



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. Work Study can be applied in
 - (i) Automotive industry
 - (ii) Hospital
 - (iii) Tourism
 - (iv) Every where
2. Application of Ergonomics are in
 - (i) Aerospace
 - (ii) Product design
 - (iii) Health care
 - (iv) All three
3. In Method Study, Transport is represented by -----
4. In Production System, inputs are
 - (i) Materials
 - (ii) Road
 - (iii) Transport
 - (iv) None of the above
5. 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



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6. Prime Cost in a Manufacturing Industry includes:
- (i) All direct cost Factory overhead cost
 - (ii) Summation of direct and factory overhead cost
7. JIT concept is used for -----
8. Under ABC analysis, quantity of class-A product is
- (i) 70 – 80 %
 - (ii) 15 – 20 %
 - (iii) 5 – 10 %
 - (iv) None of the above
9. Benefits of Process Planning are
- (i) Reduction in setup costs
 - (ii) Reduction in tooling costs
 - (iii) Reduction in material costs
 - (iv) All
10. Number of product under "Job Production System" are
- (i) Less
 - (ii) More
 - (iii) In between
 - (iv) Nil

Section- B

04X04 = 16 Marks

11. Yesterday, the price of envelopes was \$3 a box and Ram was willing to buy 10 boxes. Today, the price has gone up to \$3.75 a box and Ram is now willing to buy 8 boxes. Is Ram's demand for elastic or inelastic. What is Ram's elasticity of demand?
12. Discuss about various types of production systems!
13. Write down the comparison between Conventional and JIT attitudes!
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.	100	90	105	95	----

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



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- 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. Write down short notes on

- (i) ABC Analysis (ii) Kanban System

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!



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Answer Key

Section – A

10X01 = 10 Marks

1. Work Study can be applied in
(i) Automotive industry (ii) Hospital (iii) Tourism
(iv) Every where
Ans. (iv)
2. Application of Ergonomics are in
(i) Aerospace (ii) Product design (iii) Health care
(iv) All three
Ans. (iv)
3. In Method Study, Transport is represented by -----
4. In Production System, inputs are
(i) Materials (ii) Road (iii) Transport (iv) None of the above
Ans. (i)
5. 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)
6. 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)
7. JIT concept is used for -----
Ans. Inventory control



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8. 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)

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

Ans. All

10. Number of product under "Job Production System" are
(i) Less (ii) More (iii) In between (iv) Nil

Ans. (i)

Section – B

04X04 = 16 Marks

11. Yesterday, the price of envelopes was \$3 a box and Ram was willing to buy 10 boxes. Today, the price has gone up to \$3.75 a box and Ram is now willing to buy 8 boxes. Is Ram's demand for elastic or inelastic. What is Ram's elasticity of demand?

$$\text{Soln.: EOD} = \frac{\{(8-10)/10\}}{\{(3.75-3.00)/3.00\}} = [-0.8] = 0.8$$

EOD is < 1. Hence inelastic.

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 attitudes!

Ans.

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



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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.	100	90	105	95	----

Ans.: $F_5 = 0.4 \times 95 + 0.3 \times 105 + 0.2 \times 90 + 0.1 \times 100 = 97.5$ 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 = $74000 + 12000 + 8000 + 4000 = 98000$

% = $74000 / 98000 = 75.5$



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17. Write down short notes on (i) ABC Analysis (ii) Kanban System

Ans.: **ABC Analysis** : Class-A: 70% - 80% of total inventory cost 10% -15% of total items.

Class-B: 20% - 15% of total inventory cost 15% -20% of total items

Class-C: 10% - 5% of total inventory cost 75% -65% of total items

Kanban System: System of planning and controlling production

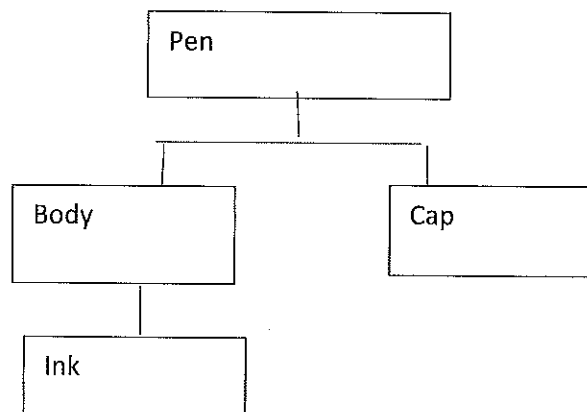
- Kanban means *card*
- Signaling to the upstream workstation that the downstream workstation is ready for the upstream station to produce another batch of parts
- Two types of kanban cards: Conveyance card (C-Kanban) and Production card (P-Kanban)
- Shop-floor planning and control are reduced to planning and controlling the movement of orders among work centers with stable and level production schedules, priority decisions are routine
- No parts can be produced or moved without a kanban (or card)

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:





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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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Course Code: SMS1502

Course Name: Integrated CAD-CAM-CNC

Time: 2 Hour

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.

Section – A

10X01 = 10 Marks

1. Which of the following bearing has no wear?
 - a) magnetic bearing
 - b) roller bearing
 - c) plain bearing
 - d) none of above
2. Pipe threads have a flank angle of-
 - a) 60°
 - b) 30°
 - c) 55°
 - d) 33°
3. Tr 40 x 14(P 7), here 14 indicates-
 - a) Pitch
 - b) Lead
 - c) Diameter
 - d) None of the above
4. _____ is the light metal (density > 5kg/dm³)
 - a) Titanium
 - b) Zinc
 - c) Copper
 - d) Lead



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5. Which material is having high thermal conductivity?
 - a) Glass
 - b) Plastics
 - c) Air
 - d) Iron
6. Density of air at 0°C, 1.013 bar is-
 - a) 1.29 Kg/m³
 - b) 1.29 g/m³
 - c) 12.9 Kg/m³
 - d) 12.9 g/m³
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.



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Section- C

04X06 = 24 Marks

15. What is the purpose of the springs? What is the spring rate of a compression spring if a force of 400 N is required in order to compress the spring by 5.5 mm?
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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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. Which of the following bearing has no wear?
a. magnetic bearing
2. Pipe threads have a flank angle of-
b. 30
3. Tr 40 x 14(P 7), here 14 indicates-
b. Lead
4. _____ is the light metal (density > 5kg/dm³)
a. Titanium
5. Which material is having high thermal conductivity?
d. Iron
6. Density of air at 0°C, 1.013 bar is-
a. 1.29 Kg/m³
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



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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.

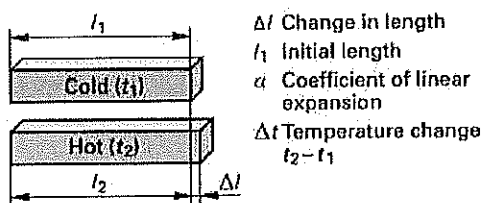
Alloys are mixtures of primarily metal atoms which form a continuous solid solution

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 $\Delta t = 1^\circ\text{C}$.

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.



Linear thermal expansion

$$\Delta l = l_1 \cdot \alpha \cdot \Delta t$$

Figure 1: Linear thermal expansion

Section- C

04X06 = 24 Marks

15. What is the purpose of the springs? What is the spring rate of a compression spring if a force of 400 N is required in order to compress the spring by 5.5 mm?

Ans.

1. To store energy for part of a functioning cycle.
2. To force a component to bear against, to maintain contact with, to engage, to disengage, or to remain clear of some other component.
3. TO counterbalance a weight or thrust (gravitational, hydraulic, etc.). Such springs are usually called equilibrator springs.
4. To maintain electrical continuity,
5. To return a component to its original position after displacement.
6. To reduce shock or impact by gradually checking the motion of a moving weight.
7. To permit some freedom of movement between aligned components without disengaging them. These are sometimes called take-up springs.

→ We know that spring rate is

$$R = F/S$$

So here $f = 400 \text{ n}$

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:

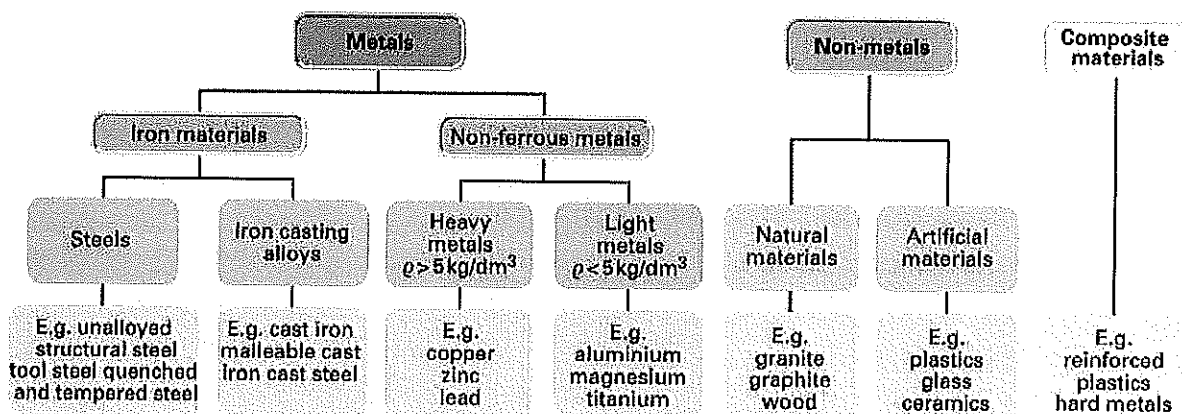
It describes the suitability or unsuitability of a material for welding. Unalloyed and low alloy steels with a low carbon content have good welding properties. High alloy steels as well as aluminium and copper alloys can also be welded using special welding methods.

Hardenability:

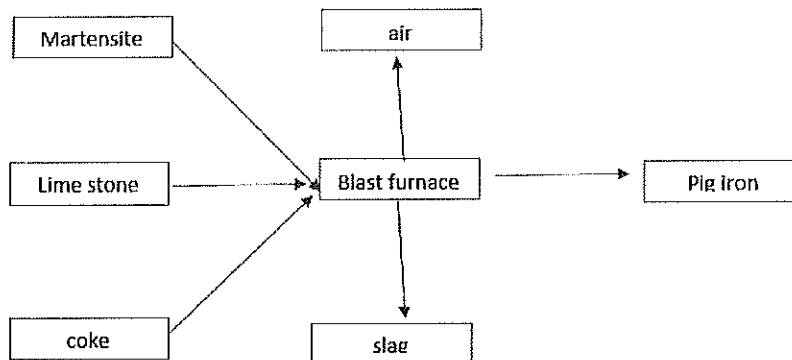
Hardenability and heat treatability refer to the capacity of a material to increase its hardness and strength by targeted heat treatment.

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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Course Code: SMS1503

Time: 2 Hour

Course Name: Basics of Multiaxis Machining & Dialog CNC Programming

Max. Marks: 50

Instructions:

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Section – A

10X01 = 10 Marks

1. What is the material thickness for waterjet cutting?
 - a) 1 to 100 mm
 - b) 1 to 1000 mm
 - c) 20 to 5000 mm
 - d) 10 to 50 mm
2. Which coating is preferred for aluminum and aluminum alloys?
 - a) Phosphating
 - b) Chromating
 - c) Both a & b
 - d) None of the above
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



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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. The spray painting material essentially consists of...
 - a) Liquid binder
 - b) Powder pigments
 - c) Solvent thinner
 - d) All of above
7. Spray painting method not used for.....
 - a) 2D surface
 - b) Structured parts
 - c) Small flat pieces
 - d) All of above
8. How much pressure is used for Spray painting (compressed air spraying) method?
 - a) 1 - 2 bar
 - b) 2 - 6 bar
 - c) Upto 250 bar
 - 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. Define coating and write its function.
13. Explain the Die clearance.
14. What is Electro coating (electrophoretic dip painting)? Write their advantages and applications?



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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 phosphating and chromating method of coating.
18. Describe the chemical vapor composition(CVD) and write down their advantage and application.



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Answer Key

Section – A

10X01 = 10 Marks

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a) 1 to 100 mm
2. Which coating is preferred for aluminum and aluminum alloys?
b) chromating
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?
c) 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. The spray painting material essentially consists of...
d) All of above
7. Spray painting method not used for.....
b) structured parts
8. How much pressure is used for Spray painting (compressed air spraying) method?
b) 2-6 bar
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

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 magazine. During the process, the metal panel is traversed under the tool so that required shape is created.

Cutting by nibbling

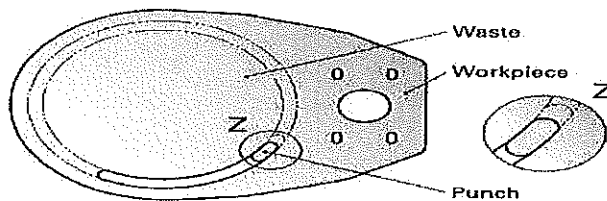


Figure 3: Cutting by nibbling

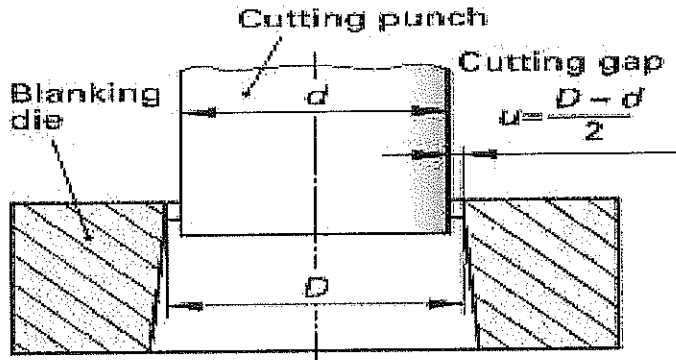
12. Define coating and write their function

- A coating is a covering that is applied to the surface of an object, usually referred to as the **substrate**. The purpose of applying the coating may be **decorative, functional**, or both.
- Low friction
- Abrasion resistance
- Chemical resistance
- Electrical insulation
- Rust and corrosion prevention
- Function and aesthetic

13. Explain the Die clearance.

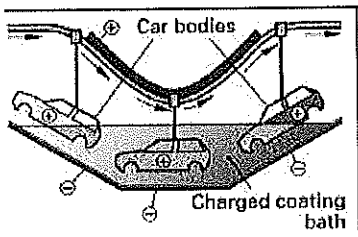
Ans. Die clearance

A die clearance must be present between punch and blanking die. The size of the die clearance depends on the sheet metal thickness, the shear strength of the sheet metal, the required tool life and the quality of the cut surface. Normally, the die clearance is 0.5% for fine cutting, and otherwise up to 5% of the sheet metal thickness. Whether the correct die clearance has been adhered to can be checked by observing the cut surface. If it is raw and brittle, and shows strong burring, the die clearance is too big. Correct die clearance can be taken from tables.



Sheet metal thickness <i>s</i> in mm	Die clearance <i>u</i> in mm for shear strength τ_{AB} in N/mm^2	
	250 ... 400	400 ... 600
0.4 ... 0.6	0.015	0.02
0.7 ... 0.8	0.02	0.03
0.9 ... 1.0	0.03	0.04
1.5 ... 2.0	0.04 ... 0.05	0.05 ... 0.07
2.5 ... 3.0	0.06 ... 0.07	0.09 ... 0.10
3.5 ... 4.0	0.08 ... 0.09	0.11 ... 0.13

14. What is Electrocoating (electrophoretic dip painting). writes their advantages and applications

Description	Advantage	Application
<p>The grounded component is immersed 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.</p> 	<p>The coating is uniform and penetrates deep into uneven surfaces including areas that are difficult to access and cavities.</p>	<p>Anti-corrosive coating for automotive bodies and other highly structured parts (corrosion</p>

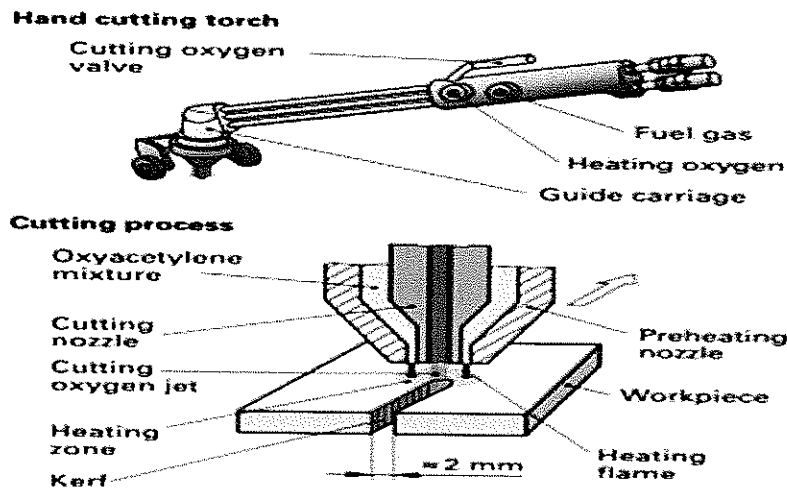
15. Explain the following.

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



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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 phosphating and chromating method of coating

Phosphating

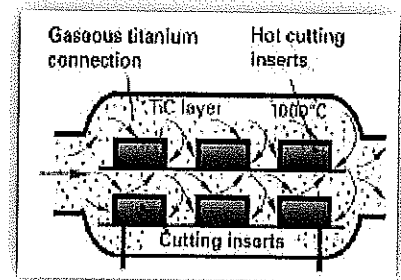
- During phosphating, the steel structure, such as an automotive body shell, either sprayed with **zinc phosphate** solution in an enclosure or immersed in a zinc phosphate bath.
- This process forms an **iron phosphate layer** on the steel surface approximately **20 microns** deep that is bonded.
- This layer serves as a primer for the paint and prevents rust forming under the paint layer.
- The phosphate layer can be used as short-term **corrosion protection** as well as an **anti-friction layer** on sheet metal for use in metal forming.
- The main types of phosphate coatings are manganese, iron and zinc.

Chromating

- Chromate conversion coatings are the most widely used coating for corrosion protection of Aluminium and Aluminium alloys minimizing surface oxidation. It is commonly used for an undercoat for paint or adhesive applications due to the excellent bonding properties it provides.
- It is used aluminium and magnesium for coating.
- Chromating coating is performed by dipping and spraying.
- It has greenish-yellow colour

18. Describe the chemical vapor composition(CVD) and write down their advantage and application.

- Chemical Vapour Deposition (CVD) is an atmosphere controlled process conducted at elevated temperatures (1000 °C) in a CVD reactor.
- During this process, **thin-film coatings** are formed as the result of reactions between **various gaseous phases** and the heated surface of substrates within the CVD reactor. As different gases are transported through the reactor, distinct hard coating layers are formed on the **tool**.

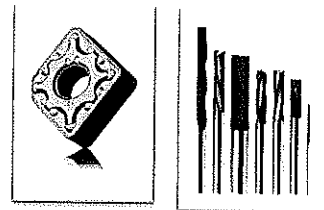


Advantage

- Possibility of coating with oxides, metal carbides and metal nitrides.
- Thin multilayer coating are also possible.

Applications

- Coating of tools and indexible cutter inserts, guide rollers, thread guides and similar objects with hard materials coatings of Al_2O_3 , TiC, TiN, TiAlN and AlCrN.ss





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Registration No.:

School of Manufacturing Skills
Session: 2019-20 (Summer Semester)
B. Voc. Program, 5th Semester,
End-Sem. Examination, Set A

Course Code: SMS1504
Course Name: Project Work

Time: 2 Hours
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. In the class the report writing was discussed and in particular the project report. According to the instruction given when must the **executive summery** be written?
 - a. At the beginning of the report writing.
 - b. Continuously during report writing.
 - c. The executive summery must be written at the end of the phase "Reporting"
 - d. Does not matter
2. In the class the report writing was discussed and in particular the project report. According to the instruction given what is the content of the **executive summery**.
 - a. Project overview.
 - b. All the details you can find in the appendix to highlight them in the very beginning because the students have worked so hard for it.
 - c. Summary of the results.
 - d. Project cost.
3. The CPM/CPA (Critical Path Method / Critical Path Analysis) as an algorithm for scheduling a set of project activities was discussed during the lecturing. What is **not** part of CPM/CPA?
 - a. Structure planning
 - b. Time planning
 - c. Net planning
 - d. Cost planning



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4. When does a project path become critical according to CPM/CPA (Critical Path Method / Critical Path Analysis)?
 - a. When a task / process in a project path seems so complicated that the entire project team is afraid of it and nobody wants to work on it.
 - b. When a project path of several tasks/processes does not even have 1 time unit between the tasks/processes it must be regarded as critical and observed very closely.
 - c. When a team member becomes ill/sick and cannot work on his assigned work packages the involved project path becomes critical.
 - d. Every project must to be regarded as critical. It is just a matter of fact.

5. Please evaluate the following statement:
The project phases "launch or execution" and "performance and control" form a unity in reality.
 - a. Yes, they form a unity because both phases are part of the project.
 - b. Yes, they form a unity because the output of the phase "performance and control" feedback as an input to the phase "launch or execution". Both phases are in a loop therefore.
 - c. No, they do not form a unity because both phases have to be regarded separately.
 - d. No, they do not form a unity because the phase "launch or execution" forms a unity with the phase "definition and planning". Also the phase "performance and control" forms a unity with the phase "project close".

6. A task/process has its early start (ES) in the time unit 6 and its early finish (EF) in the time unit 15. What is the total duration (D)?
 - a. 10 units.
 - b. 9 units
 - c. 11 units
 - d. Not clearly defined, we only think in weeks never in units.

7. After the "table of content" the main part of the project report should always be written in the following order:
 - a. Introduction, body, conclusion
 - b. Body, introduction, appendix
 - c. Introduction, reference, conclusion
 - d. Conclusion, body, introduction



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8. Evaluate following statement:

The project team should always communicate directly among the team members and the project leader has always to be informed regarding the status and decisions.

- a. Yes, because talking is very nice and social. Basically the team members are friends and should regard their friendship as priority number 1 during the project work.
- b. No, because the team members should not be friends. They are colleagues and should not have a too deep relation among each other.
- c. No, the communication should always go through the project leader. He will decide what steps should be taken next.
- d. Yes, direct communication avoids the dilution of the information and also increases the pace of decision taking. Because the project leader is always in the loop he can interfere in the decision taking process of the team if required.

9. Evaluate following statement:

The project report should always be written at the end of the project.

- a. Yes, because at the end all the information and data are available. It does not make sense to start with project report writing in the beginning therefore.
- b. No, the phase "project report writing" should be started at the very beginning and should be a continuous activity during the whole project. It helps to avoid a work overload at the end of the project. If not enough information and data is available, the structure/template of the report can always be prepared.
- c. No, the project report should be written at the beginning of the project because the team just needs to follow to what is written in the report. At the end the project team adds only the appendix.
- d. None of the answers above is correct.

10. Project risks are events which occur:

- a. In their probability
- b. No one can forecast the future. Therefore, the occurrence of an event with negative impact on the project is not predictable. The probability is a statistical value which helps to assess the risks at the beginning of a project and prepares the project team for the same.
- c. Always
- d. Never

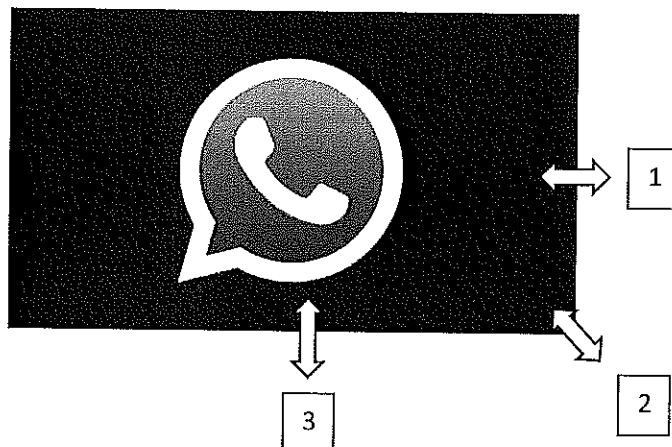


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Section – B

04X04 = 16 Marks

1. The project organization structure was discussed in depth in the lesson. This organizational structure is appropriate for what type of orders? Justify your answer by highlighting the advantage and disadvantages as an attribute/characteristics.
2. The phase 1 "Conception & Initiation" at the very start is done by a) *whom* and b) *what* is the result/outcome/deliverable item of this phase? (Note: All the project groups received this respective deliverable item at the very beginning of their project)
3. The phase 5 "Project Close" at the very end is done by a) *whom* and b) *what* is the result/outcome/deliverable item of this phase?
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:
.....



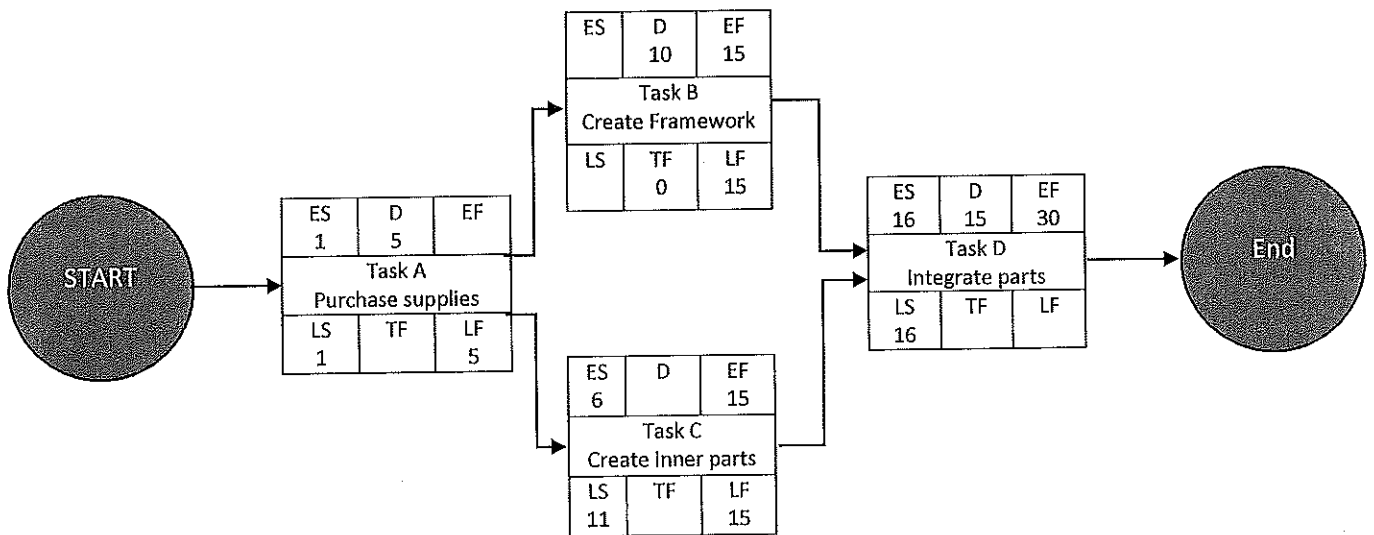


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Section – C

04X06 = 24 Marks

1. At the beginning of the lectures, the progression of a project from **Point A to Point B** was explained by a sketch on the whiteboard. Reproduce this sketch and illustrate the five different phases of the project. (Project Initiation/Launch, Project Definition & Planning, Project Execution, Project Control, Project Closure)
2. In the Net-plan below the process/task path A-B-D and A-C-D is visible. In each process/path a value is missing. Complete each box and use the correct formula for the calculation. Decide after completing which path of the two is critical and explain why.



3. Reproduce the sketch of the Project Phase model which was introduced during the lecturing. Define in this illustration the typical phases of project management and project work.



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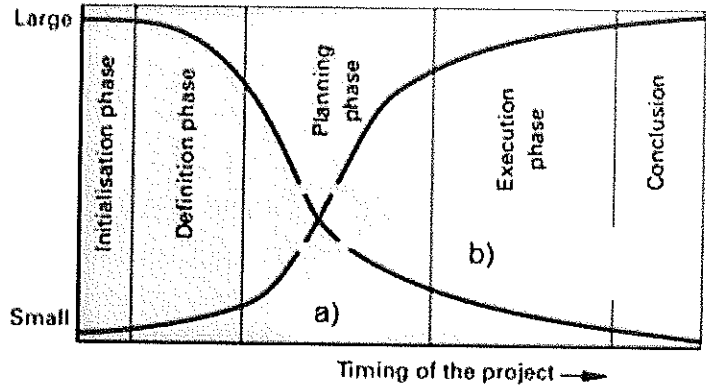
4. In the lesson we discussed the interplay of knowledge and influence of decisions in the progress of projects.

Please name the red line correctly

a).....

Please name the blue line correctly

b).....



- c) Explain the importance of the intersection point in the yellow circle in own words. What document should be signed ideally at this point?

.....

.....

.....

.....



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Registration No.:

School of Manufacturing Skills
Session: 2019-20 (Summer Semester)
B. Voc. Program, 5th Semester,
End-Sem. Examination, Set A
Answer sheet

Course Code: SMS1504

Course Name: Project Work

Time: 2 Hours

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 c. is correct
2. Answer c. is correct
3. Answer d. is correct
4. Answer b. is correct
5. Answer b. is correct
6. Answer a. is correct
7. Answer a is correct
8. Answer d is correct.
9. Answer b. is correct.
10. Answer b is correct

Section – B

04X04 = 16 Marks

1. The organizational structure of a project is particularly suitable for operating multidisciplinary, one-off and individual orders.
Advantage: Direct communication among the team members.
Disadvantage: Responsibilities are not always clearly defined
2. a) Normally done by the Project Manager and the customer
b) The result is the Project Order



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3. The Project Closure will be done by a) the project team and the b) Product and Project report are the deliverables of this phase and the entire project
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.

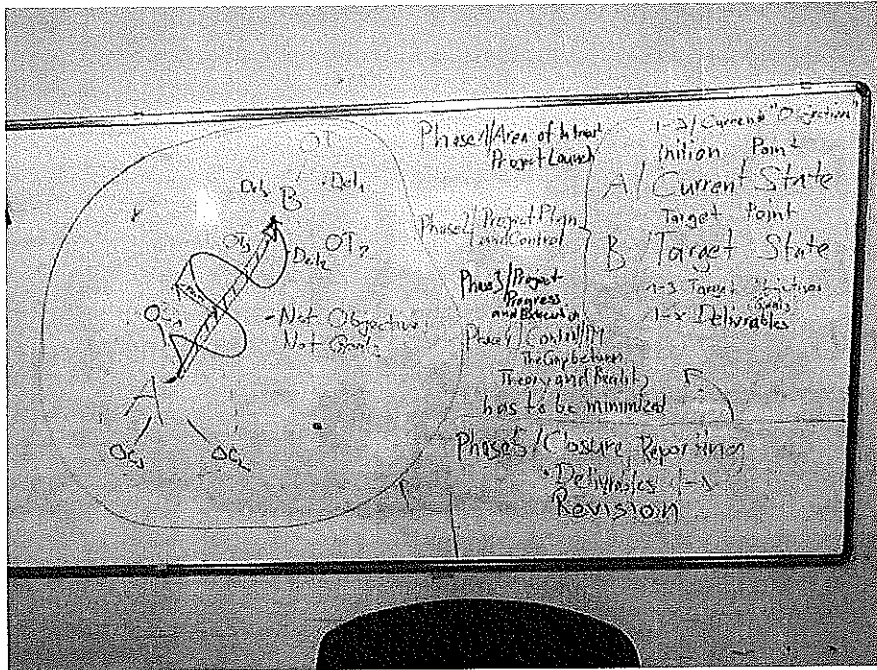


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Section – C

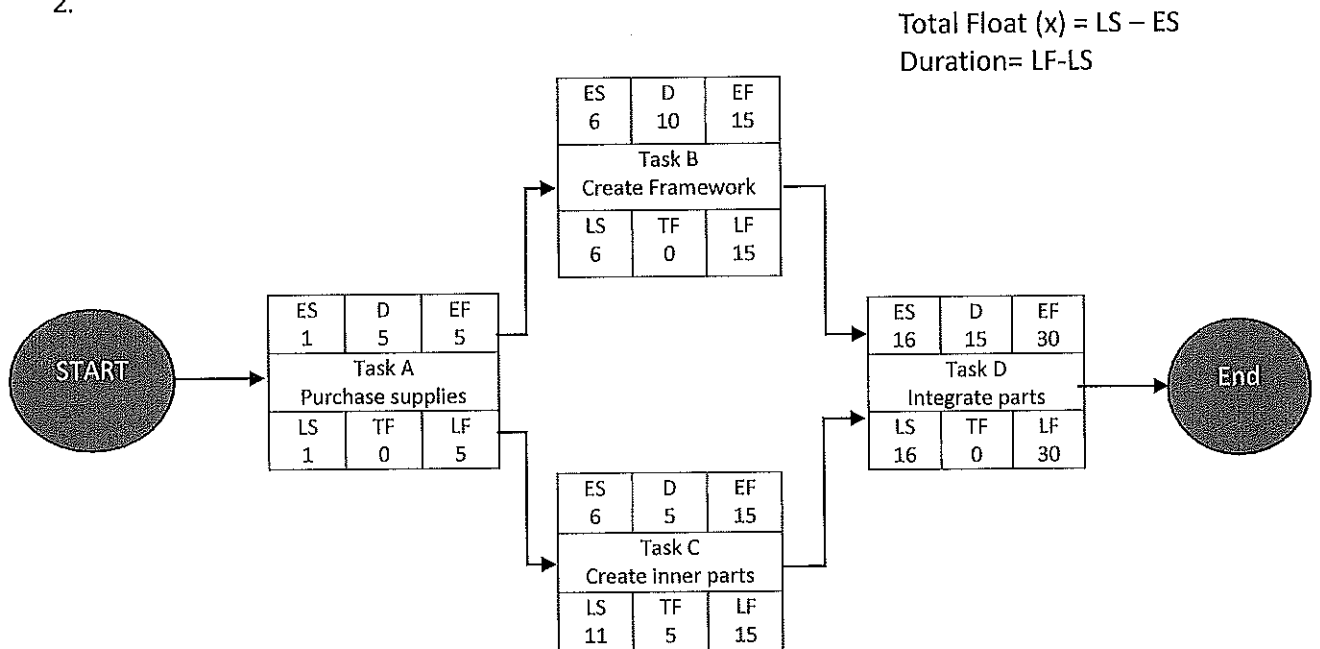
04X06 = 24 Marks

1.



The sketch should look similarly like above

2.

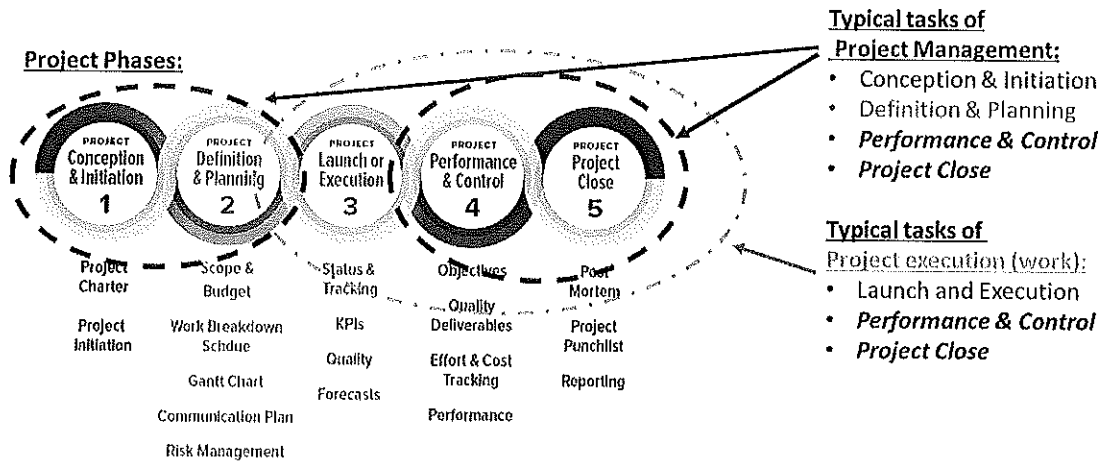




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The path A-C-D is critical because there is 0 time between the processes/task.

3.



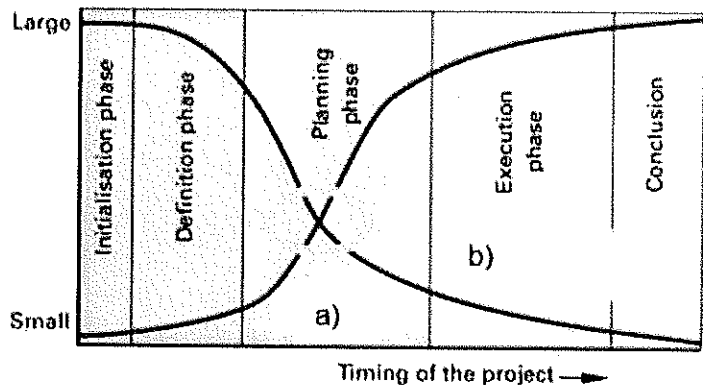
4. In the lesson we discussed the interplay of knowledge and influence of decisions in the progress of projects.

Please name the red line correctly

a) Knowledge line

Please name the blue line correctly

b) Influence of decision line



c) Explain the importance of the intersection point in the yellow circle in own words. What document should be signed ideally at this point?

At this moment the knowledge has increased to such a value that the project contract can be signed. The influence of the decision has decreased, but is still high enough to make the decision for the coming project phases.



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Registration No.:

School of Manufacturing Skills
Session: 2019-20 (Summer Semester)
B. Voc. Program, V Semester,
End-Sem. Examination

10/1/2020
Time - 2:00 - 4:00

Course Code: SMS1505
Course Name: Quality Management

Time: 2 Hour
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. Which generic approach's precursor is the Toyota Production System?
 - A. Kaizen
 - B. TQM
 - C. Lean manufacturing
 - D. Six sigma
2. 80/20 Rules is applicable for
 - A. Pareto Charts
 - B. Fishbone Diagram
 - C. To define the OEE
 - D. PFMEA
3. Dock Inspection is called.
 - A. Incoming Inspection
 - B. Final Inspection
 - C. In process Inspection
 - D. BOP Inspection
4. For Attribute data which chart is prepared:
 - A. X bar Chart
 - B. Range Chart
 - C. P chart
 - D. None of the above



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5. A six sigma process has defect level below _____ defects per million opportunities.
 - A. 3.4
 - B. 4.3
 - C. 5.6
 - D. 6.0
6. The process capability is calculated as
 - A. $(USL-LSL)/3\sigma$
 - B. $(USL+LSL)/3\sigma$
 - C. $(USL-LSL)/6\sigma$
 - D. $(USL+LSL)/6\sigma$
7. A fundamental attribute of TQM is
 - A. Drawing control charts
 - B. Having team meetings
 - C. Top management's direct involvement
 - D. Meeting ISO 9000 audit
8. 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
9. Seven QC tools include
 - A. Team meetings & 5-S
 - B. Deming 14 points approach
 - C. Workers' toolkit
 - D. Histogram
10. PPM is used for:
 - A. For Production Quantity
 - B. For Quality Rejection
 - C. For Sales Benefit
 - D. For Material Scheduling

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. Write the Names of different types of charts used in SPC.



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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. Explain any three
 - A. 5-S
 - B. Kaizen
 - C. Kanban
 - D. OEE



BHARTIYA SKILL DEVELOPMENT UNIVERSITY
SCHOOL OF MANUFACTURING SKILLS
5th SEMESTER, END-SEMESTER EXAMINATION
SUMMER SEMESTER, B.VOC. PROGRAM
SESSION 2019-2020

Answer Key (Set A)

Course Code: SMS1505
Time (Minutes): 120

Course Name: Quality Management
Maximum Marks: 50 Marks

Section- A

(1X10=10)

1. Which generic approach's precursor is the Toyota Production System?
A. Kaizen
2. 80/20 Rules is applicable for
A. Pareto Charts
3. Dock Inspection is called.
A. Final Inspection
4. For Attribute data which chart is prepared:
A. P chart
5. A six sigma process has defect level below _____ defects per million opportunities.
A. 3.4
6. The process capability is calculated as
A. $(USL-LSL)/6\sigma$
7. A fundamental attribute of TQM is
A. Top management's direct involvement
8. ISO 9000 determines
A. If the company practices its written procedures
9. Seven QC tools include
A. Histogram
10. PPM is used for:
A. For Quality Rejection



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. Write the Names of different types of chart.

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.

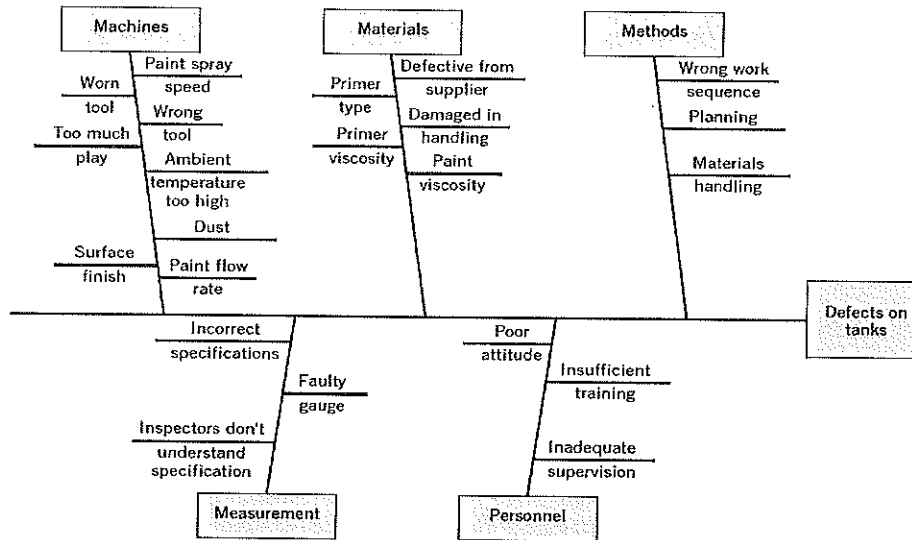
- unnecessary transportation;
- excess inventory;
- unnecessary motion of people, equipment or machinery;
- waiting, whether it is people waiting or idle equipment;
- over-production of a product;
- over-processing or putting more time into a product than a customer needs, such as designs that require 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 the problem.
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. Explain any three :

A. 5-S

Ans.

5S, sometimes referred to as 5s or Five S, refers to five Japanese terms used to describe the steps of the 5S system of visual management. Each term starts with an S. In Japanese, the five S's are *Seiri*, *Seiton*, *Seiso*, *Seiketsu*, and *Shitsuke*. In English, the five S's are translated as Sort, Set in Order, Shine, Standardize, and Sustain

B. Kaizen

Ans. Kaizen (Ky ' zen) is a Japanese term that means continuous improvement, taken from words 'Kai', which means continuous and 'zen' which means improvement. Some translate 'Kai' to mean change and 'zen' to mean good, or for the better. If you are aware of the Kaizen philosophy and strive to implement it, not a day should go by without some kind of improvement being made somewhere in the company.

C. Kanban

Ans. Kanban is a system that schedules lean manufacturing. It controls the supply chain to realize cost savings through implementing the just-in-time inventory control system. All we are doing is looking at the timeline, from the moment the customer gives us an order to the point when we collect the cash.

D. OEE

Ans.

OEE (Overall Equipment Effectiveness) is the gold standard for measuring manufacturing productivity. Simply put – it identifies the percentage of manufacturing time that is truly productive. An OEE score of 100% means you are manufacturing only Good Parts, as fast as possible, with no Stop Time. In the language of OEE that means 100% Quality (only Good Parts), 100% Performance (as fast as possible), and 100% Availability (no Stop Time).