Code use for_____.

a) Cutter compensation left

b) Cutter compensation right

c) Cutter compensation off

d) None of the above

Q9. SPH means

a) hot rolled steal

b) aluminum

c) Titanium

d) SS

Q10. Oscillator is used for

a) start the punching

b) generating laser

c) cooling dust collector

d) none of the above

Section – B

04X04 = 16 Marks

Q11. What do you mean by punching off explain?

Q12. Explain modes (retract, manual, memory).

Q13. What do you mean by absolute or incremental programing code?

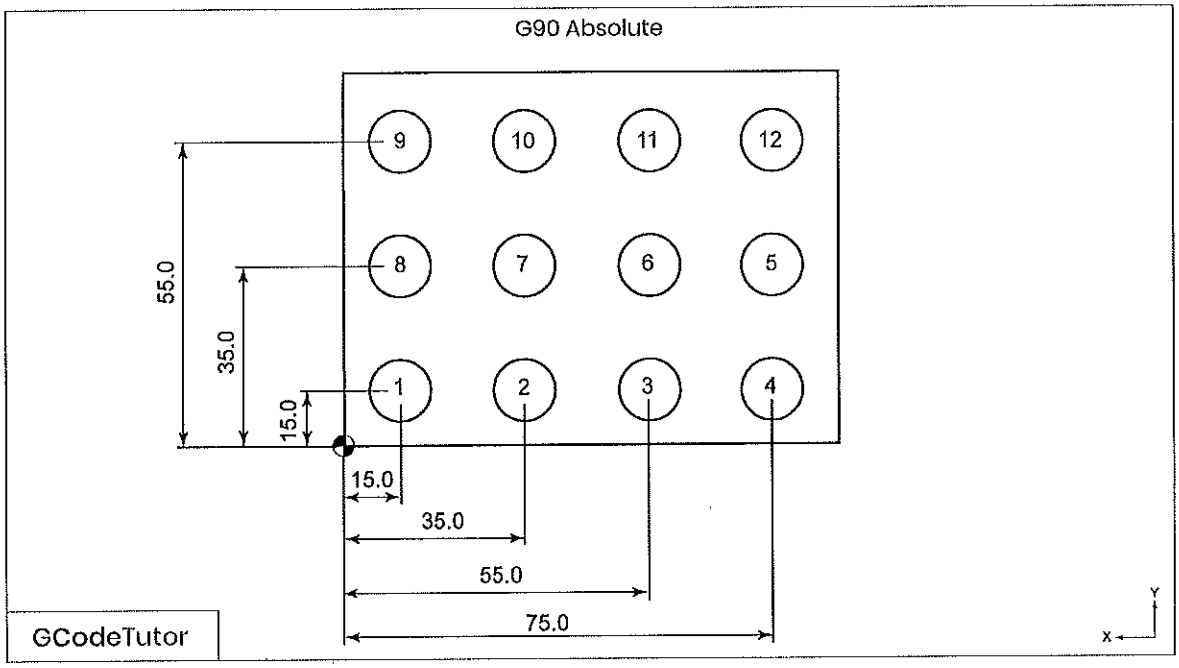
Q14. Which code is use to designate worksheet material and thickness in CNC punching machine?

Section – C

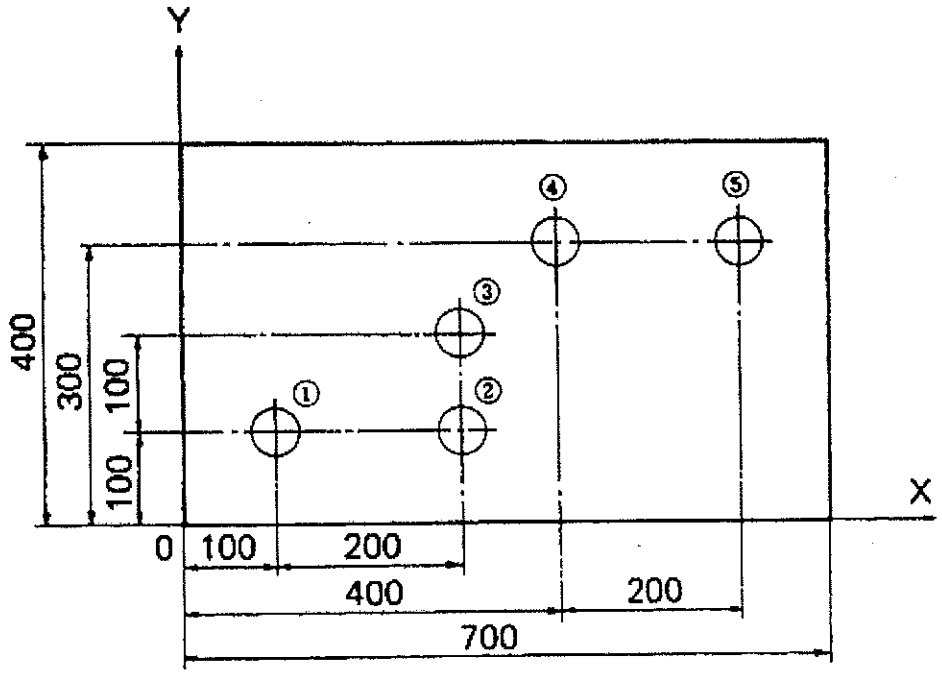
04X06 = 24 Marks

Q15. Explain dead zone, program check, auto power off, block skip, single block, optional stop.

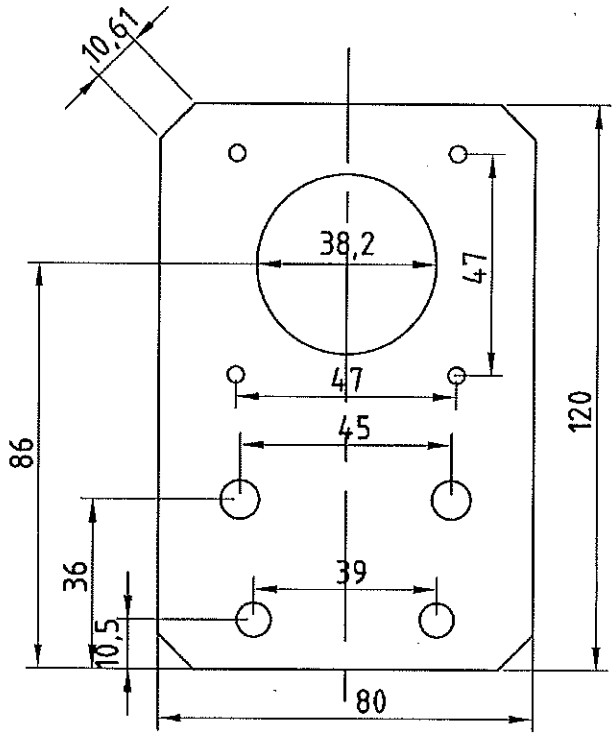
Q16. Write down the absolute coordinates for the given drawing.



Q17.calculate the coordinates of given drawing (absolute & incremental).



Q18. Write a CNC plasma program for given drawing.



SET-A

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Metal Construction Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 5th Semester,

End-Sem. Examination

Course Code: MCS1501 **Time: 2 Hours**

Course Name: Advanced CNC laser/ punching/ Bending **Max. Marks: 50**

Instruction:

1. Attempt all questions.
2. Use of Calculators is prohibited.
3. Section A contains 10 Questions. Each question carries 1 Marks.
4. Section B contains 04 Questions. Each question carries 4 Marks.
5. Section C contains 04 Questions. Each question carries 6 Marks.

Section – A

10X01 = 10 Marks

Q1. G41 Code use for_____.

a) Cutter compensation left

b) Cutter compensation right

c) Cutter compensation off

d) None of the above

Q2. In Cnc Milling 'M09' code use for _____.

a) Coolant on- mist coolant/ coolant thru spindle

b) Coolant on- flood coolant

c) Coolant off

d) None of the above

Q3. G02 code for _____

a) Circular interpolation CW

b) Circular interpolation CCW

c) Rapid Traverse

d) Liner interpolation

Q4. Sub program code is ___

a) M96

b) M30

c) M02

d) none of the above

Q5. Optional stop code is _____

a) M30

b) M02

c) M01

d) M99

Q6. In CNC Laser M102 code use for _____

a) indicate sheet thickness

b) laser on

c) piercing

d) define material

Q7. In laser E001, E002, E003 ------ E010 is

a) feed

b) speed

c)rapid motion

d) cutting conditions

Q8. G42 Code use for_____.

a) Cutter compensation left

b) Cutter compensation right

c) Cutter compensation off

d) None of the above

Q9. SPH means

a) hot rolled steal

b) aluminum

c) Titanium

d) SS

Q10. Oscillator is used for

a) start the punching

b) generating laser

c) cooling dust collector

d) none of the above

Section – B

04X04 = 16 Marks

Q11. What do you mean by punching off explain?

Ans:

G70: PUNCH OFF (NO PUNCHING)

This code is used to position the worksheet without punching so that the workclamps will move away from the die or the workholders can hold the worksheet when automatic repositioning is performed. Enter "G70" prior to entering X____Y____.

Example:

```
G90  X100.00  Y100.00
G70  X300.00
```

The axes move at a position of "X300.00 Y100.00" without punching.

"G70" can be entered with "G90" or "G91."

```
     G90  X100.00  Y100.00 (Punching)
G70  G91  X200.00          (No punching)
     G90           Y300.00 (Punching)
```

Q12. Explain modes (retract, manual, memory).

Ans: Pressed to select an NC mode. Each illuminates when the corresponding NC mode is selected.

RETRACT button

Selects the RETRACT mode to permit the manual zero-return of an axis or axes.

MEMORY button

Selects the MEMORY mode to permit the execution of a program stored in the memory of the NC unit.

MANUAL button

Selects the MANUAL mode to permit the manual feed of the carriage (X-axis) or carriage base (Y-axis), rotation of the turret (T-axis), or direct programming.

Q13. What do you mean by absolute or incremental programing code?

Ans: G90 Absolute programming:

When G90 is commanded, all coordinates in the program refer to current program origin or to the absolute origin point. G90 is MODAL and remains effective until G91 is commanded.

G91 Incremental programming:

When G91 is commanded, all coordinates in the program are incremental distances from the previous coordinate. G91 is MODAL and remains effective until G90 is commanded

Q14. Which code is use to designate worksheet material and thickness in CNC punching machine?

Ans:

G06 A___ B___

This code is used to designate the worksheet thickness and material. Enter "G06" at the beginning of the program. When "G06" is omitted, the thickness is 6.3 mm and the material is mild steel.

A: Worksheet thickness 0.1 to 6.3 mm (0.002" to 0.248")

B: Worksheet material 0: Mild steel (SPC or CRS)
1: Stainless steel (SUS)
2: Aluminum (AL)

The decimal point in the thickness data is handled as follows:

Command data	Effective data
1.6	1.6 mm
2.36	2.3 mm (Omit the numerals below the second place of decimals.)
63	0.6 mm (Omit the numerals below the second place of decimals.)

Example:

OOOOO

G06 A1.0 B0 (1-mm thick mild steel worksheet is designated.)

G92 X___ Y___

•
•

Section – C

04X06 = 24 Marks

Q15. Explain dead zone, program check, auto power off, block skip, single block, optional stop.

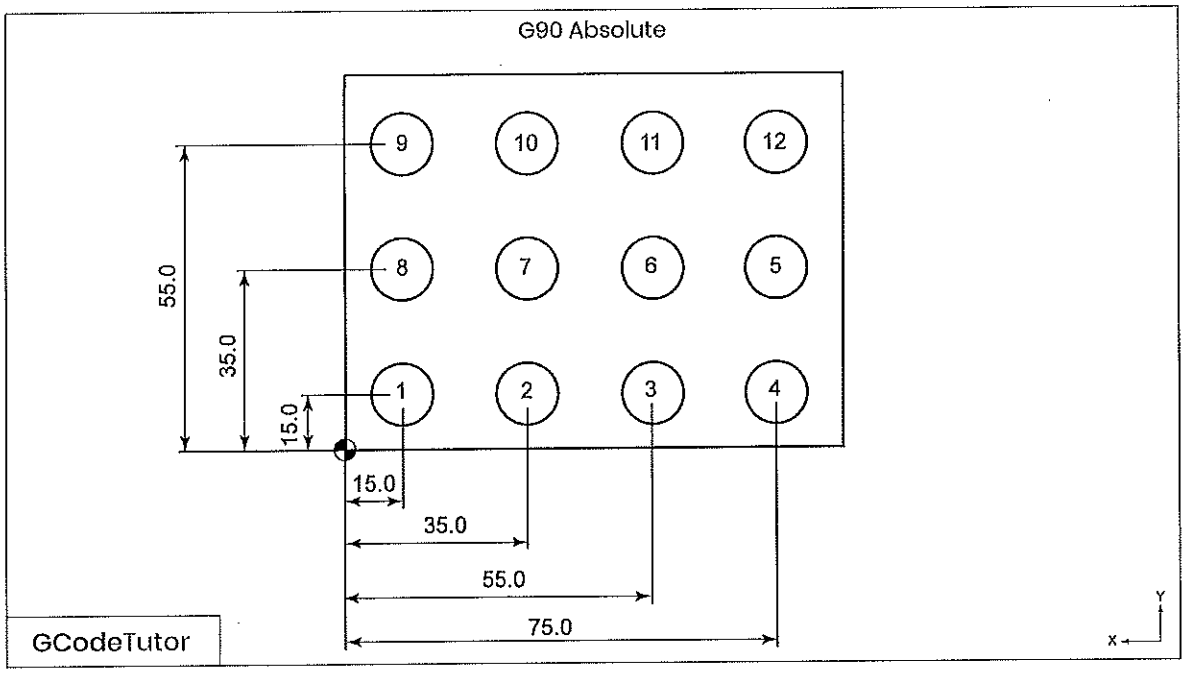
Ans:

1. Dead zone region: - Region where a workclamp enters a punching position and is punched itself when the worksheet is punched in this condition. "Dead zone" appears on the MESSAGE display.
2. Program check: - Pressed and illuminated to enable the program check function. The machine does not operate while the program is being checked. For details, refer to "Checking program" in Part VI, Operation. Pressed again and extinguished to disable the program check function.
3. Auto power off: - Pressed and illuminated to enable the automatic power-off function. Pressed again and extinguished to disable the automatic power-off function. The button changes to flashing after the program is completed, and the power of the NC unit turns off 15 min later. If the machine is not automatically operating, the power of the NC unit can be turned off 2 min later after the button is pressed and held for 2 sec or more. Button illuminated: The automatic power-off function is enabled Button flashing: The power of the NC unit turns off 15 min after the start of flashing.
4. Block skip: - Pressed and illuminated. When the program is started, the machine ignores each block with a slash (/) at the beginning and goes to the next block. Pressed again and extinguished. The machine executes blocks with a slash (/) at the beginning without ignoring them.
5. Single block: - Pressed and illuminated to enable the single block operation of the machine. Each time the START button on the main control panel is pressed in the single block

operation, the machine executes one block of the program and then stops. Pressed again and extinguished to disable the single block operation of the machine.

6. Optional stop: - Pressed and illuminated. When the program is started, the machine pauses each time "M01" (optional stop command) is read. When the machine pauses, press the START button on the main control to resume its operation. Pressed again and extinguished. When "M01" is read, the machine ignores it and continues to operate.

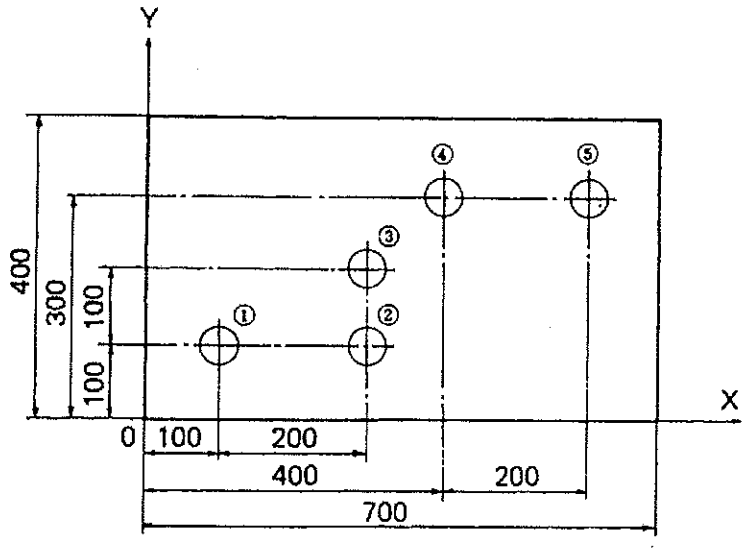
Q16. Write down the absolute coordinates for the given drawing.



Ans:

1. (15,15)
2. (35,15)
3. (55,15)
4. (75,15)
5. (75,35)
6. (55,35)
7. (35,35)
8. (15,35)
9. (15,55)
10. (35,55)
11. (55,55)
12. (75,55)

Q17.calculate the coordinates of given drawing (absolute & incremental).



X- and Y-coordinates

Absolute value: Distance from origin

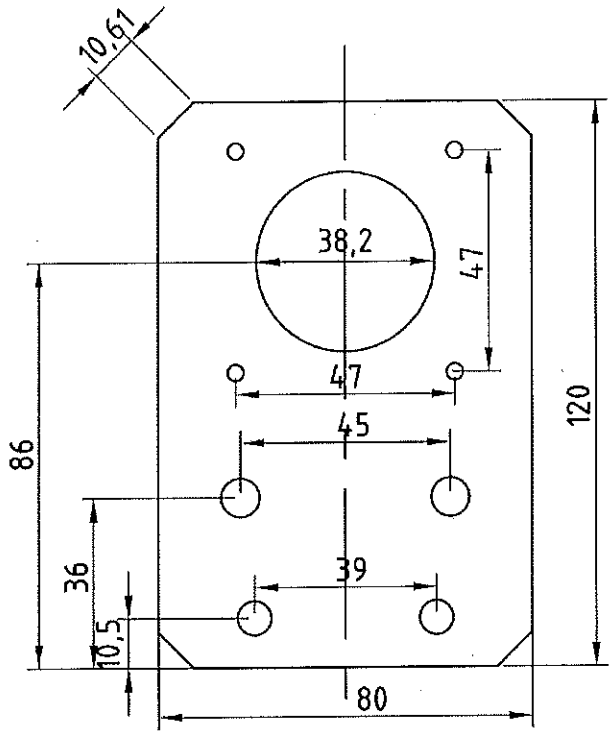
Incremental value: Distance from previous position

Hole	X-coordinate	Y-coordinate	Method
①	100.00	100.00	Absolute
②	300.00	100.00	
③	300.00	200.00	
④	400.00	300.00	
⑤	600.00	300.00	

Hole	X-coordinate	Y-coordinate	Method
①	100.00	100.00	Absolute
②	200.00	0*	Incremental
③	0*	100.00	
④	100.00	100.00	
⑤	200.00	0*	

*In the case of zero, no decimals are needed.

Q18. Write a CNC plasma program for given drawing.



Ans:

G92 X0 Y0;

G91;

G21;

G00 X20.9 Y86;

G41;

M07;

G02 X0 Y0 I19.1 J0;

M08;

G40;

G00 X-20.9 Y-86

G41;

M07;

G01 X0 Y120;

G01 X80 Y0;

G01 X0 Y-120;

G01 X-80 Y0;

M08

G40;

M02;

SET-B

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Metal Construction Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 5th Semester,

End-Sem. Examination

Course Code: MCS1501 **Time: 2 Hours**

Course Name: Advanced CNC laser/ punching/ Bending **Max. Marks: 50**

Instruction:

1. Attempt all questions.
2. Use of Calculators is prohibited.
3. Section A contains 10 Questions. Each question carries 1 Marks.
4. Section B contains 04 Questions. Each question carries 4 Marks.
5. Section C contains 04 Questions. Each question carries 6 Marks.

Section – A

10X01 = 10 Marks

Q1. Feed is measured in units of _____

a) length/revolution

b) degree/revolution

c) length

d) velocity

Q2. Which of the following is not the advantage of CNC machines?

a) Higher flexibility

b) Improved quality

c) Reduced scrap rate

d) Improved strength of the components

Q3. G01 code for _____

a) Circular interpolation CW

b) Circular interpolation CCW

c) Rapid Traverse

d) Liner interpolation

Q4. Sub program end code is ___

a) M99

b) M30

c) M02

d) none of the above

Q5. Optional stop code is _____

a) M30

b) M02

c) M01

d) M99

Q6. In CNC Laser M102 code use for _____

a) indicate sheet thickness

b) laser on

c) piercing

d) define material

Q7. In laser E001, E002, E003 ------ E010 is

a) feed

b) speed

c)rapid motion

d) cutting conditions

Q8. How many turret station in RS India CNC punching machine?

a) 70-station turret (King type-turret)

b) 58-station turret (King type-turret)

c) 58-station turret (Z type-turret)

d) 45-station turret (Z type-turret)

Q9. SPC means

a) cold rolled steal

b) aluminum

c) Titanium

d) SS

Q10. Oscillator is used for

a) start the punching

b) generating laser

c) cooling dust collector

d) none of the above

Section – B

04X04 = 16 Marks

Q11. What do you mean by absolute or incremental programing code?

Q12.Explain Safety during operating punching.

Q13.Explain Safety during operating laser.

Q14. Which code is use to designate worksheet material and thickness in CNC punching machine?

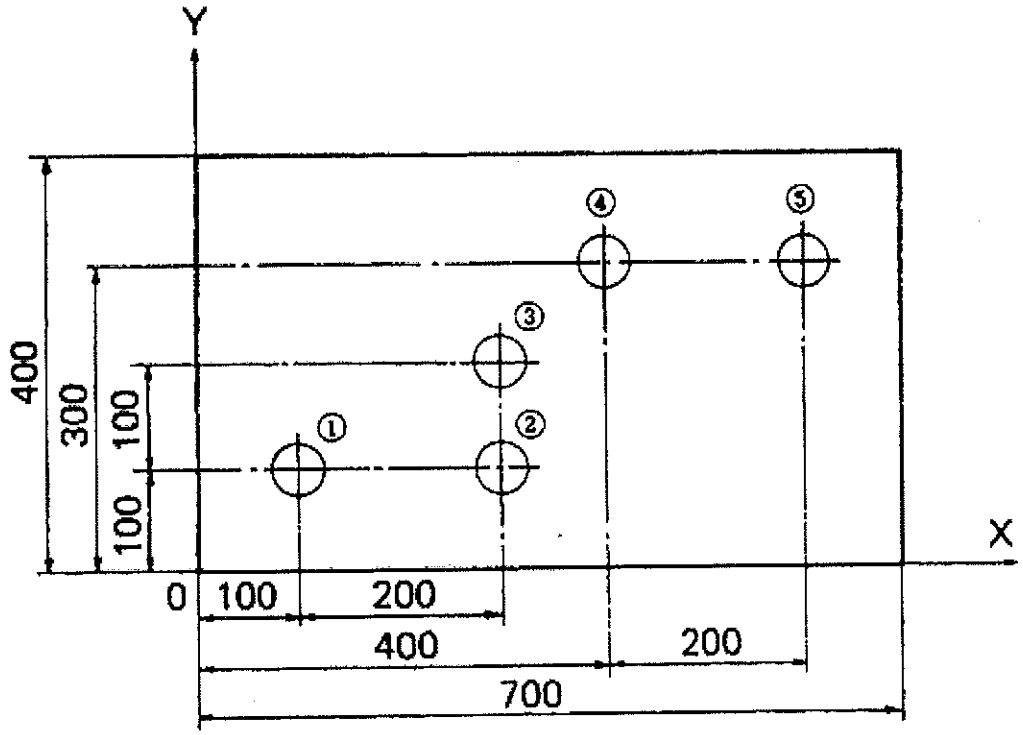
Section – C

04X06 = 24 Marks

Q15. Explain dead zone, program check, auto power off, block skip, single block, optional stop.

Q16. What do you mean by NC machine or CNC Machine?

Q17.calculate the coordinates of given drawing.



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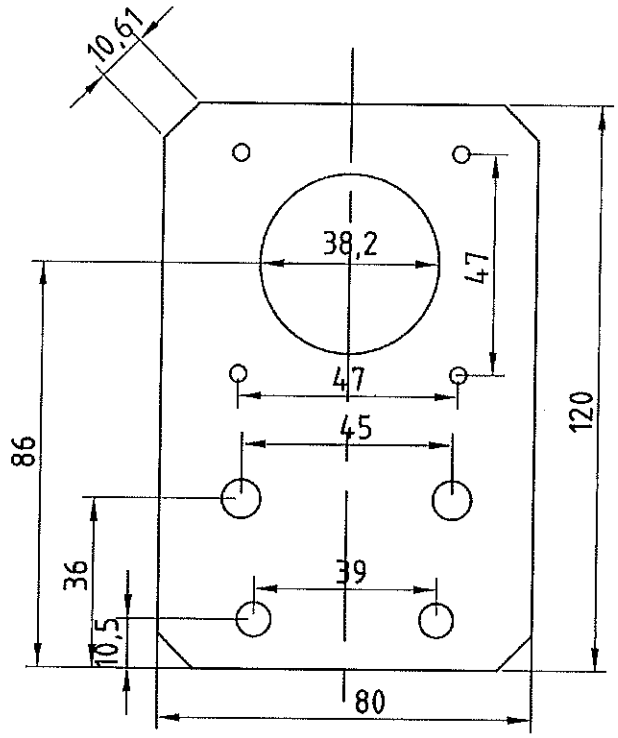
10,61
38,2
47
47
45
120
86
36
39
10,5
80

SET-B

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Metal Construction Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 5th Semester,

End-Sem. Examination

Course Code: MCS1501 **Time: 2 Hours**

Course Name: Advanced CNC laser/ punching/ Bending **Max. Marks: 50**

Instruction:

1. Attempt all questions.
2. Use of Calculators is prohibited.
3. Section A contains 10 Questions. Each question carries 1 Marks.
4. Section B contains 04 Questions. Each question carries 4 Marks.
5. Section C contains 04 Questions. Each question carries 6 Marks.

Section – A

10X01 = 10 Marks

Q1. Feed is measured in units of _____

a) length/revolution

b) degree/revolution

c) length

d) velocity

Q2. Which of the following is not the advantage of CNC machines?

a) Higher flexibility

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d) Improved strength of the components

Q3. G01 code for _____

a) Circular interpolation CW

b) Circular interpolation CCW

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d) Liner interpolation

Q4. Sub program end code is ___

a) M99

b) M30

c) M02

d) none of the above

Q5. Optional stop code is _____

a) M30

b) M02

c) M01

d) M99

Q6. In CNC Laser M102 code use for _____

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c) 58-station turret (Z type-turret)

d) 45-station turret (Z type-turret)

Q9. SPC means

a) cold rolled steal

b) aluminum

c) Titanium

d) SS

Q10. Oscillator is used for

a) start the punching

b) generating laser

c) cooling dust collector

d) none of the above

Section – B

04X04 = 16 Marks

Q11. What do you mean by absolute or incremental programing code?

Ans: G90 Absolute programming:

When G90 is commanded, all coordinates in the program refer to current program origin or to the absolute origin point. G90 is MODAL and remains effective until G91 is commanded.

G91 Incremental programming:

When G91 is commanded, all coordinates in the program are incremental distances from the previous coordinate. G91 is MODAL and remains effective until G90 is commanded

Q12.Any five Safety point during operating punching.

Ans:

1. Program must be checked.
2. Worksheet proper clamp
3. Punch must be install according to program (check before production)
4. Have the machine operated by a single, trained person who has read this manual and acquired a thorough knowledge of the machine and its operation. If more than one authorized operator must be involved, coordinate their work to ensure utmost safety.
5. Turn off the power and shut down the compressed air supply when carrying out a maintenance operation. Then padlock the machine circuit breaker switch lever. If the power is needed, prevent the machine from being started by mistake. Turn the SAFETY DEVICE keyswitch to SETTING, remove the key from the switch, and keep it by yourself.
6. Clear the hazardous area around the machine of people and obstacles before starting the machine. Do not overlook the area behind the machine.

Q13.Any five safety points during operating laser.

Ans:

1. Check the program
2. Oscillator must be on
3. Worksheet proper clamped
4. Laser must be setup according to program
5. Have the machine operated by a single, trained person who has read this manual and acquired a thorough knowledge of the machine and its operation. If more than one authorized operator must be involved, coordinate their work to ensure utmost safety.

Q14. Which code is use to designate worksheet material and thickness in CNC punching machine?

Ans:

G06 A___ B___

This code is used to designate the worksheet thickness and material. Enter "G06" at the beginning of the program. When "G06" is omitted, the thickness is 6.3 mm and the material is mild steel.

A: Worksheet thickness 0.1 to 6.3 mm (0.002" to 0.248")

B: Worksheet material 0: Mild steel (SPC or CRS)
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The decimal point in the thickness data is handled as follows:

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63	0.6 mm (Omit the numerals below the second place of decimals.)

Example:

OOOOO

G06 A1.0 B0 (1-mm thick mild steel worksheet is designated.)

G92 X___ Y___

•

•

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Section – C

04X06 = 24 Marks

Q15. Explain dead zone, program check, auto power off, block skip, single block, optional stop.

Ans:

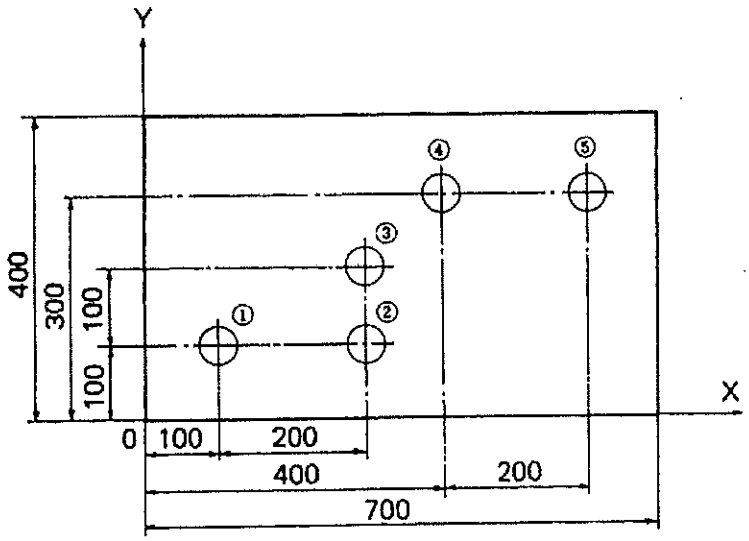
1. Dead zone region: - Region where a workclamp enters a punching position and is punched itself when the worksheet is punched in this condition. "Dead zone" appears on the MESSAGE display.
2. Program check: - Pressed and illuminated to enable the program check function. The machine does not operate while the program is being checked. For details, refer to "Checking program" in Part VI, Operation. Pressed again and extinguished to disable the program check function.
3. Auto power off: - Pressed and illuminated to enable the automatic power-off function. Pressed again and extinguished to disable the automatic power-off function. The button changes to flashing after the program is completed, and the power of the NC unit turns off 15 min later. If the machine is not automatically operating, the power of the NC unit can be turned off 2 min later after the button is pressed and held for 2 sec or more. Button illuminated: The automatic power-off function is enabled Button flashing: The power of the NC unit turns off 15 min after the start of flashing.
4. Block skip: - Pressed and illuminated. When the program is started, the machine ignores each block with a slash (/) at the beginning and goes to the next block. Pressed again and extinguished. The machine executes blocks with a slash (/) at the beginning without ignoring them.
5. Single block: - Pressed and illuminated to enable the single block operation of the machine. Each time the START button on the main control panel is pressed in the single block operation, the machine executes one block of the program and then stops. Pressed again and extinguished to disable the single block operation of the machine.
6. Optional stop: - Pressed and illuminated. When the program is started, the machine pauses each time "M01" (optional stop command) is read. When the machine pauses, press the START button on the main control to resume its operation. Pressed again and extinguished. When "M01" is read, the machine ignores it and continues to operate.

Q16. What do you mean by NC machine or CNC Machine?

Ans: The comparison of NC and CNC machine are:

- NC stands for Numerical Control whereas CNC stands for Computer Numerical Control.
- In NC Machine the programs are fed into the punch cards. But in CNC machine the programs are fed directly into the computer with the help of a small keyboard similar to our traditional keyboard.
- In NC machine if an error occurs in the program than its debugging and modification is not easy. In CNC machine the debugging and modification is very easy.
- High skilled operator is required to operate the NC machine whereas to operate a CNC machine, a semiskilled operator may work.
- The cost of the NC machine is less as compared with the computer control machines.
- The maintenance cost of NC is less whereas it is costly in the case of CNC machine.
- No programs can be stored in the NC machine. In CNC machine, numbers of programs can be stored and can be used again and again for the production.
- The accuracy of the NC is less as compared with the CNC.
- In NC machine the execution of the job takes more time but the CNC machine executes the job without taking much time.
- NC cannot be run continuously for 24 hours but CNC machine can be run for 24 hours continuously.

Q17.calculate the coordinates of given drawing (absolute & incremental).



X- and Y-coordinates

Absolute value: Distance from origin

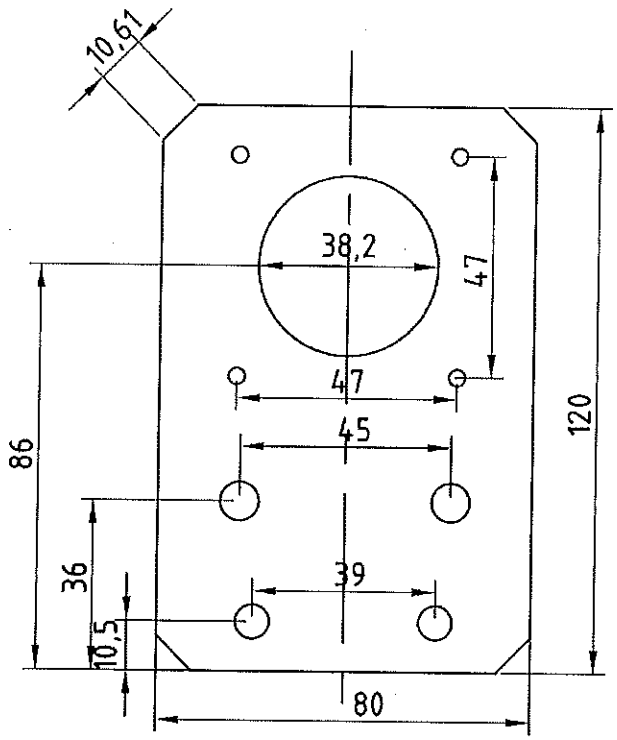
Incremental value: Distance from previous position

Hole	X-coordinate	Y-coordinate	Method
①	100.00	100.00	Absolute
②	300.00	100.00	
③	300.00	200.00	
④	400.00	300.00	
⑤	600.00	300.00	

Hole	X-coordinate	Y-coordinate	Method
①	100.00	100.00	Absolute
②	200.00	0*	Incremental
③	0*	100.00	
④	100.00	100.00	
⑤	200.00	0*	

*In the case of zero, no decimals are needed.

Q18. Write a CNC plasma program for given drawing.



Ans:

G92 X0 Y0;

G91;

G21;

G00 X20.9 Y86;

G41;

M07;

G02 X0 Y0 I19.1 J0;

M08;

G40;

G00 X-20.9 Y-86

G41;

M07;

G01 X0 Y120;

G01 X80 Y0;

G01 X0 Y-120;

G01 X-80 Y0;

M08

G40;

M02;

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Metal Construction Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 5th Semester,

End-Sem. Examination

Set: A

Course Code: MCS1502 **Time: 2 Hours**

Course Name: Robotic Welding **Max. Marks: 50**

Instruction:

1. Attempt all questions.
2. Use of Calculators is prohibited.
3. Section A contains 10 Questions. Each question carries 10 Marks.
4. Section B contains 04 Questions. Each question carries 16 Marks.
5. Section C contains 04 Questions. Each question carries 24 Marks.

Section – A

10X01 = 10 Marks

1. GTPU stands for
   a) Graphical Teach Pendant Unit
   b) Graph tech pressure unit
   c) Graphical technique of point uniform
   d) None of them

2. IRC5 stands for
   a) International Robot Controller (Fifth Generation)
   b) Industrial Robot Controller (Fifth Generation)
   c) Both of them
   d) None of them

3. SMB stands for
   a) Switch Measurement Board
   b) Switch Mode Box
   c) Serial Measurement Box
   d) Serial Measurement Board

4. Drive units control the
   a) torque
   b) acceleration
   c) speed of the joints.
   d) All of them

5. Axis computers perform all the calculations of individual joints.
   a) True
   b) False

6. Which gas is used to extinguish the fire
   a) Nitrogen di oxide
   b) Carbon di oxide
   c) Aluminum oxide
   d) None of the above

7. Which is not a part of graphical teach pendant unit-
   a) Emergency stop
   b) 3- way joy stick
   c) Controller
   d) None of the above

8. A robot can be operated in different modes which is-
   a) Manual mode
   b) Manual 100% mode
   c) Automatic mode
   d) All of the Above

9. Which is not a code for robot-
   a) MoveJ
   b) MoveL
   c) ArcL start
   d) Alll of the above

10. Jogging can be done while programming
   a) True
   b) False

Section – B

04X04 = 16 Marks

1. What are the major Components of robot?
2. draw a block diagram of the ABB robot.
3. What is the use of resolver and SMB?
4. explain degree of freedom.

Section – C

04X06 = 24 Marks

1. What is calibration and how it's done?
2. what do you mean by limiting robot workspace?
3. what do you mean by jogging and its uses? Explain its various modes
4. what do you mean by coordinate system and what coordinate system are used in robot?

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Metal Construction Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 3rd Semester,

End-Sem. Examination

Set: A

Course Code: MCS1502 **Time: 2 Hours**

Course Name: Robotic Welding **Max. Marks: 50**

Instruction:

1. Attempt all questions.
2. Use of Calculators is prohibited.
3. Section A contains 10 Questions. Each question carries 10 Marks.
4. Section B contains 04 Questions. Each question carries 16 Marks.
5. Section C contains 04 Questions. Each question carries 24 Marks.

Section – A

10X01 = 10 Marks

1. GTPU stands for
   a) Graphical Teach Pendant Unit
   b) Graph tech pressure unit
   c) Graphical technique of point uniform
   d) None of them

2. IRC5 stands for
   a) International Robot Controller (Fifth Generation)
   b) Industrial Robot Controller (Fifth Generation)
   c) Both of them
   d) None of them

3. SMB stands for
   a) Switch Measurement Board
   b) Switch Mode Box
   c) Serial Measurement Box
   d) Serial Measurement Board

4. Drive units control the
   a) torque
   b) acceleration
   c) speed of the joints.
   d) **All of them**

5. Axis computers perform all the calculations of individual joints.
   a) **True**
   b) False

6. Which gas is used to extinguish the fire
   a) Nitrogen di oxide
   b) Carbon di oxide
   c) Aluminum oxide
   d) None of the above

7. Which is not a part of graphical teach pendant unit-
   a) Emergency stop
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   c) Controller
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10. Jogging can be done while programming
    a) True
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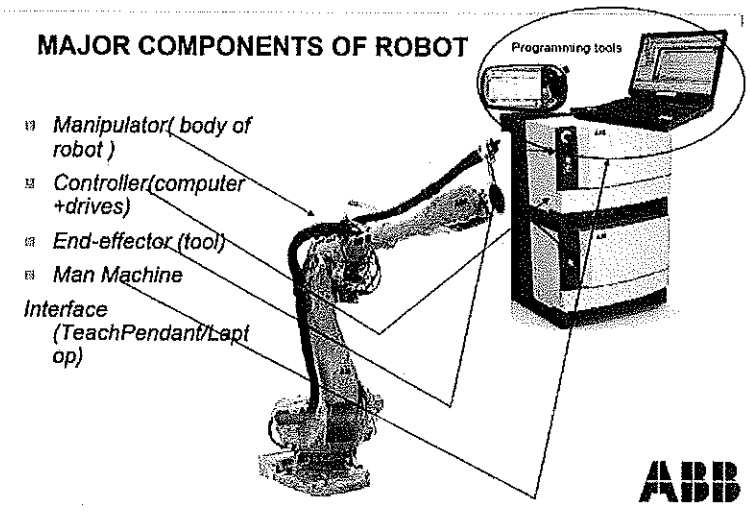
Section – B

04X04 = 16 Marks

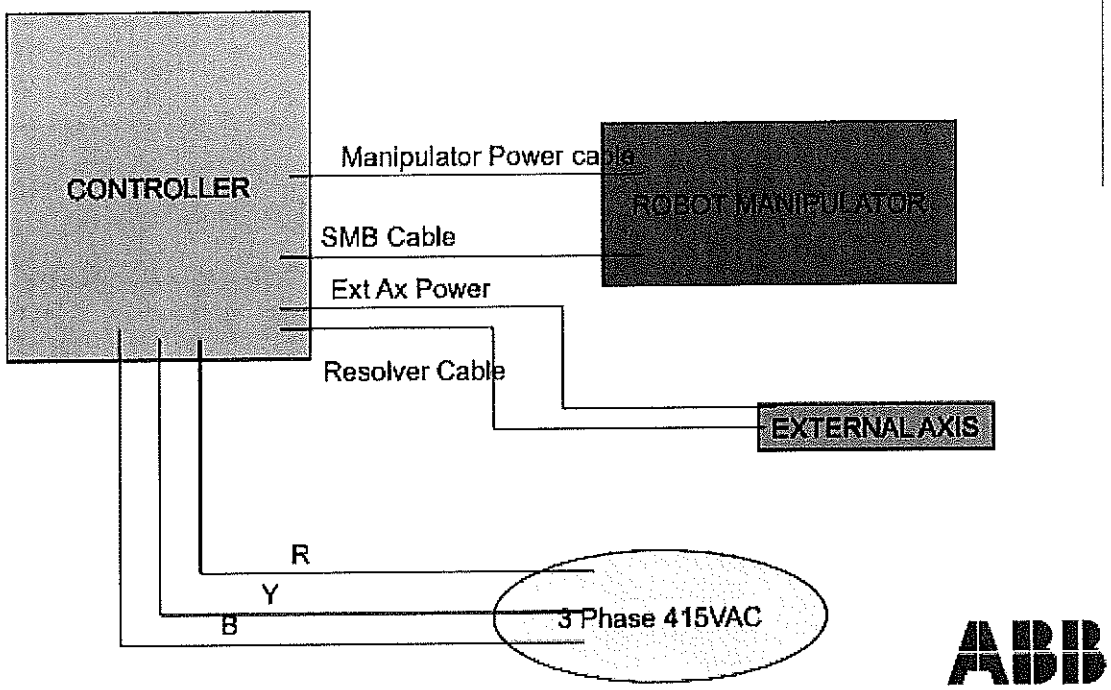
1. What are the major Components of robot?

Ans



2. draw a block diagram of the ABB robot.

Block Diagram of Robot



3. What is the use of resolver and SMB?

Ans:

USE OF RESOLVERS AND SMB

- Every joint of a robot has a resolver, the resolver measures the position and velocity of a joint and sends the data to the SMB (Serial Measurement Board) located at the base of the manipulator.
- There is a separate battery for backing the SMB data in case of a power failure.
- The SMB is connected to the controller via "resolver cable"

4. explain degree of freedom.

Ans

DEGRES OF FREEDOM

The number of independent movements a robot can make is known as the degree of freedom of the robot manipulator. In other words, the number of rotary axes a manipulator has is known as its degree of freedom

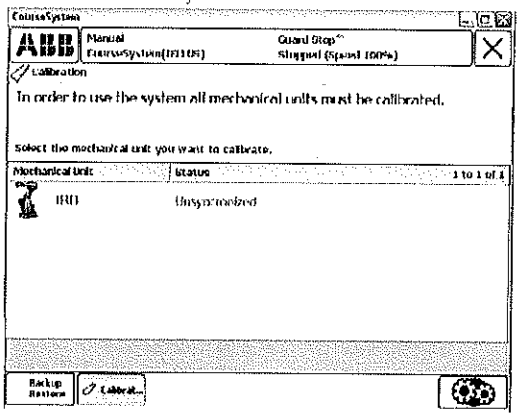
Section – C

04X06 = 24 Marks

1. What is calibration and how it's done?

CALIBRATION

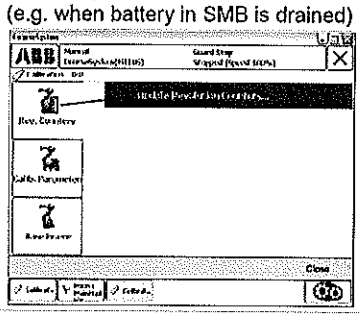
- An uncalibrated system.



ABB

REVOLUTION COUNTER

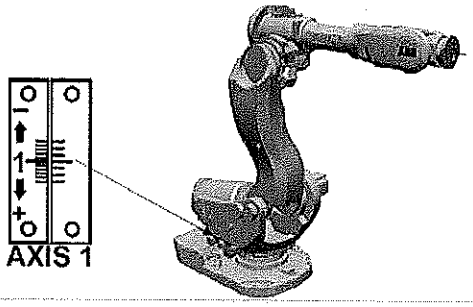
- Rev.Counter
  - Tells how many turns the engine shaft has rotated in the gearbox.
  - If value is lost the robot cannot run any programs.
  - A message notifies that the Rev.Counters needs to be updated. (e.g. when battery in SMB is drained)



ABB

UPDATE REV. COUNTERS

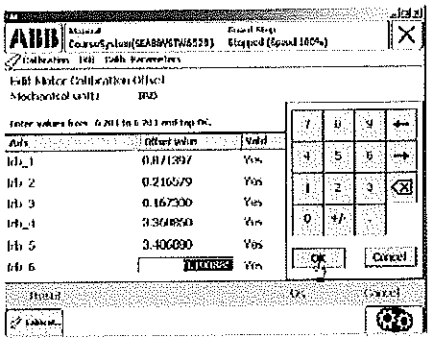
- Jog all of the 6 axis to the sync marks
- Update Rev.Counters
- Check if Rev.Counters where correctly updated
- Possible to update the axis one by one, if the cell is cramped



ABB

MOTOR CALIBRATION VALUES

- Type in the fine calibration values manually
- Use moc.cfg values from Backup, Silver label in back of manipulator with 6 values, or original Motor Calibration values floppy shipped with system.



66-26761	
Axis	Resolver Values
1	0.871397
2	0.216579
3	0.167300
4	3.360860
5	3.406880
6	0.190685

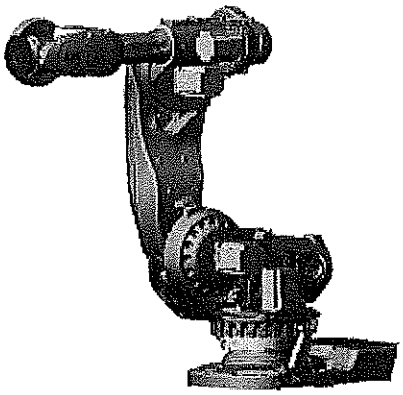
ABB

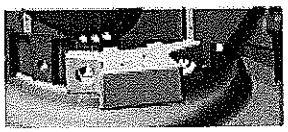
2. what do you mean by limiting robot workspace?

Ans:

LIMITING ROBOTS WORKSPACE

- To avoid the risk of getting caught between the robot and the outer safe equipment, e.g. a fence, the robot's workspace can be limited:
  - All axis can be software controlled
  - Axis 1–3 can be limited by adjustable mechanical stops and controlled by limit switches





ABB

3. what do you mean by jogging and its uses? Explain its various modes

Ans

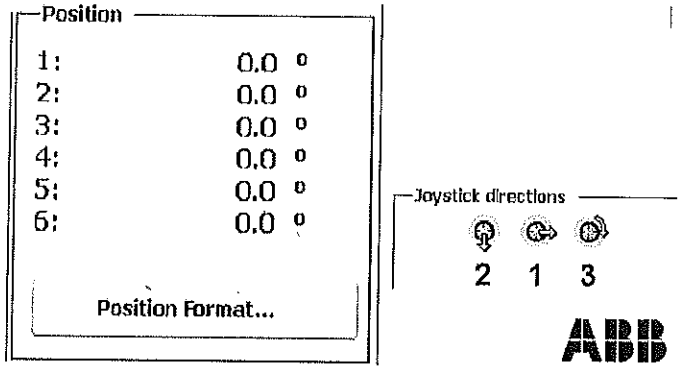
JOGGING

- Jogging means manually moving a robot using the joystick on the flexpendant.
- The Robot gains more as per the Joystick Deflection.
- Jogging cannot be done in auto mode.
- Jogging is used while teaching a robot points in space.
- Jogging can be done while programming

MODES OF JOGGING

Jogging can be done in three modes:

- Axes mode (joint by joint)
  AXIS MODE
  We can jog axes 1-3 or axes 4-6 at one go. The position format shows the angular position of each joint in degrees or radians



- Linear mode (along X / Y / Z)
  LINEAR MODE
  In linear mode the TCP moves in a straight line.
  The TCP can move parallel to either the x-axis or the y-axis or the z-axis of the selected coordinate system of the robot which can be the base, world, tool or workobject coordinate system.
  The position format shows the position of the TCP w.r.t the coordinate system selected in mm and orientation of tool in Quaternions or Euler Angles.
  During linear jogging orientation of tool remains same

- Reorient mode (changing orientation of tool)
  REORIENTATION MODE
  In reorientation mode the TCP of the selected tool remains at a fixed positon in space. However, the orientation of the tool about that fixed point changes.

4. what do you mean by coordinate system and what coordinate system are used in robot?

Ans

A coordinate system = origin O and 3 perpendicular axes X, Y, & Z. It is used to specify the position of a point in space. The various types of coordinate systems used in a Robot are

COORDINATE SYSTEMS

THE BASE COORDINATE SYSTEM.

THE WORLD COORDINATE SYSTEM.

THE TOOL COORDINATE SYSTEM.

THE WORK OBJECT COORDINATE SYSTEM.

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Metal Construction Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 3rd Semester,

End-Sem. Examination

Set: B

Course Code: MCS1502 **Time: 2 Hours**

Course Name: Robotic Welding **Max. Marks: 50**

Instruction:

1. Attempt all questions.
2. Use of Calculators is prohibited.
3. Section A contains 10 Questions. Each question carries 10 Marks.
4. Section B contains 04 Questions. Each question carries 16 Marks.
5. Section C contains 04 Questions. Each question carries 24 Marks.

Section – A

10X01 = 10 Marks

1. which is the event massage?
   a) ⚠ **Warning**
   b) ✖ **Error**
   c) ℹ **Information**
   d) **All of the above**

2. Which is not belongs to event contents.
   a) Description
   b) Consequences
   c) **Sequence**
   d) Action

3. The "WaitDI" instruction is used for waiting for a single input.
   a) **True**
   b) False

4. The _____ instruction is used to wait for a complicated condition.
   a) **Wait Until**
   b) Wait DI
   c) Wait time
   d) None of these

5. The _____ instruction is used for waiting for an amount of time
   a) Wait until
   b) **Wait time**
   c) Wait DI
   d) None of these

6. Match the following

Robot part	Function
a. Manipulator arm	1. For holding a piece or tool
b. Controllers	2. Move the manipulator arm and end effector
c. Drives	3. Number of degrees of freedom of movement

d. Gripper 4. Delivers commands to the actuators

a. a-1, b-4, c-2, d-3
b. a-3, b-4, c-2, d-1
c. a-3, b-2, c-4, d-1
d. a-4, b-3, c-2, d-1

7. Which is not a part of graphical teach pendant unit-
   a) Emergency stop
   b) 3- way joy stick
   c) Controller
   d) None of the above

8. A robot can be operated in different modes which is-
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   d) All of the Above

9. Which is not a code for robot-
   a) MoveJ
   b) MoveL
   c) ArcL start
   d) AIII of the above

10. Jogging can be done while programming
   a) True
   b) False

Section – B

04X04 = 16 Marks

11. what is the use of controller in robot?

Ans

DESCRIPTION OF A CONTROLLER v A controller is the brain behind the functioning of a robot The picture below shows the IRC5 controller of ABB .It is a Dual cabinet controller.

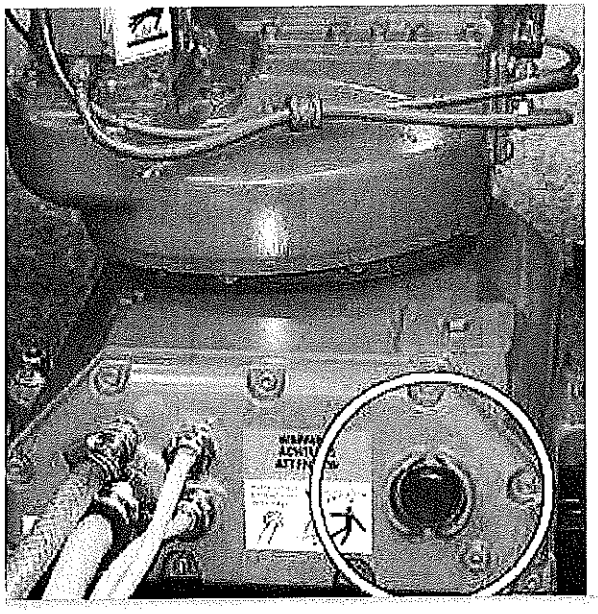
12. what do you mean by break release button?

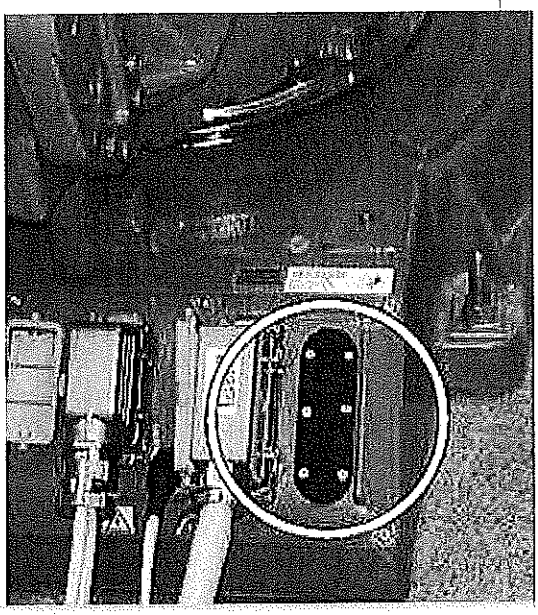
Ans

When break release button is pressed the arms of the robot move freely

BRAKE RELEASE BUTTON

- The brake release buttons when pressed release the brakes.





13. what are the major or minor Axis of the robot?

Ans

THE MAJOR AND MINOR AXES OF A ROBOT

The first 3 axes (axis 1/2/3/) of a robot are known as the major axes because they help in positioning the wrist at a required point on the work piece.

The last 3 axes (4/5/6) of a robot are called as the minor axes because they allow the wrist to reorient in any required direction without changing its position

14. describe manipulator.

Ans DESCRIPTION OF A MANIPULATOR

- A manipulator is an assemblage of rigid links connected by joints.
- Each joint is driven by an actuator (AC Servo motors in ABB robots).
- Actuators are coupled to joints via geared transmission.
- An industrial manipulator has 4 OR 6 degrees of freedom.
- Brakes are installed in every joint motor to hold the manipulator in position against gravity in motors off state

Section – C

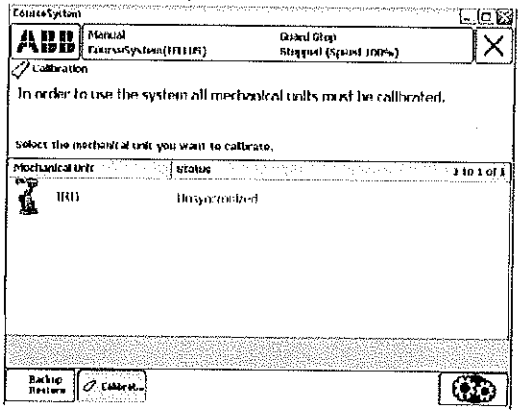
04X06 = 24 Marks

15. What is calibration and how it's done?

Ans:

CALIBRATION

- An uncalibrated system



REVOLUTION COUNTER

- Rev.Counter
  - Tells how many turns the engine shaft has rotated in the gearbox.
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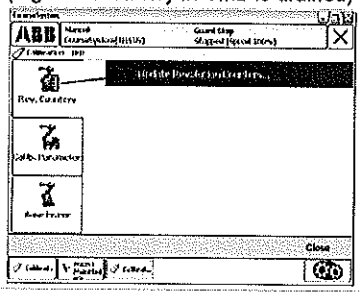

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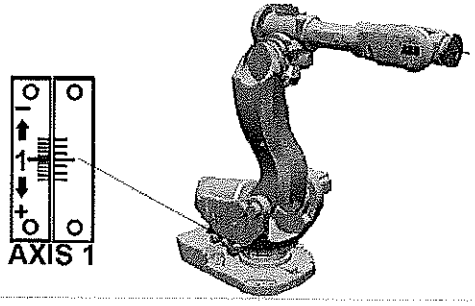

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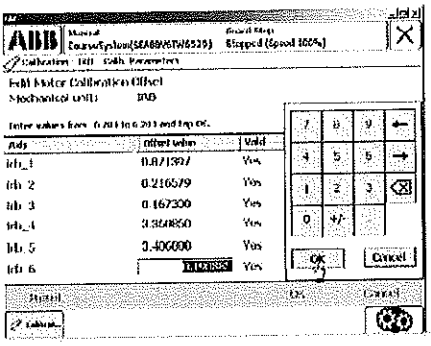

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Axis	Resolver Values
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ABB

16. what are the major components of controller?

Ans

- MAJOR COMPONENTS OF AN IRC5 CONTROLLER
- A main computer does all the primary computing job.
- Axis computers perform all the calculations of individual joints.
- Drive units control the torque , acceleration and speed of the joints.
- The SMPS (Switch Mode Power Supply) supplies 24 VDC to main computer, axis computers, I/O Boards etc
- Contactors cut off supply from motors as and when required.
- Transformer steps down 415 VAC to 230 VAC.
- Rectifier converts AC to DC.
- I/O Boards are used for user signals. IRC5 stands for Industrial Robot Controller (Fifth Generation

17. what do you mean by jogging and its uses? Explain its various modes

Ans

JOGGING

- Jogging means manually moving a robot using the joystick on the flexpendant.
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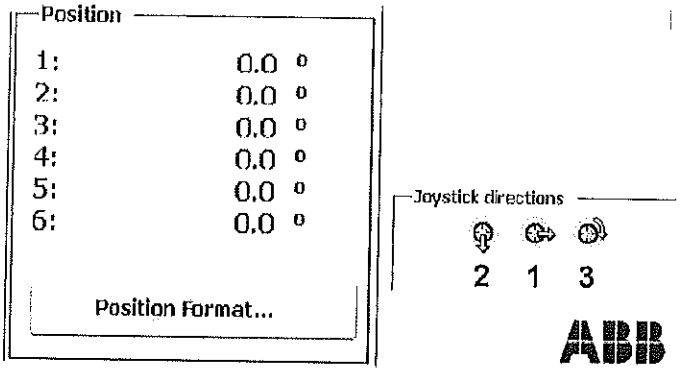

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Ans

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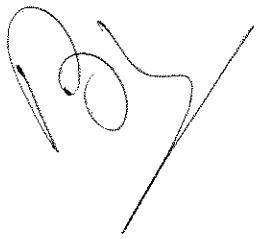

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Metal Construction Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 3rd Semester,

End-Sem. Examination

Set: B

Course Code: MCS1502 **Time: 2 Hours**

Course Name: Robotic Welding **Max. Marks: 50**

Instruction:

1. Attempt all questions.
2. Use of Calculators is prohibited.
3. Section A contains 10 Questions. Each question carries 10 Marks.
4. Section B contains 04 Questions. Each question carries 16 Marks.
5. Section C contains 04 Questions. Each question carries 24 Marks.

Section – A

10X01 = 10 Marks

1. which is the event massage?
   a) ⚠ **Warning**
   b) ✖ **Error**
   c) ℹ **Information**
   d) All of the above

2. Which is not belongs to event contents.
   a) Description
   b) Consequences
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6. Match the following

Robot part	Function
a. Manipulator arm	1. For holding a piece or tool
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   d) All of the above

10. Jogging can be done while programming
    a) True
    b) False

Section – B

04X04 = 16 Marks

11. what is the use of controller in robot?
12. what do you mean by break release button?
13. what are the major or minor Axis of the robot?
14. Describe manipulator.

Section – C

04X06 = 24 Marks

15. What is calibration and how it's done?
16. what are the major components of controller?
17. what do you mean by jogging and its uses? Explain its various modes
18. what do you mean by coordinate system and what coordinate system are used in robot?

A.

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Metal Construction Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 5th Semester,

End-Sem. Examination

Course Code: MCS1503 Time: 2 Hours

Course Name: Welded Construction & Design Max. Marks: 50

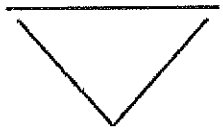
Instruction:

1. Attempt all questions.
2. Use of Calculators is prohibited.
3. Section A contains 10 Questions. Each question carries 1 Marks.
4. Section B contains 04 Questions. Each question carries 4 Marks.
5. Section C contains 04 Questions. Each question carries 6 Marks.

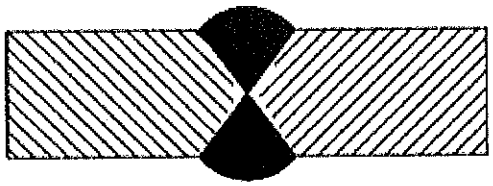
Section – A

10X01 = 10 Marks

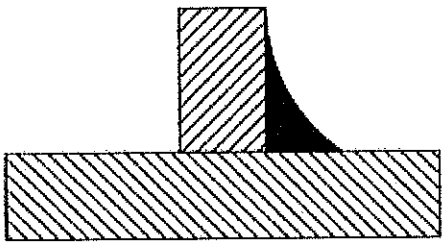
Q1. Find the appropriate weld illustration for the following weld symbol.



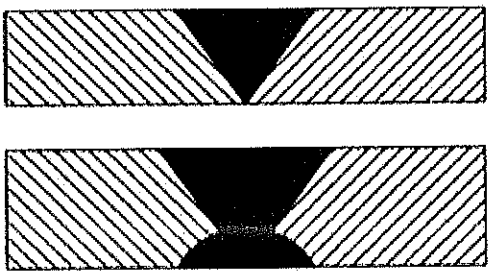
a)



b)

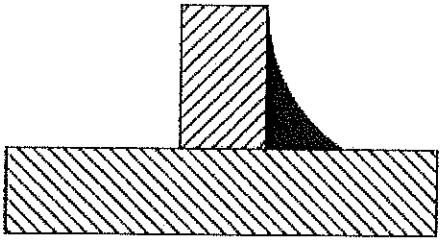


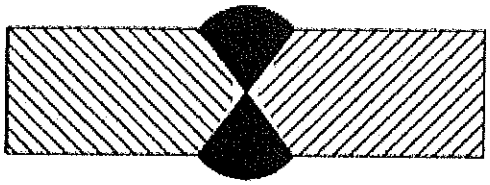
c)



d)

Q2. Which of the following illustrates the flat single-V butt weld with a flat backing run.

a) 

b) 

c) 

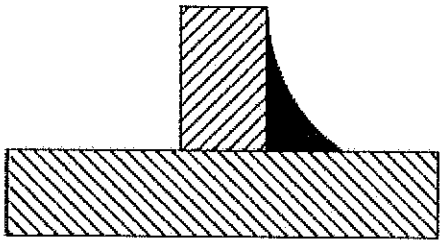
d) 

Q3. Find the type of weld joint the following diagram is representing.

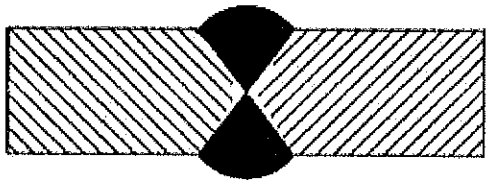
a) Seam weld
b) Fillet weld
c) Plug weld
d) Spot weld

Q4. Which of the following diagram illustrates the concave fillet weld?

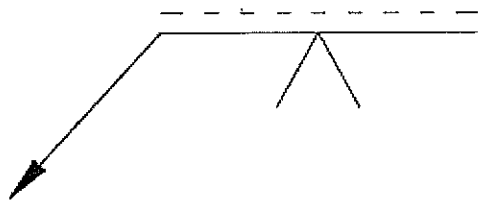
a) 

b) 

c) 

d) 

Q5. What does the following sign with the position of the symbol indicate?



a) To weld on the other side
b) For symmetric weld
c) To weld on the arrow side
d) Edge preparation

Q6. In butt weld joint, what will be the strength equation? if the thickness of the plate is t, permissible tensile stress for the weld is σ_t, and the length of the weld is l.
a) $\sigma_t tl$
b) $\sigma_t(tl)^2$
c) $\sigma_t tl^2$
d) $\sigma_t lt^2$

Q7. If force act in a direction parallel to the direction of weld, then fillet weld is called as?
a) Transverse
b) Longitudinal
c) Parallel
d) Longitudinal or Parallel

Q8. Relation between throat and leg for a parallel fillet weld is
a) t =h Cos (45')
b) h =t Cos (45')
c) h= t
d) None of the listed

Q9. If length of weld is l and leg h, then area of throat can be given by
a) 0.707 hl
b) 1.414hl
c) hl
d) None of the listed

Q10. Quality checking of riveted joint is much expensive than that of welded joint.
a) True
b) False

Section – B

04X04 = 16 Marks

Q11. What is effective throat thickness?

Q12. Explain welding distortion.

Q13. Explain tacking.

Q14. How do you calculate weld length in butt weld?

Section – C

04X06 = 24 Marks

Q15. Explain stress relieving of welded joint.

Q16. What do you mean by stress &strain?

Q17. A gas tank consists of a cylindrical shell of 2.5 m inner diameter. It is enclosed by hemispherical shells by means of butt welded joint as shown in Fig. 8.6. The thickness of the cylindrical shell as well as the hemispherical cover is 12 mm. Determine the allowable internal pressure to which the tank may be subjected, if the permissible tensile stress in the weld is 85 N/mm2. Assume efficiency of the welded joint as 0.85.

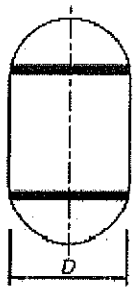


Fig. 8.6

Q18. A steel plate, 100 mm wide and 10 mm thick, is welded to another steel plate by means of double parallel fillet welds as shown in Fig. 8.9. The plates are subjected to a static tensile force of 50 kN. Determine the required length of the welds if the permissible shear stress in the weld is 94 N/mm2

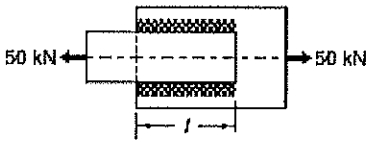


Fig. 8.9

A.

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Metal Construction Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 5th Semester,

End-Sem. Examination

Course Code: MCS1503 **Time: 2 Hours**

Course Name: Welded Construction & Design **Max. Marks: 50**

Instruction:

1. Attempt all questions.
2. Use of Calculators is prohibited.
3. Section A contains 10 Questions. Each question carries 1 Marks.
4. Section B contains 04 Questions. Each question carries 4 Marks.
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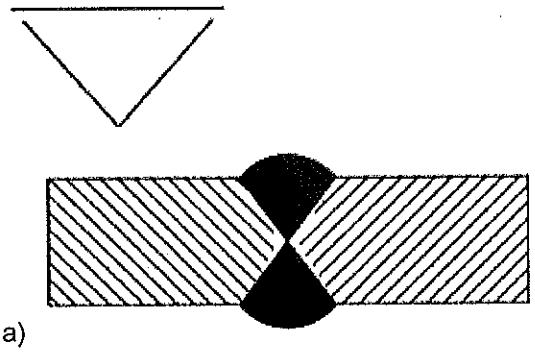
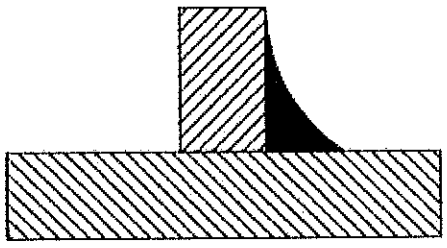
Section – A

10X01 = 10 Marks

Q1. Find the appropriate weld illustration for the following weld symbol.



a)

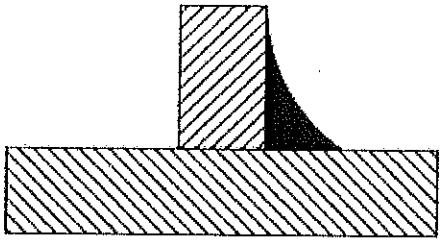


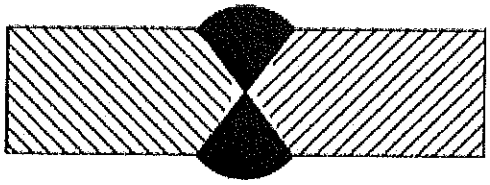
b)

c)

d)

Q2. Which of the following illustrates the flat single-V butt weld with a flat backing run.

a) 

b) 

c) 

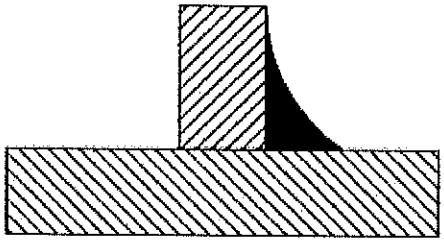
d) 

Q3. Find the type of weld joint the following diagram is representing.

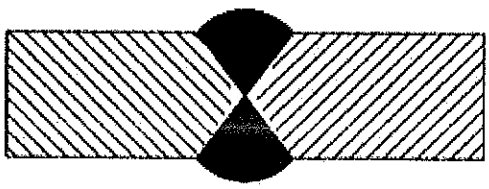
a) Seam weld
b) Fillet weld
c) Plug weld
d) Spot weld

Q4. Which of the following diagram illustrates the concave fillet weld?

a) 

b) 

c) 

d) 

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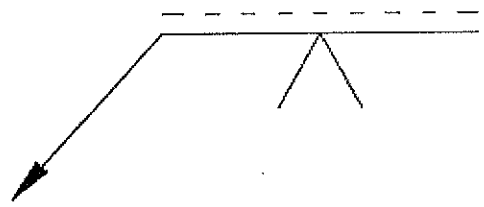

a) To weld on the other side
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a) 0.707 hl
b) 1.414hl
c) hl
d) None of the listed

Q10. Quality checking of riveted joint is much expensive than that of welded joint.
a) True
b) False

Section – B

04X04 = 16 Marks

Q11. What is effective throat thikness?

Q12. Explain welding distortion.

Ans: Weld shrinkage plagues experienced and amateur welders alike. Shrinkage causes distortion of

Q13. Explain tacking.

Q14. How do you calculate weld length in butt weld?

Section – C

04X06 = 24 Marks

Q15. Explain stress relieving of welded joint.

Q16. What do you mean by stress &strain?

Q17. A gas tank consists of a cylindrical shell of 2.5 m inner diameter. It is enclosed by hemispherical shells by means of butt welded joint as shown in Fig. 8.6. The thickness of the cylindrical shell as well as the hemispherical cover is 12 mm. Determine the allowable internal pressure to which the tank may be subjected, if the permissible tensile stress in the weld is 85 N/mm2. Assume efficiency of the welded joint as 0.85.

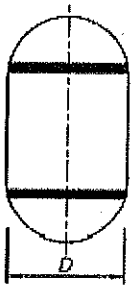

Fig. 8.6

Q18. A steel plate, 100 mm wide and 10 mm thick, is welded to another steel plate by means of double parallel fillet welds as shown in Fig. 8.9. The plates are subjected to a static tensile force of 50 kN. Determine the required length of the welds if the permissible shear stress in the weld is 94 N/mm2

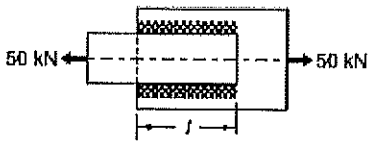

Fig. 8.9

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Metal Construction Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 5th Semester,

End-Sem. Examination

Course Code: MCS1503 **Time: 2 Hours**

Course Name: Welded Construction & Design **Max. Marks: 50**

Instruction:

1. Attempt all questions.
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3. Section A contains 10 Questions. Each question carries 1 Marks.
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5. Section C contains 04 Questions. Each question carries 6 Marks.

Section – A

10X01 = 10 Marks

Q1. Forge welding involves heating of parts to elastic stage and joint is prepared by impact force.

a) Yes

b) No, it is done up to plastic stage

c) Heating is done up to boiling point

d) None of the listed

Q2. Filler material is used in electric resistance welding.

a) Yes

b) No filler material used

c) Depends on the type of welding

d) None of the listed

Q3. Which type of welding is generally used in automobile sector?

a) Electric arc welding

b) Electric resistance welding

c) Gas welding

d) Forge welding

Q4. Hard peening is

a) Hammering the weld across the length while the joint is hot

b) Hammering the weld along the length while the joint is hot

c) Hammering the weld along the length while the joint is cold

d) Hammering the weld across the length while the joint is cold

Q5. In gas welding which of the following is generally used?

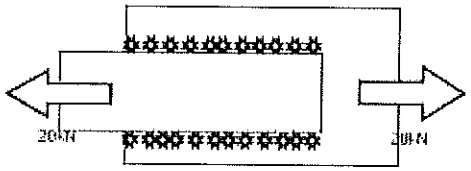
a) Oxygen-Hydrogen

b) Oxygen-Acetylene

c) Oxygen-Hydrogen or Oxygen-Acetylene

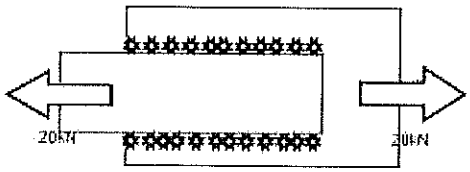
d) None of the mentioned

Q6. A steel plate is welded to another steel plate as shown in the below figure. This is an example of transverse fillet weld.



a) True
b) False

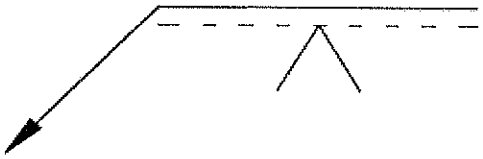
Q7. The two plates are welded as shown below figure. It is an example of



a) Parallel fillet weld
b) Transverse fillet weld
c) Parallel as well as transverse fillet weld
d) None of the mentioned

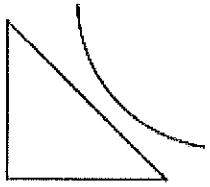
Q8. Strength of parallel fillet weld is greater than strength of transverse fillet weld.
a) True
b) False

Q9. What does the following sign with the position of the weld symbol indicate?

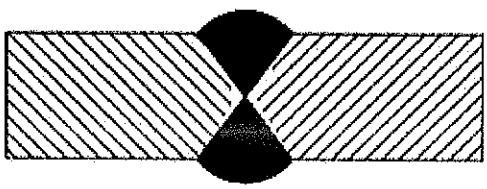


a) To weld on the other side
b) For symmetric weld
c) To weld on the arrow side
d) Edge preparation

Q10. What does the following weld symbol illustrate?

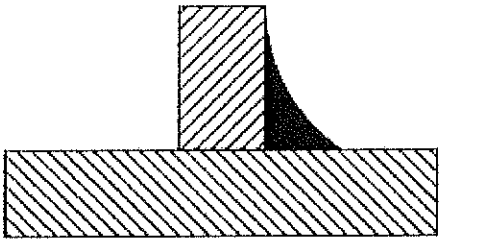


a)



b)

c)



d)

Section – B

04X04 = 16 Marks

Q11. What is stress?

Ans: When a body is subjected to external forces, equal and opposite internal forces are developed at the various sections of that body. This resisting force is known as unit stress or stress.

Formula of stress :

Stress = Force / Cross sectional are = P/A

Stress is generally denoted by the Greek letter sigma .

IN system international (S.I) the **unit of stress** is Pascal (Pa) .
1 Pa = 1 Newton /1 square meter.
In practical calculation, bigger units like megapascal (Mpa) or gigapascal (Gpa) is used.

Q12. What do you mean by strain?

Ans: When an external force is applied on a body, there is some change occur in the dimension of the body. The ratio of this change of dimension in the body to its actual dimension is called strain.

For example: if you have a bar of length l and an external force P is applied to the bar, then there is some change in the length of the bar. Let the change produced in the bar is dl. Then the strain is the ratio of this change in the length to the original (actual) length. The strain is a dimensionless quantity.

Mathematically,

strain= (change in length)/(original length)
e= dl/l

Q13. Explain tacking.

Ans: Tack welding is a process in which you set your welding material in place by applying short welds or tack welds that act as fixtures or joints. These welds are placed along the metals being soldered together before making the initial and final root pass.

Q14. What kind of welding process you use on 1mm thick sheet and why? Explain.

Ans: Tig welding because its arc can easly controllable, and we can also use pulse mode in it

Section – C

04X06 = 24 Marks

Q15. Explain stress relieving of welded joint.

Ans: Welded joints are subjected to residual stresses due to non-uniform heating of the parts being joined. There is always a possibility that localised thermal stresses may result from uneven heating and cooling during fusion and subsequent cooling. This also results in distortion. The magnitude of residual stresses cannot be predicted with any degree of certainty. This is the major disadvantage of welded joints. The following two methods can reduce the residual stresses: (i) Preheating of the weld area to retard cooling of the metal in the vicinity of the joint. (ii) Stress relieving of weld area by using proper heat treatment such as normalising and annealing in temperature range of 550° to 675°. One of the methods of stress relieving is hand peening. It consists of hammering the weld along the length with the peen of the hammer while the joint is hot. It reduces residual stresses and induces residual compressive stresses on the surfaces. This improves the fatigue strength of the joint

Q16. What are the advantages of welded joints compared with riveted joints?

Ans: Welded joints offer the following advantages compared with riveted joints:

(i) Riveted joints require additional cover plates, gusset plates, straps, clip angles and a large number of rivets, which increase the weight. Since there are no such additional parts, welded assembly results in lightweight construction. Welded steel structures are lighter than the corresponding iron castings by 50% and steel castings by 30%.

(ii) Due to the elimination of these components, the cost of welded assembly is lower than that of riveted joints.

(iii) The design of welded assemblies can be easily and economically modifi ed to meet the changing product requirements. Alterations and additions can be easily made in the existing structure by welding.

(iv) Welded assemblies are tight and leakproof as compared with riveted assemblies.

(v) The production time is less for welded assemblies.

(vi) When two parts are joined by the riveting method, holes are drilled in the parts to accommodate the rivets. The holes reduce the cross-sectional area of the members and result in stress concentration. There is no such problem in welded connections.

(vii) A welded structure has smooth and pleasant appearance. The projection of rivet head adversely affects the appearance of the riveted structure.

(viii) The strength of welded joint is high. Very often, the strength of the weld is more than the strength of the plates that are joined together.

(ix) Machine components of certain shape, such as circular steel pipes, find difficulty in riveting. However, they can be easily welded.

Q17. A gas tank consists of a cylindrical shell of 2.5 m inner diameter. It is enclosed by hemispherical shells by means of butt welded joint as shown in Fig. 8.6. The thickness of the cylindrical shell as well as the hemispherical cover is 12 mm. Determine the allowable internal pressure to which the tank

may be subjected, if the permissible tensile stress in the weld is 85 N/mm2. Assume efficiency of the welded joint as 0.85.

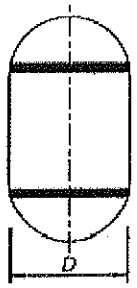


Fig. 8.6

Solution

Given For shell, $D = 2.5$ m $t = 12$ mm
For weld, $\sigma_t = 85$ N/mm^2 $\eta = 0.85$

Step I Tensile force on plates

The length of the welded joint is equal to the circumference of the cylindrical shell.

$l = \pi D = \pi (2.5 \times 10^3) = 7853.98$ mm

From Eq. (8.3),

$P = \sigma_t t l \eta = (85)(12)(7853.98)(0.85)$
$= (6809.4 \times 10^3)$ N

Step II Allowable internal pressure

Corresponding pressure inside the tank is given by

$$p = \frac{P}{\frac{\pi}{4} D^2} = \frac{(6809.4 \times 10^3)}{\frac{\pi}{4} (2.5 \times 10^3)^2} = 1.39 \text{ N/mm}^2$$

:

Q18. A steel plate, 100 mm wide and 10 mm thick, is welded to another steel plate by means of double parallel fillet welds as shown in Fig. 8.9. The plates are subjected to a static tensile force of 50 kN. Determine the required length of the welds if the permissible shear stress in the weld is 94 N/mm2

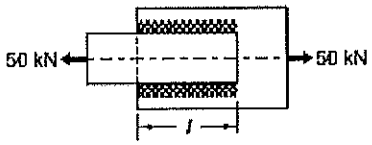
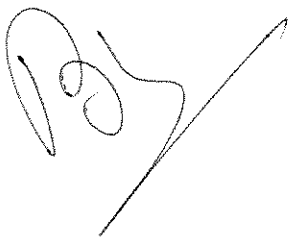


Fig. 8.9



BHARTIYA SKILL DEVELOPMENT UNIVERSITY

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School of Metal Construction Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 5th Semester,

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Course Code: MCS1503 **Time: 2 Hours**

Course Name: Welded Construction & Design **Max. Marks: 50**

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3. Section A contains 10 Questions. Each question carries 1 Marks.
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Section – A

10X01 = 10 Marks

Q1. Forge welding involves heating of parts to elastic stage and joint is prepared by impact force.

a) Yes

b) No, it is done up to plastic stage

c) Heating is done up to boiling point

d) None of the listed

Q2. Filler material is used in electric resistance welding.

a) Yes

b) No filler material used

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Q3. Which type of welding is generally used in automobile sector?

a) Electric arc welding
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a) Hammering the weld across the length while the joint is hot
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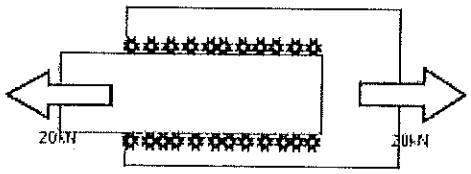

a) True
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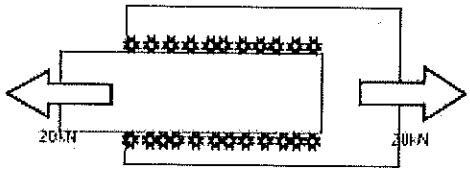

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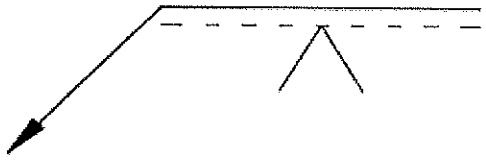

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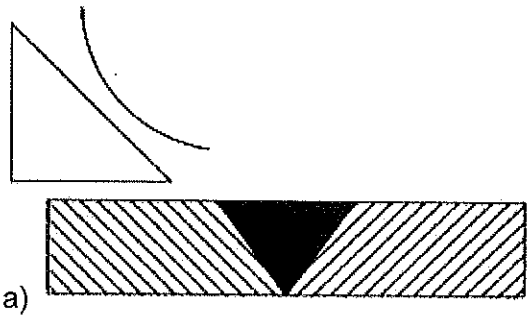
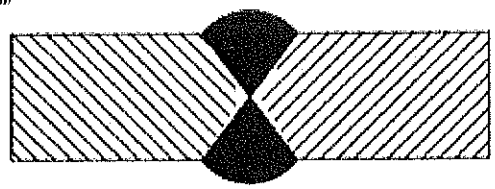
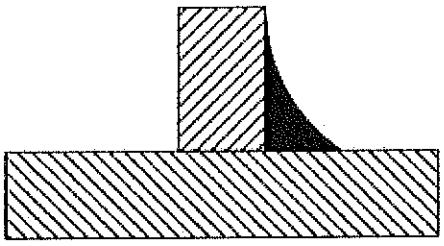


b)



c)



d)

Section – B

04X04 = 16 Marks

Q11. What is stress?

Q12. What do you mean by strain?

Q13. Explain tacking.

Q14. What kind of welding process you use on 1mm thick sheet and why? Explain.

Section – C

04X06 = 24 Marks

Q15. Explain stress relieving of welded joint.

Q16. What are the advantages of welded joints compared with riveted joints?

Q17. A gas tank consists of a cylindrical shell of 2.5 m inner diameter. It is enclosed by hemispherical shells by means of butt welded joint as shown in Fig. 8.6. The thickness of the cylindrical shell as well as the hemispherical cover is 12 mm. Determine the allowable internal pressure to which the tank may be subjected, if the permissible tensile stress in the weld is 85 N/mm2. Assume efficiency of the welded joint as 0.85.

Fig. 8.6

Q18. A steel plate, 100 mm wide and 10 mm thick, is welded to another steel plate by means of double parallel fillet welds as shown in Fig. 8.9. The plates are subjected to a static tensile force of 50 kN. Determine the required length of the welds if the permissible shear stress in the weld is 94 N/mm2

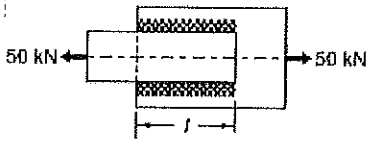


Fig. 8.9

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Registration No.: .....

School of Metal Construction Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 5th Semester,

End-Sem. Examination

Course Code: MCS 1504 **Time: 2 Hour**

Course Name: Quality Management **Max. Marks: 50**

Instruction:

1. Attempt all questions.
2. Use of Calculators is prohibited.
3. Section A contains 10 Questions. Each question carries 1 Marks.
4. Section B contains 04 Questions. Each question carries 4 Marks.
5. Section C contains 04 Questions. Each question carries 6 Marks.

Answer Key

Section – A

10X01 = 10 Marks

1. ISO 9000 determines
   - **A. If the company practices its written procedures**
   - B. If vendors are performing well
   - C. Process capability
   - D. The kind of control chart to be used
2. Seven QC tools include
   - A. Team meetings & 5-S
   - B. Deming 14 points approach
   - C. Workers' toolkit
   - **D. Histogram**
3. Which of the following statement is correct?
   - A. R – charts are to control the central tendency of the process
   - **B. R – charts are to control the dispersion of the process**
   - C. R – charts are to control the mean of the process
   - D. B & C both
4. HEIJUNKA stands for:
   - A. Production stop
   - B. Production start
   - **C. Production leveling**
   - D. Mass production

5. The cause and effect diagram is also called
   A. Stratification analysis
   B. Total quality management
   C. PDCA technique
   D. Fishbone diagram

6. 80/20 Rules is applicable for
   A. Pareto Charts
   B. Fishbone Diagram
   C. To define the OEE
   D. PFMEA

7. A six-sigma process has a defect level below _____ defects per million opportunities.
   A. 3.4
   B. 4.3
   C. 5.6
   D. 6.0

8. Which generic approach's precursor is the Toyota Production System?
   A. Kaizen
   B. TQM
   C. Lean manufacturing
   D. Six sigma

9. Which of the following is correct in context to Inspection?
   A. It is a way to prevent the production of bad items
   B. Inspection adds to the cost of the product but not for its value
   C. Fatigue and Monotony don't affect any inspection judgment
   D. None of the above

10. Which of the following is not among 7 QC tools?
    A. Check sheet
    B. Histogram
    C. Kanban
    D. Pareto chart

Section – B

04X04 = 16 Marks

11. What is TPS? Explain.

Ans.

TPS is based on two concepts: JIDOKA and just-in-time. JIDOKA, a Japanese term that can be translated as "automation with a human touch" is a method for quickly identifying and correcting any issues that could lead to faulty production. Just-in-time is about refining and coordinating each

production process so that it only produces what is required by the next process in the sequence. By applying these concepts, we are able to produce vehicles quickly and efficiently, every one meeting our high quality standards and our customers' individual requirements.

12. Write any two purposes of inspection.

Ans.

(1) To distinguish good lots from bad lots

(2) To distinguish good pieces from bad pieces.

(3) To determine if the process is changing.

(4) To determine if the process is approaching the specification limits.

13. Differentiate between Quality control & Quality assurance with a practical example.

Ans.

- **Quality Control**: "A part of quality management focused on fulfilling quality requirements".
- **Quality Control** is defined as "The operational techniques and activities used to fulfil requirements for quality".
- **Quality Assurance**: "A part of quality management focused on providing confidence that quality requirements will be fulfilled
- **Quality Assurance** is defined as "All the planned and systematic activities implemented within the quality system that can be demonstrated to provide confidence that a product or service will fulfil requirements for quality".

14. What is COPQ? Define Appraisal and prevention cost.

Ans.

Those costs that are generated as a result of producing defective material. This cost includes the cost involved in fulfilling the gap between the desired and actual product/service quality. It also includes the cost of lost opportunity due to the loss of resources used in rectifying the defect. This cost includes all the labour cost, rework cost, disposition costs, and material costs that have been added to the unit up to the point of rejection. COPQ does not include detection and prevention cost.

Section – C

04X06 = 24 Marks

15. What are the different types of waste in Lean manufacturing & define them?

Ans.

- unnecessary transportation;
- excess inventory;
- the unnecessary motion of people, equipment or machinery;
- waiting, whether it is people waiting or idle equipment;

- over-production of a product;
- over-processing or putting more time into a product than a customer needs, such as designs that require high-tech machinery for unnecessary features; and
- defects, which require effort and cost for corrections.
- Waste of unused talent and ingenuity.

16. Write at least six characteristics of the quality circle.

Ans.

- Volunteers
- Set Rules and Priorities
- Decision made by consensus
- Members of a circle need to receive training
- Support of senior management required
- Members need to be empowered

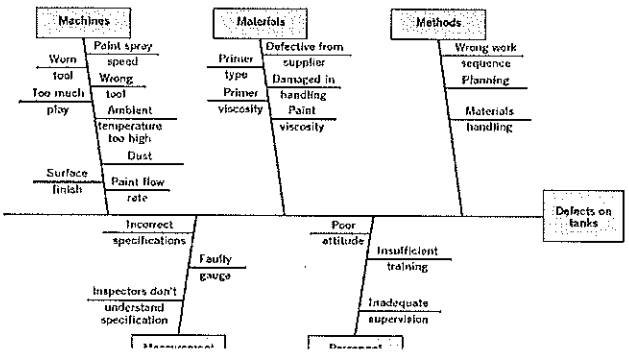
17. Name the 7 QC tool. Explain the fishbone diagram with neat & clean Sketch.

Ans.

- Histogram or stem-and-leaf plot
- Check sheet
- Pareto chart
- Cause-and-effect diagram
- Defect concentration diagram
- Scatter diagram
- Control chart

Fishbone Diagram Steps:

1. Define the problem or effect to be analyzed.
2. Form the team to perform the analysis. Often the team will uncover potential
3. causes through brainstorming.
4. Draw the effect box and the center line.
5. Specify the major potential cause categories and join them as boxes connected to
6. the center line.
7. Identify the possible causes and classify them into the categories in step 4. Create
8. new categories, if necessary.
9. Rank order the causes to identify those that seem most likely to impact the problem.
10. Take corrective action.



18. Explain the Pareto chart with appropriate example.

Ans.

A Pareto diagram, also called 80/20 rule, is used to graphically abridge and display the relative significance of the differences between clusters of data i.e., separating the vital few causes (20%) that account for a dominant share of quality loss (80%) (Besterfield, 2001). The Pareto diagram is based on the Pareto principle, which states that few of the defects account for most of the effects.

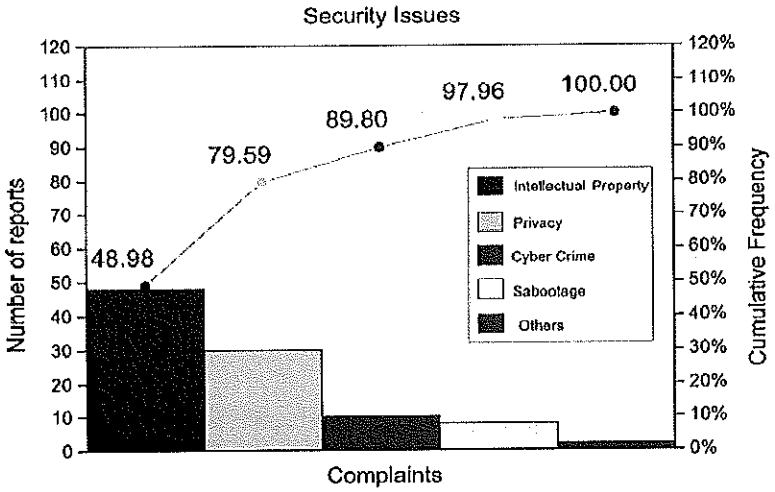


Figure 4 Pareto diagram used to prioritize the security issues

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Course Name: Quality Management **Max. Marks: 50**

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5. Section C contains 04 Questions. Each question carries 6 Marks.

Section – A

10X01 = 10 Marks

1. ISO 9000 determines
   A. If the company practices its written procedures
   B. If vendors are performing well
   C. Process capability
   D. The kind of control chart to be used

2. Seven QC tools include
   A. Team meetings & 5-S
   B. Deming 14 points approach
   C. Workers' toolkit
   D. Histogram

3. Which of the following statement is correct?
   A. R – charts are to control the central tendency of the process
   B. R – charts are to control the dispersion of the process
   C. R – charts are to control the mean of the process
   D. B & C both

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5. The cause and effect diagram is also called
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   A. It is a way to prevent the production of bad items
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   C. Fatigue and Monotony don't affect any inspection judgment
   D. None of the above

10. Which of the following is not among 7 QC tools?
   A. Check sheet
   B. Histogram
   C. Kanban
   D. Pareto chart

Section – B

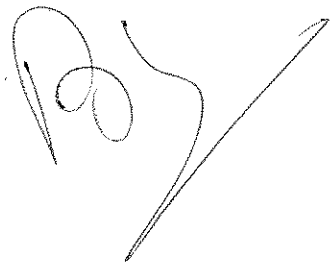
04X04 = 16 Marks

11. What is TPS? Explain.
12. Write any two purposes of inspection
13. Differentiate between Quality control & Quality assurance with a practical example.
14. What is COPQ? Define Appraisal and prevention cost.

Section – C

04X06 = 24 Marks

15. What are the different types of waste in Lean manufacturing & define them?
16. Write at least six characteristics of the quality circle.
17. Name the 7 QC tool. Explain the fishbone diagram with neat & clean Sketch.
18. Explain the Pareto chart with appropriate example.



A

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   D. Histogram
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   D. The kind of control chart to be used
3. The cause and effect diagram is also called
   A. Stratification analysis
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   C. PDCA technique
   D. Fishbone diagram
4. Dock Inspection is called.
   a. Incoming Inspection
   b. Final Inspection
   c. In-process Inspection

d. BOP Inspection

5. For Attribute data which chart is prepared:
   a. X bar Chart b.
   b. Range Chart
   c. P chart
   d. None of the above

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Section – B

04X04 = 16 Marks

11. Differentiate between Quality control & Quality assurance with a practical example.
12. What is COPQ? Define Appraisal and prevention cost.
13. Write down purposes of inspection.
14. When assignable causes are identified in a process? Explain with example.

Section – C

04X06 = 24 Marks

15. Write at least six characteristics of the quality circle.
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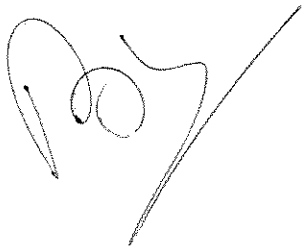

A

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(4) To determine if the process is approaching the specification limits.

14. When assignable causes are identified in a process? Explain with example.

Ans.

When there is some inconsistency in process operation.

For example, a breakfast cereal packaging line may be designed to fill each cereal box with 500 grams of product, but some boxes will have slightly more than 500 grams, and some will have slightly less, in accordance with a distribution of net weights. If the production process, its inputs, or its environment changes (for example, the machines doing the manufacture begin to wear) this distribution can change. For example, as its cams and pulleys wear out, the cereal filling machine may start putting more cereal into each box than specified. If this change is allowed to continue unchecked, more and more product will be produced that fall outside the tolerances of the manufacturer or consumer, resulting in waste. While in this case, the waste is in the form of "free" product for the consumer, typically waste consists of rework or scrap.

Section – C

04X06 = 24 Marks

15. Write at least six characteristics of the quality circle.

Ans.

- Volunteers

- Set Rules and Priorities
- Decision made by consensus
- Members of a circle need to receive training
- Support of senior management required
- Members need to be empowered

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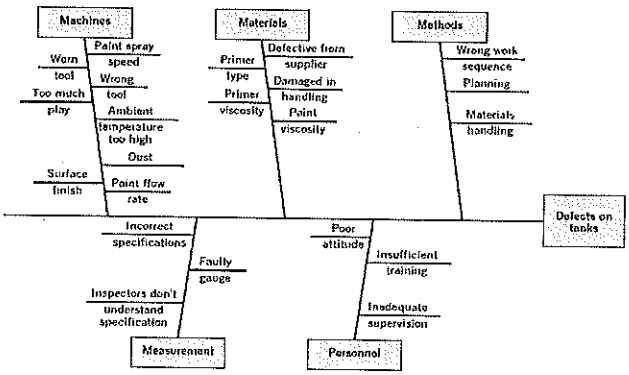

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- defects, which require effort and cost for corrections.
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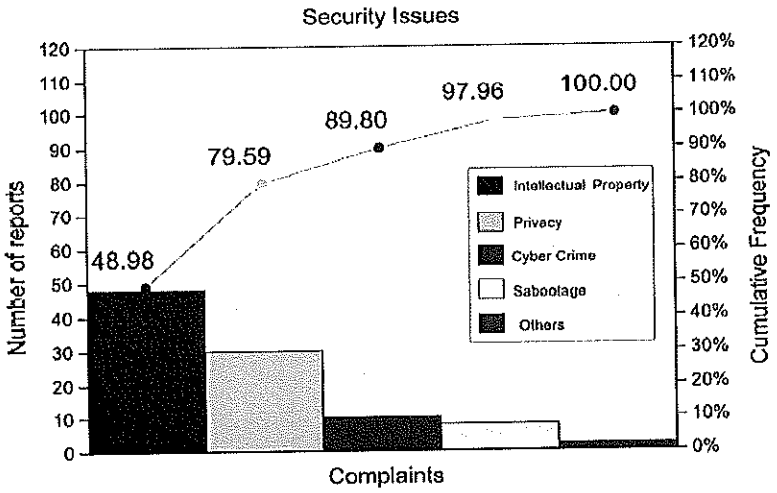

Figure 4 Pareto diagram used to prioritize the security issues