BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Manufacturing Skills

Session: 2019-20 (Summer Semester)

B. Voc. Program, V Semester,

End-Sem. Examination

Course Code: SMS1501 **Time: 2 Hour**

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

Instructions:

1. Attempt all questions.
2. Use of Calculators is Allowed.
3. Section A contains 10 Questions. Each question carries 1 Mark.
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

1. Direct Cost in a Manufacturing Industry includes:
   (i) Only direct labour cost
   (ii) Only direct material cost
   (iii) Summation of direct material and labour cost

2. MRP means
   (i) Material Resource Planning (ii) Mean Resource Planning
   (iii) Machine Resource Planning (iv) All

3. In Method Study, Transport is represented by ----------

4. In Production System, inputs are
   (i) Materials (ii) Man (iii) Machine (iv) All of the above

5. Prime Cost in a Manufacturing Industry includes:
   (i)All direct cost (ii) Factory overhead cost (iii) Summation of direct and factory overhead cost

6. JIT concept is used for ----------

7. Under ABC analysis, quantity of class-A product is
   (i) 70 – 80 %
   (ii) 15 – 20 %
   (iii) 5 – 10 %
   (iv) None of the above

8. Benefits of Process Planning are
   (i) Reduction in setup costs (ii) Reduction in tooling costs
   (iii) Reduction in material costs (iv) All

9. Number of product under "Job Production System" are

   (i) Less (ii) More (iii) In between (iv) Nil

10. Application of Ergonomics are in

    (i) Aerospace

    (ii) Product design

    (iii) Health care

    (iv) All three

Section- B

04X04 = 16 Marks

11. An operator manufactures 50 jobs in 6 hours and 30 minutes. If this time includes the time for setting his machine. Calculate the operator's efficiency. Standard time allowed for the job was:

    Setting time = 35 minutes

    Production time per piece = 8 minutes

12. Discuss about various types of production systems.
13. Write down the comparison between Conventional and JIT attitutes.
14. A department store has found that in a four-month period, the best forecast is derived by using 40% of the actual sales for the most recent month, 30% of the two months ago, 20% of three months ago and 10% of four months ago. Find out the forecast for the 5th month, if the actual sales for the 4 month is:

Month	1	2	3	4	5
Sales in nos.	105	95	110	100	----

Section- C

04X06 = 24 Marks

15. Describe the steps for doing a method study of job process. Illustrate one of the recording techniques used in the method improvement with a case example.
16. A medium scale industry incurs the following costs for their products annually. The production volume on an average is 12000 a year.

    a. Raw material cost including losses due to scrap and wastage (due to rejection) = Rs.50000

    b. Tool cost = Rs.4000

    c. Wages to skilled hands engaged on production = Rs.20000

    d. Wages to foremen, other supervisory staff = Rs.40000

    e. Expenses of office staff (salary, bonus etc.) = Rs.12000

    f. Expenses on sales and distribution agencies = Rs.8000

    g. Expenses on insurance, lighting etc. = Rs.4000

    Find direct cost as percentage of total cost.

17. Define Standard time. Discuss the steps involved in developing Standard Time.

18. Link Company is producing pen. The gross requirements for the products in next weeks are given below. The on hand inventory levels for Body = 800, Cap=1000 and schedule receipts for Body (2^{nd} week) = 200, Body (4^{th} week) = 200, Cap(1^{st} week)=1000, Ink Cartridge (2^{nd} week) = 500, Ink Cartridge(4^{th} week) = 500, Ink Cartridge (6^{th} week) = 500, Ink Cartridge (8^{th} week) = 500. No fixed lot size is available.

Week	1	2	3	4	5	6	7	8
Material requirement					1000			1000

Draw the Production Tree for Pen. Calculate the planned order release for Body.

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

Answer Key

Section – A

10X01 = 10 Marks

1. Direct Cost in a Manufacturing Industry includes:
   (i) Only direct labour cost (ii) Only direct material cost (iii) Summation of direct material and labour cost
   Ans. (iii)
2. MRP means
   (i) Material Resource Planning (ii) Mean Resource Planning
   (iii) Machine Resource Planning (iv) All
   Ans. (i)
3. In Method Study, Transport is represented by ----------
   Ans. ⟶
4. In Production System, inputs are
   (i) Materials (ii) Man (iii) Machine (iv) All of the above
   Ans. (iv)
5. Prime Cost in a Manufacturing Industry includes:
   (i)All direct cost (ii) Factory overhead cost (iii) Summation of direct and factory overhead cost
   Ans. (i)
6. JIT concept is used for ----------
   Ans. Inventory control
7. Under ABC analysis, quantity of class-A product is
   (i) 70 – 80 % (ii) 15 – 20 % (iii) 5 – 10 % (iv) None of the above
   Ans. (i)

8. Benefits of Process Planning are

   (i) Reduction in setup costs (ii) Reduction in tooling costs

   (iii) Reduction in material costs (iv) All

   Ans. All

9. Number of product under "Job Production System" are

   (i) Less (ii) More (iii) In between (iv) Nil

   Ans. (i)

10. Application of Ergonomics are in

    (i) Aerospace (ii) Product design (iii) Health care

    (iv) All three

    Ans. (iv)

Section – B

04X04 = 16 Marks

11. An operator manufactures 50 jobs in 6 hours and 30 minutes. If this time includes the time for setting his machine. Calculate the operator's efficiency. Standard time allowed for the job was:

    Setting time = 35 minutes

    Production time per piece = 8 minutes

    Soln:

    Standard time for manufacturing 50 jobs = 35 + 8 X 50 = 435 minutes

    Efficiency = (435 X 100) / 390 = 111.5%

12. Discuss about various types of production systems!

    Ans.: Three types – Job production, Batch production, Continuous production.

13. Write down the comparison between Conventional and JIT attitutes!

    Ans.

Conventional	Just-in-Time
Large lots are efficient (more is better)	Ideal lot size is one unit (less is better)
Faster production is more efficient	*Faster production than necessary is a waste (balanced production is more efficient)*
Scheduling and queues are necessary tradeoffs to maximize output from equipment and manpower	Tradeoffs are bad; they trade one waste for another and prevent the proper solution of problems
Inventory provides safety	*Safety stock is a waste*
	Inventory is undesirable

14. A department store has found that in a four-month period, the best forecast is derived by using 40% of the actual sales for the most recent month, 30% of the two months ago, 20% of three months ago and 10% of four months ago. Find out the forecast for the 5th month, if the actual sales for the 4 month is:

Month	1	2	3	4	5
Sales in nos.	105	95	110	100	----

Ans.: $F_5 = 0.4 \times 100 + 0.3 \times 110 + 0.2 \times 95 + 0.1 \times 105 = 102.5$ units.

Section – C

04X06 = 24 Marks

15. Describe the steps for doing a method study of job process. Illustrate one of the recording techniques used in the method improvement with a case example.

- Ans.: This involves systematic, orderly and scientific approach to problems and decisions must be taken after listing out all possible alternatives and evaluating them critically

1. ***Select*** the work to be studied
2. ***Record*** all relevant facts by direct observation
3. ***Examine*** the facts critically in sequence using special critical examination sheet
4. ***Develop*** the best method which is practical, economical and effective
5. ***Install*** the method as a standard practice

   Maintain the method installed as a standard

16. A medium scale industry incurs the following costs for their products annually. The production volume on an average is 12000 a year.

    a. Raw material cost including losses due to scrap and wastage (due to rejection) = Rs.50000
    b. Tool cost = Rs.4000
    c. Wages to skilled hands engaged on production = Rs.20000
    d. Wages to foremen, other supervisory staff = Rs.40000
    e. Expenses of office staff (salary, bonus etc.) = Rs.12000
    f. Expenses on sales and distribution agencies = Rs.8000
    g. Expenses on insurance, lighting etc. = Rs.4000

    Find direct cost as percentage of total cost.

    Ans. Direct cost = (50000 + 4000 + 20000) = 74000

    Total Cost = 74000 + 12000 + 8000 + 4000 = 98000

    % = 74000 /98000 = 75.5

17. Define Standard time. Discuss the steps involved in developing Standard Time.

Ans.:

Standard Time: It's a catalogue of "normal time" values for different elements of jobs or for minute movements involved in different jobs.

This catalogue is prepared by compiling the timings of a number of standard elements

The necessity of preparing such a catalogue arose because, generally, similar elements or motions are involved in many jobs. Eg.: Drilling holes is a common feature in many machine shop jobs.

If time study is to be conducted every time it would consume a lot of time. Hence it is economical to use previously timed and compiled data known as standard data.

Steps:

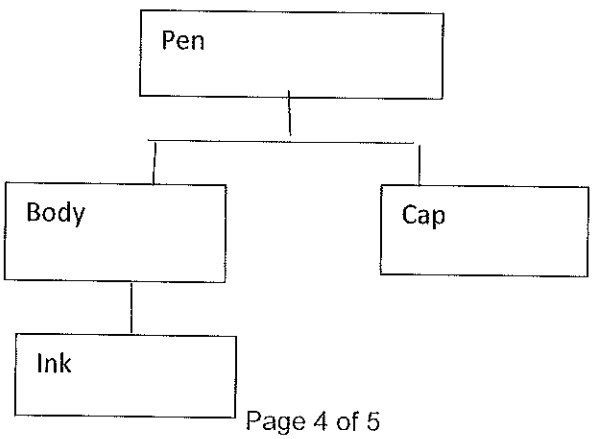
Decide the range of applicability of standard data
Break the job into elements as constant and variable elements
Conduct time study for wide variety of jobs or family of jobs under different set of parameters and conditions
Summarize the data using a summary form
Classify data into constant and variable elements
Calculate average standard time for constant elements
Explore the job characteristics leading to variability in elements
A graph between normal time dimension of variable is plotted to obtain a smooth curve
Test the data for correctness and accuracy
Compile the standard data obtained

18. Link Company is producing pen. The gross requirements for the products in next weeks are given below. The on hand inventory levels for Body = 800, Cap=1000 and schedule receipts for Body (2nd week) = 200, Body (4th week) = 200, Cap(1st week)=1000, Ink Cartridge (2nd week) = 500, Ink Cartridge(4th week) = 500, Ink Cartridge (6th week) = 500, Ink Cartridge (8th week) = 500. No fixed lot size is available.

Week	1	2	3	4	5	6	7	8
Material requirement					1000			1000

Draw the Production Tree for Pen. Calculate the planned order release for Body!

Ans.: Production tree:



Body - 2 week LT (Lead Time)

Week	1	2	3	4	5	6	7	8
Gross requirement					1000			1000
Scheduled receipts		200		200				
Available (inventory)	800	1000		1200	200	200	200	0
Net requirement					0			800
Planned order receipt					0			800
Planned order released			0			800		

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School of Manufacturing Skills

Session: 2019-20 (Summer Semester)

B. Voc. Program, V Semester,

End-Sem. Examination

Course Code: SMS1502 **Time: 2 Hour**

Course Name: Integrated CAD-CAM-CNC **Max. Marks: 50**

Instructions:

1. Attempt all questions.
2. Use of Calculators is Allowed.
3. Section A contains 10 Questions. Each question carries 1 Mark.
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

1. In joining steel plate and asbestos, welding is preferred over riveting.
   a) True
   b) False
2. Pipe threads have a flank angle-
   a) 600
   c) 300
   b) 550
   c) 330
3. Which screw thread has the designation S 24 x 5 -
   a) Buttress screw thread
   b) Trapezoidal screw thread
   c) Pipe thread
   d) None
4. _____ is the light metal (density > 5kg/dm^3)
   a) Titanium
   b) Zinc
   c) Copper
   d) Lead

5. Which material is having high thermal conductivity?
   a) Glass
   b) Plastics
   c) Air
   d) Iron
6. Density of air at 0^0C, 1.013 bar is-
   a) 1.29 Kg/m^3
   b) 1.29 g/m^3
   c) 12.9 Kg/m^3
   d) 12.9 g/m^3
7. What is carbon percentage in steel?
   a) 0.008-0.025%
   b) 2-4%
   c) 2-6.67%
   d) 0-2%
8. Which furnace is used to manufacture Pig Iron?
   a) Blast furnace
   b) Cupola furnace
   c) Puddling furnace
   d) None of them
9. What is carbon percentage for low carbon steel?
   a) 2-4%
   b) 4-6.67%
   c) 0.6-2%
   d) 0-0.3%
10. GRP stands for-
   a) Glass fiber Reinforced Plastics
   b) Glass Rubber Plastics
   c) Glass Reinforced Polythene
   d) None of the above

Section- B

04X04 = 16 Marks

11. Explain the classification of screw thread according to their profile.
12. What are the advantages of riveting compared to welding?
13. What do you mean by Iron casting alloys? Also write the difference between alloy and composite?
14. Define Linear thermal expansion with formula.

Section- C 04X06 = 24 Marks

15. What do you understand by 10.9 written on a screw? Also explain the terminology of screw thread.
16. Explain any three production engineering properties of materials.
17. Draw the flow chart of the classification of materials based on their composition and common properties.
18. Draw a flow chart for manufacturing of pig iron?

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Course Name: Integrated CAD-CAM-CNC **Max. Marks: 50**

Instructions:

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

Answer Key

Section – A

10X01 = 10 Marks

1. In joining steel plate and asbestos, welding is preferred over riveting.
   b. False
2. Pipe threads have a flank angle-
   b. 30
3. Which screw thread has the designation S 24 x 5 -
   a. Buttress screw thread
4. _____ is the light metal (density > 5kg/dm^3)
   a. Titanium
5. Which material is having high thermal conductivity?
   d. Iron
6. Density of air at 0^{0}C, 1.013 bar is-
   a. 1.29 Kg/m^3
7. What is carbon percentage in steel?
   d. 0-2%
8. Which furnace is used to manufacture Pig Iron?
   a. Blast furnace
9. What is carbon percentage for low carbon steel?
   d. 0-0.3%
10. GRP stands for-
    a. Glass fiber Reinforced Plastics

Section- B

04X04 = 16 Marks

11. Explain the classification of screw thread according to their profile.

Ans.

1. **Metric ISO screw thread**
   - Flank angle 60 degree
   - The screw designation M16x1.5 where M indicates the metric thread and 16 is nominal diameter in mm and 1.5 is pitch.
2. **Pipe thread**
   - Flank angle 55 degree
3. **Trapezoidal screw thread**
   - Flank angle 30 degree
   - The screw designation Tr16x1.5 where Tr indicates the trapezoidal thread and 16 is nominal diameter in mm and 1.5 is pitch.
4. **Buttress screw thread**
   - Flank angle 33 degree
   - The screw designation S 16 x 1.5 where S indicates the Buttress thread and 16 is nominal diameter in mm and 1.5 is pitch.
   - High load capacity in one direction.

12. What are the advantages of riveting compared to welding?

Ans.

- No change in microstructure, so no reduction in strength and embrittlement in the joint sheet metal
- Different material and surface finishes, e.g. polished or coated, sheet metal can be joined.
- Joint can also be made where only one side is accessible
- Lower energy consumption
- No health hazard due to gases or light radiation

13. What do you mean by Iron casting alloys? Also write the difference between alloy and composite?

Ans. Iron Casting alloys are also iron based materials.

It contains more than 2% Carbon may also contain other elements and are cast to form work pieces.

Alloy cast irons are the casting alloys which are based on the iron (Fe) – carbon (C) – silicon (Si) system. They contain one or more alloying elements intentionally added to improve one or more properties. The addition to the ladle of small amounts of substances such as ferrosilicon (Fe-Si), cerium (Ce), or magnesium (Mg)) that are used to control the size, shape, and/or distribution of graphite particles is termed as inoculation.
Composites are made from two or more separate materials bonded in such a way as to form one solid piece of material.

Composites are heterogeneous.

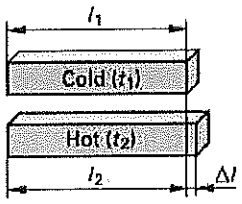
Alloys are mixtures of primarily metal atoms which form a continuous solid solution

Alloys are homogeneous by nature.

14. Define Linear thermal expansion with formula.

Linear Thermal Expansion: The coefficient of linear thermal expansion α is the change in length Δl of a 1m long body that occurs for a temperature change Δt = 1 °C.

The thermal expansion Δl must be taken into account for measuring instruments and mounted parts or for cast parts. Cast parts undergo heat shrinkage after casting and this must be compensated for by a size allowance.



Δl Change in length
l_1 Initial length
α Coefficient of linear expansion
Δt Temperature change $t_2 - t_1$

Linear thermal expansion $\Delta l = l_1 \cdot \alpha \cdot \Delta t$

Figure 1: Linear thermal expansion

Section- C

04X06 = 24 Marks

15. What do you understand by 10.9 written on a screw? Also explain the terminology of screw thread.

Ans.

a.

- For screws produced from unalloyed and alloy steels, the strength category I indicated by two numbers son the screw head, e.g. 10.9 (ten point nine). The tensile strength Rm is calculated by multiplying the first number by 100. the yield point Re is the product of both number and the number 10.
- For example:
- Hexagonal screw ISO 4017-M12x50-10.9
- Rm= 10.100 N/mm2=1000 N/mm2
- Re= 10.9.10 N/mm2= 900 N/mm2

b.

- Major Diameter- the largest diameter of a bolt at the crest, or the diameter of the roots of a nut
- Pitch Diameter- the diameter halfway between the major diameter and minor diameter
- Minor Diameter- the small diameter of a bolt at the root, or the diameter of the crest of a nut
- Pitch is the distance between the two adjacent thread.
- Lead is the linear distance traveled in one rotation.
- Crest- the top surface where the two sides of the threads meet
- Root- the bottom surface where the two sides of the threads meet

16. Explain any three production engineering properties of materials.

Castability:

A material is castable if it forms a low viscosity melt that completely fills the mould and does not form any voids (shrinkage cavities) in the solidified material. The various types of cast iron, aluminium casting alloys, copper zinc and zinc casting alloys have good Castability.

Formability:

It is the ability of a material to be formed into a work-piece due to a plastic deformation when force is applied. Hot forming processes include hot rolling and forging, while cold forming processes include cold rolling, bending, folding and deep drawing.

Low carbon steels, soft iron and aluminium and copper wrought alloys exhibit high formability. Iron casting alloys are not formable.

Machinability:

It indicates whether and under which conditions a material can be manufactured using machining techniques, such as turning, milling and grinding. The surface quality of the machined surface, the machining conditions and the service life of the machine tools are quantifying parameters for the machinability.

Weldability:

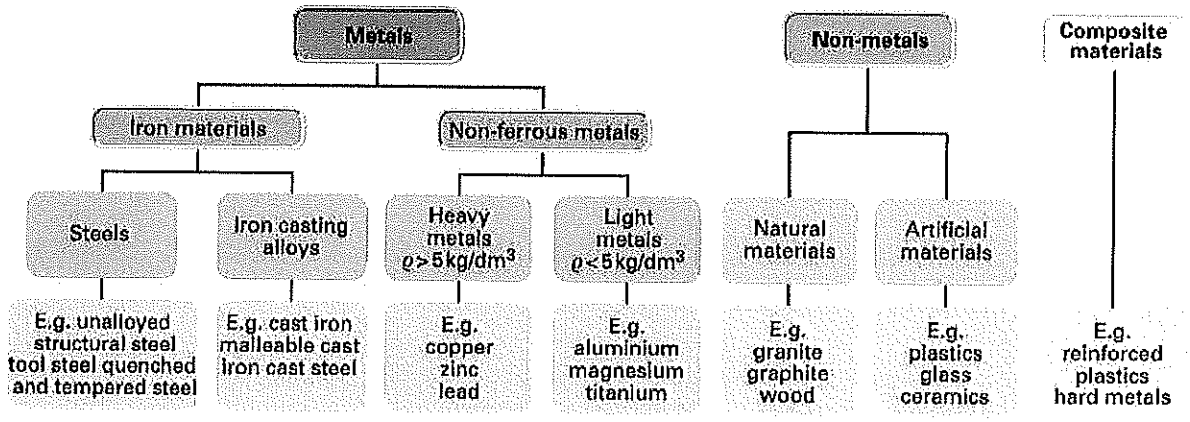
It describes the suitability or unsuitability of a material for welding. Unalloyed and low alloy steels with a low carbon content have good welding properties. High alloy steels as well as aluminium and copper alloys can also be welded using special welding methods.

Hardenability:

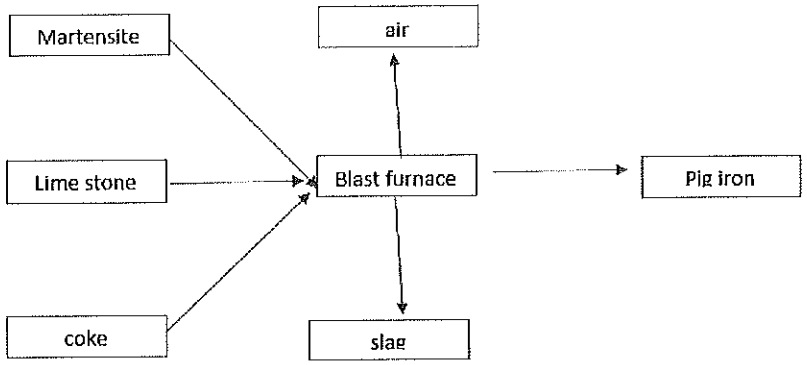
Hardenability and heat treatability refer to the capacity of a material to increase its hardness and strength by targeted heat treatment.

Most steels, some iron casting alloys and heat treatable aluminium alloys can be hardened.

17. Draw the flow chart of the classification of materials based on their composition and common properties.



18. Draw a flow chart for manufacturing of pig iron?



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Session: 2019-20 (Summer Semester)

B. Voc. Program, V Semester,

End-Sem. Examination

Course Code: SMS1503 **Time: 2 Hour**

Course Name: Basics of Multiaxis Machining & Dialog CNC Programming **Max. Marks: 50**

Instructions:

1. Attempt all questions.
2. Use of Calculators is Allowed.
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5. Section C contains 04 Questions. Each question carries 6 Marks.

Section – A

10X01 = 10 Marks

1. What is the percentage of sheet metal thickness for Die clearance?
   a) Above 25%
   b) Above 10%
   c) Up to 5%
   d) Up to 30%
2. Which of the following step is not involved in processes of coating of paint?
   a) Cleaning of the components
   b) Creation of a primer
   c) Dry in the oven
   d) Coating the parts
3. Which one of the following is not a type of thermal cutting?
   a) Oxy- fuel cutting
   b) Plasma cutting
   c) Laser cutting
   d) Water jet cutting
4. What is the cutting speed in plasma cutting for quality cut?
   a) Up to 6m / min
   b) Up to 4m / min
   c) Up to 10m / min
   d) Up to 2m / min

5. Which one of the following cutting process is not suitable for non- ferrous metals?
   a) Oxy- fuel cutting
   b) Plasma cutting
   c) Laser cutting
   d) Water jet cutting
6. Which coating is preferred for aluminum and aluminum alloys?
   a) Phosphating
   b) Chromating
   c) Both a & b
   d) None of the above
7. Which coating method is used as short-term corrosion protection as well as an anti-friction layer on sheet metal in metal forming?
   a) Phosphating
   b) Chromating
   c) Electroplating
   d) None of above
8. Which powder coating method is used for Solvent free coating with thermosetting resins?
   a) Plastic spaying
   b) Electro coating
   c) Electrostatic powder coating
   d) All of the above
9. Which electroplating materials are used to provide wear resistance on polishing rolls?
   a) Nickel and chrome plating
   b) Nickel coating
   c) Hard nickel and hard chrome
   d) None of the above
10. What is the die clearance range for 2mm sheet thickness if the shear strength is 250-400?
   a) 0.04 – 0.05 mm
   b) 0.015 mm
   c) 0.08 – 0.09 mm
   d) 0.11 – 0.13 mm

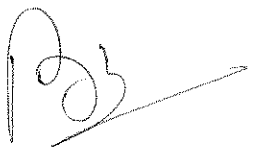
Section- B

04X04 = 16 Marks

11. Explain the nibbling process in shearing machine.
12. What is Electro coating (electrophoretic dip painting)? Write their advantages and applications.
13. What is the advantages and disadvantages of water jet and plasma cutting?
14. What are the advantages of electrostatic powder coating?

Section- C 04X06 = 24 Marks

15. Explain the following.
    - Oxy-fuel cutting
    - Water jet cutting
16. What is the difference between plasma cutting and laser cutting?
17. Explain electroplating with the help of diagram and also write its application.
18. Explain thermal spraying method of metal coating.



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B. Voc. Program, V Semester,

End-Sem. Examination

Course Code: SMS1503 **Time: 2 Hour**

Course Name: Basics of Multiaxis Machining & Dialog CNC Programming **Max. Marks: 50**

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

Answer Key

Section – A

10X01 = 10 Marks

1. What is the percentage of sheet metal thickness for Die clearance?
   c) Up to 5%
2. Which of the following step is not involved in processes of coating of paint?
   c) dry in the oven
3. Which one of the following is not a type of thermal cutting?
   d) Water jet cutting
4. What is the cutting speed in plasma cutting for quality cut?
   a) Up to 4m / min
5. Which one of the following cutting process is not suitable for thin sheets & non- ferrous metals?
   a) Oxy- fuel cutting
6. Which coating is preferred for aluminum and aluminum alloys?
   a) Chromating
7. Which coating method is used as short-term corrosion protection as well as an anti-friction layer on sheet metal in metal forming?
   a) phosphating
8. Which powder coating method is used for Solvent free coating with thermosetting resins?
   a) Electrostatic powder coating
9. Which electroplating materials are used to provide wear resistance on polishing rolls?
   c) Hard nickel and hard chrome
10. What is the die clearance range for 2mm sheet thickness if the shear strength is 250-400?
    a) 0.04 – 0.05 mm

Section- B

04X04 = 16 Marks

11. Explain the nibbling process in shearing machine.

Ans. Nibblers are used to cut out arbitrary shapes in sheet metals.the material is cut using a punch with short, rapidly –sequenced stroke. Nibblers are also used on NC -controlled machines to make shapes which can not be punched using standard tools from the tool magzine. During the process, the metal penal is traversed under the tool so that erequired shape is created.

Cutting by nibbling

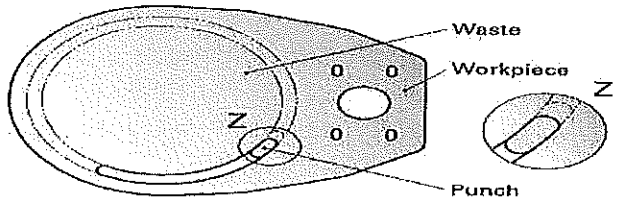
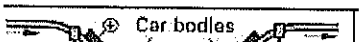


Figure 3: Cutting by nibbling

12. What is Electro coating (electrophoretic dip painting)? writes their advantages and applications

Description	Advantage	Application
The grounded component is immerged in a paint bath to which a voltage is applied. The paint particles become charged and are drawn by the electrical forces to the part to which they adhere. 	The coating is uniform and penetrates deep into uneven surfaces including areas that are difficult to accesses and cavities.	Anti-corrosive coating for automotive bodies and other highly structured parts (**corrosion**

13. What is the advantages and disadvantages of water jet and plasma cutting?

Ans. water jet

Advantages	**Cutting of all materials possible; no heat effects and therefore no distortion**
Disadvantages	**Only used when thermal cutting processes are unsuitable**

Plasma cutting

Advantages	Cutting of all metals at high cutting speeds and good cutting quality is possible
Disadvantages	Protective equipment required to counter the generated noise, dust and smoke, expensive machines

14. What are the advantages of electrostatic powder coating?

- Solvent free coating with thermosetting resins.
- Recovery of the over-spray coating powder.
- Environmentally friendly.
- All-over coating and good adhesion to the part.

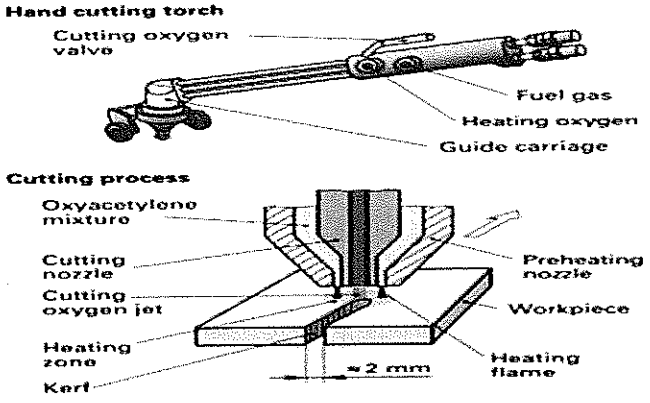
Section- C 04X06 = 24 Marks

15. Explain the following.

a) Oxy-fuel cutting

Ans. Plain carbon and low-alloy steels burn in pure oxygen if their ignition temperature is exceeded. This is around 1200°C and is below the melting temperature.
Flame cutting exploits this behavior. The cutting point on the workpiece is heated up to the ignition temperature using a fuel gas- oxygen is connected. After this, the steel burns at the incandescently hot cutting point. The resultant iron oxide together with the molten steel by the pressure of the oxygen jet. Forward movement of the cutting torch results in a kerf.

Application	Plain carbon and low-alloy steels
Material thicknesses	5 mm to 1,000 mm
Cutting speed	800 mm/min at 5 mm thickness 400 mm/min at 80 mm thickness
Advantages	Use of manually-guided burners and NC-controlled machines possible
Disadvantages	Not suitable for thin sheets, alloy steels and non-ferrous metals



b) Water jet cutting

Ans. Waterjet cutting works with a very thin waterjet which often has a blasting abrasive such as quartz sand mixed in with it in order to increase the eroding action.

Cutting process

The cutting water is brought up to a pressure of around 4,000 bar using a pump and fed into the cutting head. The blasting abrasive is added here. the jet, which is between 0.1 and 0.5 mm in width, then starts to cut the material from a starting hole in the workpiece. The cutting speed depends on the hardness and toughness of the material in addition to the required cut quality. A very smooth and burr- free cut edge is achieved using fine cutting in which the process runs at around 25% of the possible cutting speed.

Considerable noise is produced during waterjet cutting. This can be reduced by cutting underwater.

Application	Metals, non-ferrous metals, plastics, textiles, composite materials, laminated materials
Material thicknesses	1 mm to 100 mm
Cutting speed	0.4 m/min for steel 0.8 m/min for aluminium
Cutting material	Water with abrasive additives
Advantages	Cutting of all materials possible; no heat effects and therefore no distortion
Disadvantages	Only used when thermal cutting processes are unsuitable

16. What is the difference between plasma cutting and laser cutting?

Ans. plasma cutting

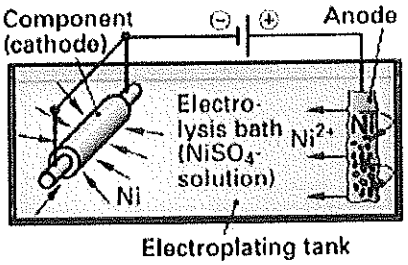
Application	Alloy steels, non-ferrous metals and non-metals
Material thicknesses	1 mm to 100 mm
Cutting speed	Up to 6 m/min for separating cuts and up to 4 m/min for quality cuts
Cutting gases	Argon, nitrogen, mixture of the two, helium, compressed air
Advantages	Cutting of all metals at high cutting speeds and good cutting quality is possible
Disadvantages	Protective equipment required to counter the generated noise, dust and smoke, expensive machines

Laser cutting

Application	All steels, aluminium alloys, plastics, ceramics
Material thicknesses (examples)	10 mm with steel 0.1 mm with films
Cutting speed	0.6 mm with steel 90 mm/min with plastic films
Cutting gases	Nitrogen, argon, oxygen
Advantages	Cutting of many materials possible, extremely good cut quality; high cutting speed
Disadvantages	Protective equipment necessary; expensive machines

17. . Explain electroplating with the help of diagram and also write its application.

- Electroplating is the process of applying a metal coating on another piece of metal (or another conductive surface) through an **electro-deposition process**. In electroplating, the deposited metal becomes part of the existing product with the plating/coating.
- The part to be coated is immersed in an **electrolytic bath** (metal salt solution) and connected as the **cathode**. The electrochemical processes forms a **metal layer** on the part.



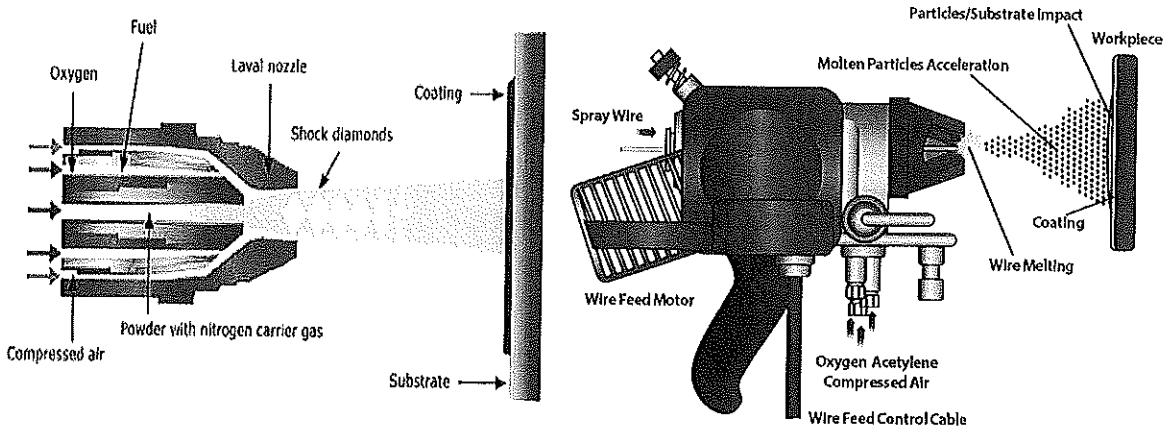
- When the electricity flows through the circuit they make, the electrolyte splits up and some of the metal atoms it contains are deposited in a thin layer on top of one of the electrodes—it becomes electroplated.

Application

- Nickel and chrome plating such as for automotive parts and many small parts.
- Coating for **switching element, valve tappets, injection moulds, extrusion screws** with nickel layers containing PTFE and SIC.
- **Hard nickel** and **hard chrome** are used to provide wear resistance on polishing rolls.
- Medical device that created with **nickel is coated with palladium** or gold.
- **Nickel coating** used for inkjet nozzle plate.
- The **silver plating coating** is popular in radio frequency conductivity applications such as antennas, radio chassis, and cellular phone gear.
- **Aluminium oxide** (Al_2O_3) coating used for automotive parts such as rims, transmission housing and small machine components

18. Explain thermal spraying method of metal coating

- Thermal spraying techniques are coating processes in which melted (or heated) materials are sprayed onto a surface. The "feedstock" (coating precursor) is heated by electrical (plasma or arc) or chemical means (combustion flame).
- Thermal spraying can provide thick coatings (approx. thickness range is 20 microns to several mm, depending on the process and feedstock), over a large area at high deposition rate as compared to other coating processes such as electroplating, physical and chemical vapour deposition.
- Coating materials available for thermal spraying include metals, alloys, ceramics, plastics and composites. They are fed in powder or wire form, heated to a molten or semi molten state and accelerated towards substrates in the form of micrometre-size particles.
- Combustion or electrical arc discharge is usually used as the source of energy for thermal spraying.



Advantage

- Coating of any metals, alloying and components.
- The adhesion of the coating is mechanical thermal.
- No thermal change occurs to the base materials.

Application

- Chemical Resistance
- Readability- resistance to oxidation, thermal shock, and wear,
- Conductive Coating
- Corrosion Protection
- Electrical Insulation

- EMI/RFI Shielding- Electromagnetic Interference/ Radio Frequency Interference
- Erosion Resistance – turbine blades

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Manufacturing Skills

Session: 2019-20 (Summer Semester)

B. Voc. Program, 5th Semester,

End-Sem. Examination, Set B

Course Code: SMS1504 **Time: 2 Hours**

Course Name: Project Work **Max. Marks: 50**

Instructions:

1. Attempt all questions.
2. Use of calculators and mobile phones are prohibited.
3. Section A contains 10 questions. Each question carries 01 mark.
4. Section B contains 04 questions. Each question carries 04 marks.
5. Section C contains 04 questions. Each question carries 06 marks.

Section – A

10X01 = 10 Marks

1. During the "Project Definition" phase, we **do not** define the following: (Mark only one answer)
   a. Communication plan
   b. Project plan / GANNT chart
   c. Project Goals
   d. The location for Project Closure ceremony

2. The project phase model was introduced. Which of the following phases is typically **not part of project management?** (Mark only one answer)
   a. Definition & Planning
   b. Performance & Control
   c. Launch or Execution
   d. Project Close

3. In addition to the Goals we also define Deliverables in the project contract. Which of the following statements is true? (Mark only one answer)
   a. The Deliverables are used to measure and to proof whether the agreed goals have been met.
   b. The Deliverables are outside of the area of interest.
   c. As soon as the Project Report is submitted to the customer, the project is considered as finished and therefore the goals have been achieved.
   d. There are no Deliverables to be achieved in a project! We only are interested to achieve the agreed goals.

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Please read the sentence below and mark the right answer in the question 4, 5 and 6.

A project is defined as a 4)..... with a 5)..... and it must be used to create a 6).....

4. a. endless endeavor
   b. undefined endeavor
   c. temporary endeavor
   d. top secret endeavor

5. a. beginning and no end
   b. break in between
   c. beginning and an end
   d. good team

6. a. disaster
   b. mass product
   c. two products
   d. unique product, service or result

Please read the sentence below and mark the right answer in the question 7, 8, 9 and 10.

7) ..... , 8) ....., 9) and 10)..... are typical tasks of Project management.

7. a. Launch or execution
   b. Status and tracking
   c. Conception and Initiation
   d. Playing dice

8. a. Forecasts
   b. Definition and Planning
   c. Key Performance Indicator
   d. Launch or execution

9. a. Forecasts
   b. Launch or execution
   c. Key Performance Indicator
   d. Performance and control

10. a. Project close
    b. Quality control
    c. Playing dice
    d. Launch or execution

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Section – B

04X04 = 16 Marks

1. The critical path method/analysis (CPM/CPA) was discussed in the lesson. Define the CPM/CPA in an appropriate sentence.

2. For what kind of activities can the critical path method/analysis (CPM/CPA) be used. Make a statement and make some examples (3 in minimum)

3. The risk analysis was discussed in depth during the lesson. Each group performed an individual risk analysis specifically for their project. What is the reason and the advantage of a risk analysis?

4. The size of the picture below has to be adjusted in MS Word 2016.

   a. Pick the box, 1, 2, or 3 (only one) on which position you would move your mouse to perform this manipulation if the proportion of the picture should remain the same. (The circle should look like a circle after resizing the picture)
   b. Explain what will happen to the shape of the white circle when you do the manipulation at position 1:

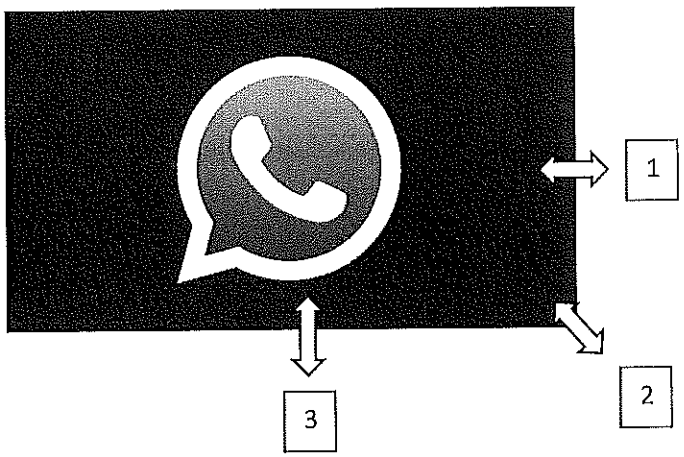
      .....

   c. Explain what will happen with the shape of the white circle when you do the manipulation at position 2:

      .....

   d. Explain what will happen with the shape of the white circle when you do the manipulation at position 3:

      .....



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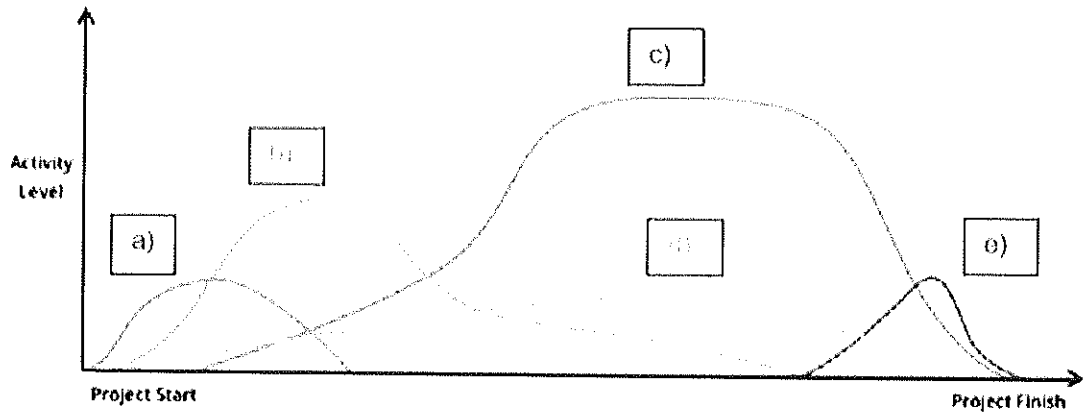
Section – C

04X06 = 24 Marks

1. Explain in words the process of **Project Management** accordingly it was explained in the lectures.

2. Explain in words the process of **Project Execution** accordingly it was explained in the lectures.

3. The diagram below was discussed in the lesson. Please name the five a)-e) curves correctly. Please make an appropriate statement regarding the meaning of the graph.



a) .....
b) .....
c) .....
d) .....
e) .....

Statement:

.....

.....

.....

.....

4. In the respective boxes visualize the **organization structure** of **line production** and **project work.** Explain your drawing!

Organization structure line production

.....

.....

.....

.....

Organization structure project work

.....

.....

.....

.....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Manufacturing Skills

Session: 2019-20 (Summer Semester)

B. Voc. Program, 5th Semester,

End-Sem. Examination, Set B

Answer sheet

Course Code: SMS1504 **Time: 2 Hours**

Course Name: Project Work **Max. Marks: 50**

Instructions:

1. Attempt all questions.
2. Use of calculators and mobile phones are prohibited.
3. Section A contains 10 questions. Each question carries 01 mark.
4. Section B contains 04 questions. Each question carries 04 marks.
5. Section C contains 04 questions. Each question carries 06 marks.

Section – A

10X01 = 10 Marks

1. Answer is d)
2. Answer is c)
3. Answer is a)

A project is defined as a 1)..... with a 2)..... and it must be used to create a 3).....

4. a. endless endeavor
   b. undefined endeavor
   c. **temporary endeavor**
   d. top secret endeavor

5. a. beginning and no end
   b. break in between
   c. **beginning and an end**
   d. good team

6. a. disaster
   b. mass product
   c. two products
   d. **unique product, service or result**

Please read the sentence below and mark the right answer in the question 4, 5 and 6 and 7.

4) ..... , 5) ....., 6)..... and 7)..... are typical tasks of Project management.

7. a. Launch or execution
   b. Status and tracking
   c. **Conception and Initiation**
   d. Playing dice

8. a. Forecasts
   b. **Definition and Planning**
   c. Key Performance Indicator
   d. Launch or execution

9. a. Forecasts
   b. Launch or execution
   c. Key Performance Indicator
   d. **Performance and control**

10. a. **Project close**
    b. Quality control
    c. Playing dice
    d. Launch or execution

Section – B

04X04 = 16 Marks

1. The critical path method/analysis (CPM/CPA) is an algorithm for scheduling a set of project activities.
2. The CPM/CPA is commonly used with all forms of projects, including construction, aerospace and defense, software development, research projects, product development, engineering, and plant maintenance, among others. Any project with interdependent activities can apply this method of mathematical analysis.
3. We perform risk analysis to obtain a clearer picture of the pitfalls and the danger zone of each project. The advantage is, if an event occurs we already know how to react on it.
4. The size of the picture below has to be adjusted in MS Word 2016.
   a. Box 2
   b. The shape of the circle changes to an oval shape. The width will be longer than the height
   c. The circle remains a circle
   d. The shape of the circle changes to an oval shape. The height will be longer than the width.

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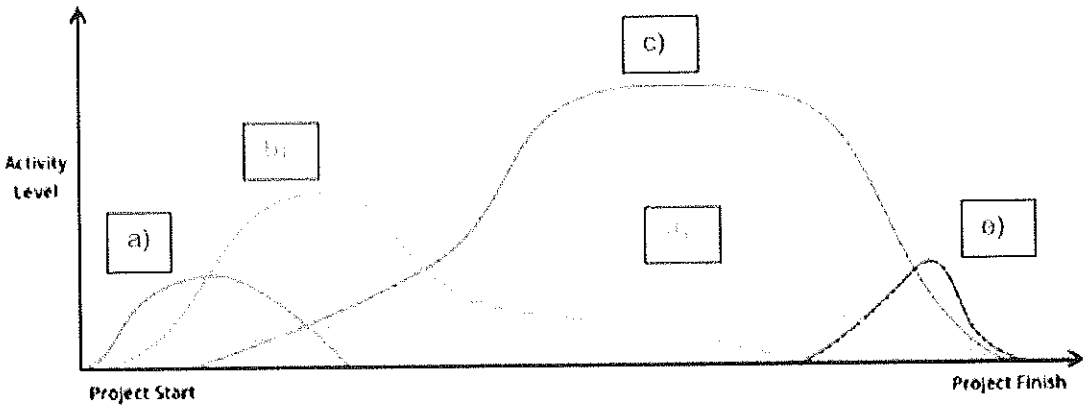
Section – C

04X06 = 24 Marks

1. A project in any organization is **collaboration across departments** to achieve a **single well defined**
   objective and/or goals. The **process** of **planning, organizing and managing resources** to achieve the organizational objective is called **project management.**

2. **Project execution** (or implementation) is the phase in which the plan designed in the prior phases of the **project** life is put **into action**. The purpose of **project execution** is to deliver the **project** expected results **(deliverable and other direct outputs).**

3. The diagram below was discussed in the lesson. Please name the five a)-e) curves correctly. Please make an appropriate statement regarding the meaning of the graph.

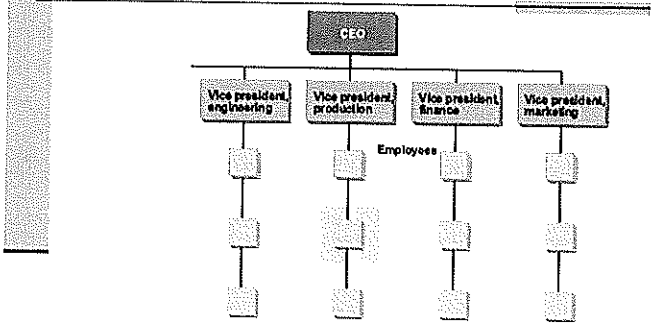


a) Conception and initiation
b) Definition and planning
c) Launch or execution
d) Performance and control
e) Project close

Statement: **Planning is the most important at the start of a project. Then, executing takes over and has the highest activity level. Controlling is important throughout the entire project.**

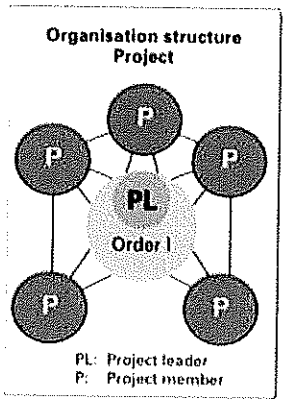
4. In the respective boxes visualize the structure of line production and project work. Explain your drawing!

Organization structure line production



A line structure is organized according it is designation. The information and orders always follow the line. Hierarchies in line production are needed to ensure the quality of the production.

Organization structure Project



Project structure has to ensure direct communication between the members. It has always the Project Manager (Leader) in the center. Orders and communication can go from one member to the other. The Manager or Leader has to be held in the loop. The advantage of this structure is the short reaction time in the project and also that the message is less falsified.

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

(B)

Registration No.: .....

School of Manufacturing Skills

Session: 2019-20 (Summer Semester)

B. Voc. Program, V Semester,

End-Sem. Examination

Course Code: SMS1505 **Time: 2 Hour**

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

Instructions:

1. Attempt all questions.
2. Use of Calculators is Allowed.
3. Section A contains 10 Questions. Each question carries 1 Mark.
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

1. A control chart displays:
   A. Process capability
   B. Top management takes interest in quality
   C. Inspectors are doing their job
   D. Process variability
2. PDCA means:
   A. Plan Do Check Act
   B. Process Do Check Assurance
   C. Plan Define Check Assurance
   D. None of the above
3. How is lean manufacturing achieved by an organization?
   A. Controlling of waste
   B. Elimination of Waste
   C. Meetings with operator
   D. By 100% inspection
4. For non-Attribute data which chart is prepared:
   A. X bar Chart
   B. N Chart
   C. P chart
   D. None of the above

5. Less than 3.4 defects per million opportunities defects called:
   A. Six Sigma
   B. Seven Sigma
   C. Three Sigma
   D. Lean manufacturing
6. SMED approach is used for:
   A. Minimizing the machine setup time
   B. Minimizing the inspection cost
   C. For plant layout
   D. For production Scheduling
7. Which 5S phase focuses cleanliness and dirt removal:
   A. 3
   B. 2
   C. 1
   D. 4
8. What does the Japanese Word SEIRI refers to?
   A. Sorting
   B. Cleaning
   C. Sustain
   D. Set in Order
9. Cost due to rework of the material will count in:
   A. Prevention cost
   B. Appraisal cost
   C. External failure cost
   D. Internal Failure cost
10. OHSAS is related to
   A. Environment & finance
   B. Health & safety
   C. Management & Training
   D. None of these

Section- B 04X04 = 16 Marks

11. Differentiate between Quality control & Quality assurance with practical example.
12. What is COPQ? Define Appraisal and prevention cost.
13. What is ISO 9001:2015? Why ISO certification is important for companies?
14. What is Quality charts? Which charts are used for variable and attribute data?

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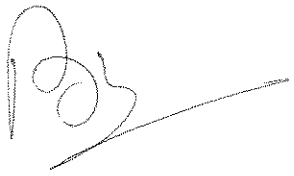
Section- C 04X06 = 24 Marks

15. What are the different type of wastes in Lean manufacturing & define them?
16. Name the 7 QC tool. Explain the fishbone diagram with neat & clean Sketch.
17. Define SPC? Why it is important for process study? Explain Cp, Cpk with the help of Range chart and X bar chart.
18. What is lean manufacturing? Write the different lean tools. Explain any of two.



BHARTIYA SKILL DEVELOPMENT UNIVERSITY

SCHOOL OF MANUFACTURING SKILLS

5th SEMESTER, END-SEMESTER EXAMINATION

SUMMER SEMESTER, B.VOC. PROGRAM

SESSION 2019-2020

Answer Key (Set B)

Course Code: SMS1505 **Course Name**: Quality Management

Time (Minutes): 120 **Maximum Marks**: 50 Marks

Section-A

1. A control chart displays

   Process variability

2. PDCA means

   Plan Do Check Act

3. How is lean manufacturing achieved by an organization?

   Elimination of Waste

4. For non-Attribute data which chart is prepared:

   X bar Chart

5. Less than 3.4 defects per million opportunities defects called

   Six Sigma

6. SMED approach is used for

   Minimizing the machine setup time

7. Which 5S phase focuses cleanliness and dirt removal

   3

8. What does the Japanese Word SEIRI refers to?

   Sorting

9. Cost due to rework of the material will count in

Internal Failure cost

10. OHSAS is related to

Health & safety

Section- B (4X4=16)

11. Differentiate between Quality control & Quality assurance with 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 fulfill 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 fulfill requirements for quality".

12. 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 labor 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.

13. What is ISO 9001:2015? Why ISO certification is important for companies?

Ans. ISO 9000:2015 describes the fundamental concepts and principles of quality management which are universally applicable to the following:

- organizations seeking sustained success through the implementation of a quality management system;
- customers seeking confidence in an organization's ability to consistently provide products and services conforming to their requirements;
- organizations seeking confidence in their supply chain that their product and service requirements will be met;

- organizations and interested parties seeking to improve communication through a common understanding of the vocabulary used in quality management

14. What is Quality charts? Which charts are used for variable and attribute data.

Ans. Two broad categories of chart exist, which are based on if the data being monitored is "variable" or "attribute" in nature.

- Variable Control Charts.
  X bar control chart. ...
  Range "R" control chart. ...
  Standard Deviation "S" control chart. ...

- Attribute Control Charts. ...
  "u" and "c" control charts. ...
  "p" and "np" control charts.

Section- C (4X6=24)

15. What are the different type of wastes in Lean manufacturing & define them?

Ans.

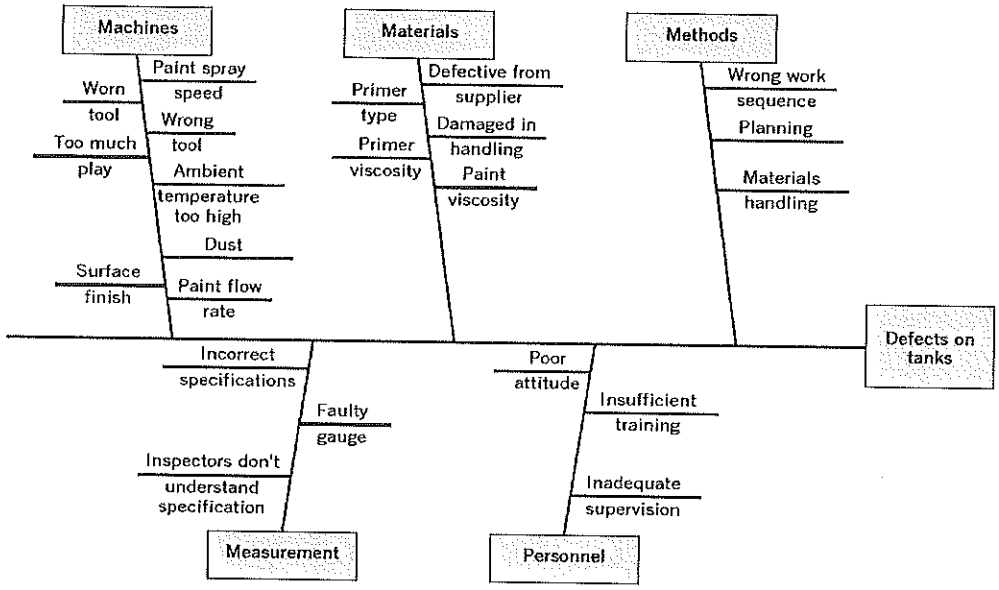
- unnecessary transportation;
- excess inventory;
- unnecessary motion of people, equipment or machinery;
- waiting, whether it is people waiting or idle equipment;
- over-production of a product;
- over-processing or putting more time into a product than a customer needs, such as designs that require high-tech machinery for unnecessary features; and
- defects, which require effort and cost for corrections.
- Waste of unused talent and ingenuity.

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

Ans.
1. Histogram or stem-and-leaf plot
2. Check sheet
3. Pareto chart
4. Cause-and-effect diagram
5. Defect concentration diagram
6. Scatter diagram
7. 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 causes through brainstorming.
3. Draw the effect box and the center line.
4. Specify the major potential cause categories and join them as boxes connected to the center line.
5. Identify the possible causes and classify them into the categories in step 4. Create new categories, if necessary.
6. Rank order the causes to identify those that seem most likely to impact theproblem.
7. Take corrective action.



17. Define SPC? Why it is important for process study? Explain Cp, Cpk with the help of Range chart and X bar chart.

Ans.

Statistical process control (SPC)

If a product is to meet or exceed customer expectations, generally it should be produced by a
process that is stable or repeatable. More precisely, the process must be capable of operating
with little variability around the target or nominal dimensions of the product's quality characteristics.

Statistical process control (SPC) is a powerful collection of problem-solving tools useful in achieving process stability and improving capability through the reduction of
variability

.

Cp and cpk

Cp and Cpk, commonly referred to as process capability indices, are used to define the ability of a process to produce a product that meets requirements. These indices, which are a fairly recent addition to the field of statistical process management, greatly simplify the management of statistically controlled processes.

To understand Cp and Cpk you must have an understanding of the following terms:

- Specifications: Specifications define product requirements. In other words, they define what is expected from an item for it to be usable. Specifications are normally defined in terms of nominal (+/-) tolerances or ranges (low to high. A specification for a piston ring, for example, might specify that the diameter be 74mm +/- 0.05mm. The upper specification limit (USL) is the upper limit of the specified range. Similarly the lower specification limit (LSL) is the lower limit of the specified range. See: Specifications.

Specification	Specifications define product requirements. In other words, they define what is expected from an item for it to be usable. Specifications are normally defined in terms of nominal (+/-) tolerances or ranges (low to high. A specification for a piston ring, for example, might specify that the diameter be 74mm +/- 0.05mm. The upper specification limit (USL) is the upper limit of the specified range. Similarly the lower specification limit (LSL) is the lower limit of the specified range. See: Specifications.
Standard Deviation	The standard deviation is a measure of variability in a process. Defined as the root mean square (RMS) deviation from average it indicates how much a process can be expected to vary from the average. The standard deviation is normally fixed for a process that is under statistical control and can only be affected by a process change that affects the variability in a process.
Mean	The arithmetic average of a group of values.

Cp

The Cp index is calculated using specification limits and the standard deviation only. This index indicates, in general, whether the process is capable of producing products to specifications. No information on the ability of the process to adhere to the target value is included in this index.

The formula for Cp is as follows:

$$Cp = (\text{upper spec} - \text{lower spec}) / 6 * \sigma$$

CpK

This Cpk index is calculated using specification limits, the standard deviation, and the mean. The index indicates whether the process is capable of producing within specification and is also an indicator of the ability of the process to adhere to the target specification.

The formula for Cpk is as follows:

$Cpk = \min \{(\mu - \text{Lower Spec}) / 3\sigma, (\text{Upper Spec} - \mu) / 3\sigma\}$

18. What is lean manufacturing? Write the different lean tools. Explain any of two.

Ans. Lean manufacturing is a methodology that focuses on minimizing waste within manufacturing systems while simultaneously maximizing productivity.

Also known as lean production, or just lean, the integrated sociotechnical approach is based on the Toyota Production System.

Five principles of lean manufacturing

A widely referenced book, *Lean Thinking: Banish Waste and Create Wealth in Your Corporation*, which was published in 1996, laid out five principles of lean, which many in the field reference as core principles. They are value, the value stream, flow, pull and perfection. These are now used as the basis for lean implementation.

1. Identify value from the customer's perspective. Value is created by the producer, but it is defined by the customer. In other words, companies need to understand the value the customer places on their products and services, which, in turn, can help them determine how much money the customer is willing to pay.

The company must strive to eliminate waste and cost from its business processes so that the customer's optimal price can be achieved at the highest profit to the company.

2. Map the value stream. This principle involves recording and analyzing the flow of information or materials required to produce a specific product or service with the intent of identifying waste and methods of improvement. The value stream encompasses the product's entire lifecycle, from raw materials through to disposal.

Companies must examine each stage of the cycle for waste -- or muda in Japanese. Anything that does not add value must be eliminated. Lean thinking recommends supply chain alignment as part of this effort.

3. Create flow. Eliminate functional barriers and identify ways to improve lead time to ensure the processes are smooth from the time an order is received through to delivery. Flow is critical to the

elimination of waste. Lean manufacturing relies on preventing interruptions in the production process and enabling a harmonized and integrated set of processes in which activities move in a constant stream.

4. Establish a pull system. This means you only start new work when there is demand for it. Lean manufacturing uses a pull system instead of a push system.

With a push system, used by manufacturing resource planning (MRP) systems, inventory needs are determined in advance and the product is manufactured to meet that forecast. However, forecasts are typically inaccurate, which can result in swings between too much inventory and not enough, as well as subsequent disrupted schedules and poor customer service.

In contrast to MRP, lean manufacturing is based on a pull system in which nothing is bought or made until there is demand. Pull relies on flexibility and communication.

5. Pursue perfection with continual process improvement, or kaizen. Lean manufacturing rests on the concept of continually striving for perfection, which entails targeting the root causes of quality issues and ferreting out and eliminating waste across the value stream.