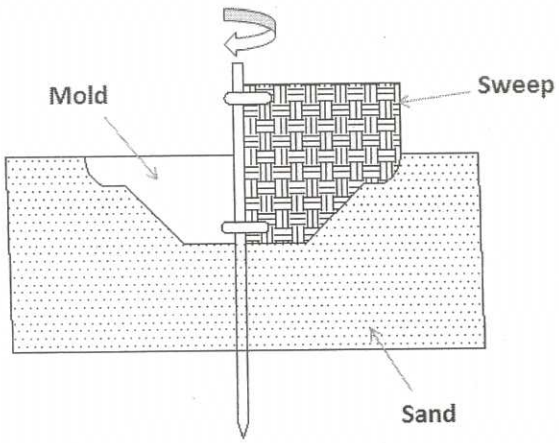
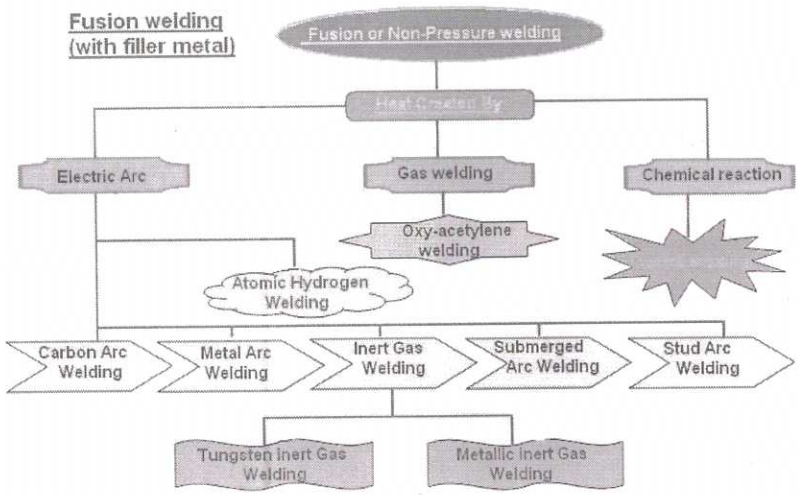
SCORING INDICATORS

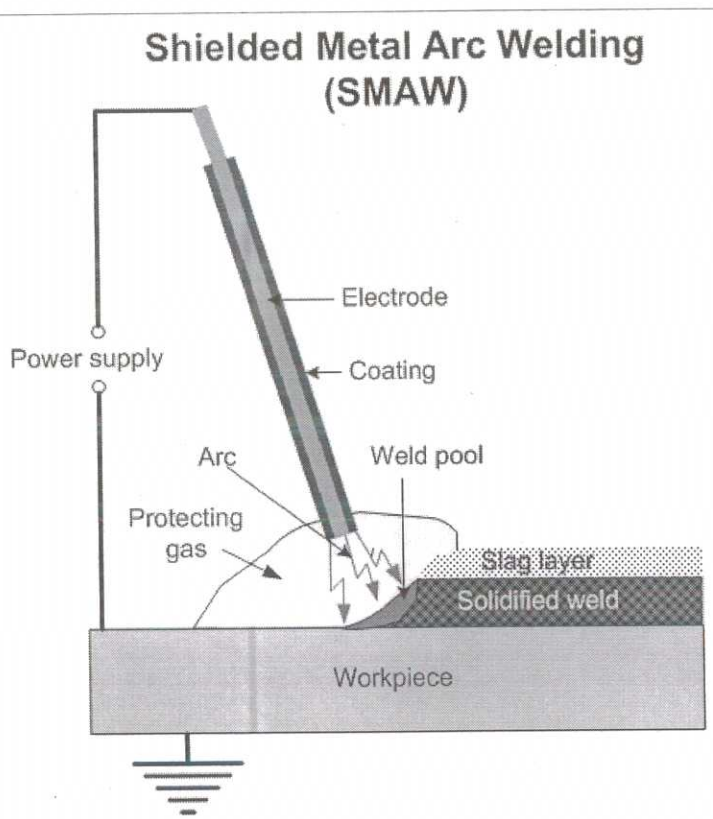
COURSE NAME :

COURSE CODE : **QID :**

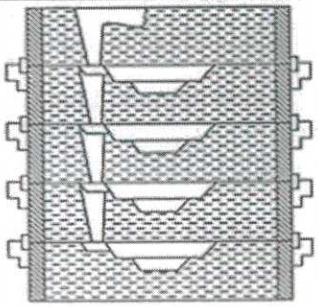
Q No	Scoring Indicators	Split score	Sub Total	Total score
	PART A			**9**
I. 1	**Define the strength of a material** ➢ Ability of a material to withstand external load without breaking is known as Strength of a material	1	1	9
I. 2	**What is a pattern** ➢ Pattern is a model or the replica of the object to be cast	1	1	
I. 3	**Define sand mould casting** ➢ The moulding process where a sand aggregate is used to make the mould is called sand moulding	1	1	
I. 4	**What is the difference between cold working and hot working** ➢ Mechanical working of metal below recrystallization temperature is known as cold working ➢ it is done above recrystallization temperature and below the melting point is known as hot working	0.5 0.5	1	
I. 5	**Define the term welding** ➢ The process of joining two or metal by the application of heat is known as welding	1	1	
I. 6	**What are the constituents and their proportions in thermit welding process** ➢ Iron oxide and aluminium powder are the constituents of thermit welding. ➢ It is in the ratio 3: 1 respectively	0.5 0.5	1	
I. 7	**Name the types of flames used in oxy acetylene welding** ➢ Neutral flame - Oxygen acetylene ratio 1:1 ➢ Oxidizing flame - Oxygen acetylene ratio 1.5:1 ➢ Carburizing flame- Oxygen acetylene ratio 1:1.5	Name=0.5 Proportion=0.5	1	
I. 8	**What is open die casting process** ➢ The process of deforming a piece of metal between multiple dies that do not completely enclose the material	1	1	
1.9	**What is upsetting in forging operation** ➢ The process of increasing the thickness of bar by reducing length is known as upsetting	1	1	

	PART B			24
II. 1	**Explain any three mechanical properties of engineering materials** **1. Strength.** It is the mechanical property of a metal, which provides resistance to an external force or it is the capacity or ability to withstand various loads without deformation or breaking **2 Hardness** It is the ability of a material to resist scratching, abrasion, indentation, or penetration. **3. Elasticity.** The property of metal and its ability to return to its shape and size after removal of load **4. Ductility.** It is the property of material or metal that represents plastic deformation under tensile load, or it enables it to be drawn into wires or elongated. Without rupture under tensile load. **5 Toughness.** It is the ability to absorb energy up to failure or fracture,	1 1 1	3	
II. 2	**Explain sweep moulding process**  ➢ The moulding is done by using a sweep pattern, is called sweep moulding. ➢ A sweep that can be rotated around an axis is used for producing a surface of revolution. ➢ The casting produced involves less time and reduced expenses in making a full pattern.	Fig= 1 Expl=2	3	
II. 3	**Name the different properties of moulding sand** ➢ 1. Porosity: 2. Cohesiveness: 3. Adhesiveness: 4. Plasticity: · 5. Flow-Ability: · 6. Collapsibility: ·	0.5 mark each	3	

	5. Shearing			
II. 6	**How welding process are classified** 	3	3	
II. 7	**Draw the schematic diagram of shielded metal arc welding process**	3	3	

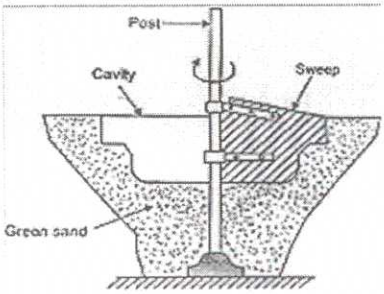


II. 8	**Explain the edge preparation in butt welding process** **i) Square Butt:** ➢ It is used when the thickness of the plate is from 3 to 5 mm. ➢ That means no edge preparation is required if thickness of work piece is less than 5 mm **(ii) Single- V-Butt:** ➢ It is used when the thickness of the plates is from 5 to 16 mm. ➢ Both the edges are bevelled to form an angle of about 70° to 90° **Double-V-Butt:** ➢ It is used when the thickness of the plates is more than 16mm and below 20mm. ➢ Both the edges are beveled to form a double-V. **(iv) Single and Double-U Butt:** ➢ It is used when the thickness of the plate is more than 20mm. ➢ The edge preparation is difficult but the joints are more satisfactory. It requires less filler metal.	Explanation =2 Figure= 1	3	



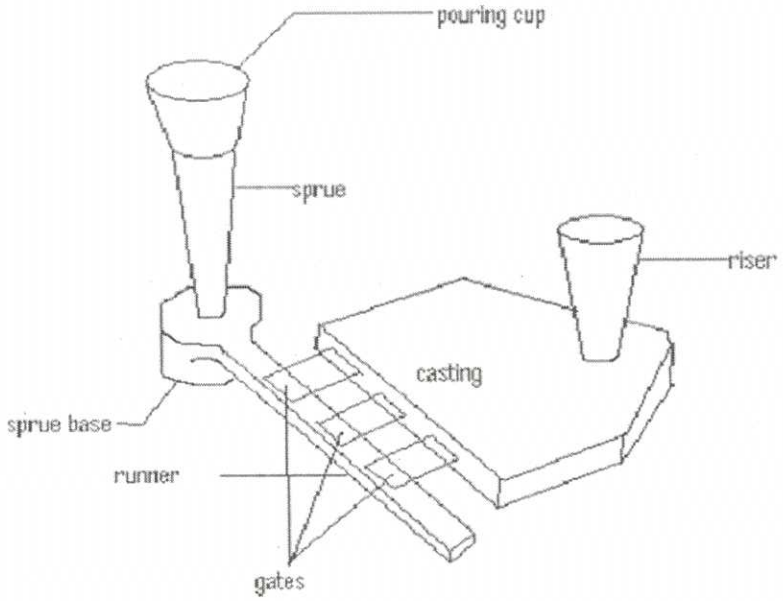
- The moulding done with 10 to 12 flasks at a time and them all have common sprue for feeding all cavities, is called stack moulding.

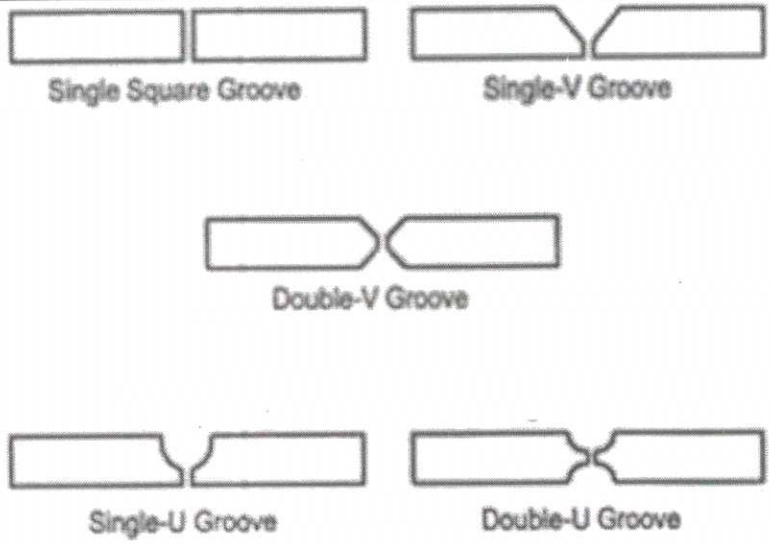
4.Sweep Moulding:



- The moulding is done by using a sweep pattern, is called sweep moulding.
- A sweep that can be rotated around an axis is used for producing a surface of revolution.
- The casting produced involves less time and reduced expenses in making a full pattern

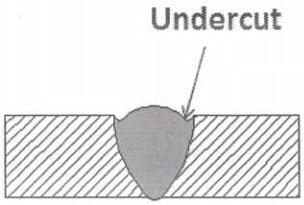
III. 12	**How moulding sand are classified briefly explain** **Foundry Green sand:** ➢ It is a sand used in wet condition for making the mould. ➢ It is a mixture of silica sand with 15-25 percent clay and 6-8 percent water ➢ Green sand moulds are not dried, when the metal poured in them in the wet condition ➢ This sand is used for producing small to medium sized moulds which are not very complex **2. Dry sand:** ➢ Dry sand is the green sand that dried or baked after preparing the mould.	One mark each	7	7

	Gate: A channel through which the molten metal enters the mold cavity. **Riser**: A column of molten metal placed in the mold to feed the castings as it shrinks and solidifies. Also known as feed head.  	Fig =4 Explanation= 3	7	7
III. 2	**What are the main constituents of moulding sand and explain the effect of each on moulding sand** The main constituents of molding sand involve silica sand, binder, moisture content and additives. **1 Silica sand** ➢ Silica sand in form of granular quarts is the main constituent of molding sand having enough refractoriness which can impart strength, stability and permeability to molding and core sand **2 Binder** ➢ Binders can be either inorganic or organic substance. Binders included in the inorganic group are clay sodium silicate and port land cement etc. ➢ In foundry shop, the clay acts as binder which may be Kaolinite, Ball Clay, Fire Clay, Limonite, Fuller's earth and Bentonite. ➢ Binders included in the organic group are dextrin, molasses, cereal binders, linseed oil and resins like phenol formaldehyde, urea formaldehyde etc			

				
II.9	**Explain the use of swage block** ➢ A swage block is a large, heavy block of cast iron or steel used in smithing, with variously-sized holes in its face and usually with forms on the sides. ➢ The through-holes are of various shapes and sizes and are used to hold, support or back up a hot bar of metal for further shaping. ➢ Using swage block different Operations such as bending, cutting, punching and forming can be performed . ➢ The sides are scalloped to present formed shapes for forging operations.	3	3	
II.10	**Name the different forging operation** ➢ Drwaing down ➢ Upsetting, ➢ Setting down ➢ Fullering ➢ Cutting ➢ Punching ➢ Bending ➢ Forge welding (Any 6)	0.5 mark each	3	
	PART C			42
III.1	**Define a gating system and with neat sketch explain all the elements in the gating system** **Pouring basin:** A small funnel shaped cavity at the top of the mold into which the molten metal is poured. **Sprue:** The vertical passage through which the molten metal, from the pouring basin, reaches the mold cavity. In many cases it controls the flow of metal into the mold. **Runner**: The channel through which the molten metal is carried from the sprue basin to the gate.			

2.Under cut

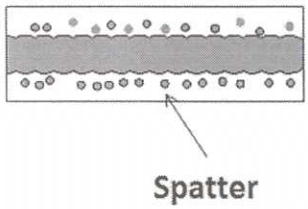
- A groove or depression adjacent to the sides of the weld, reducing the cross-sectional thickness of the base metal



7 7

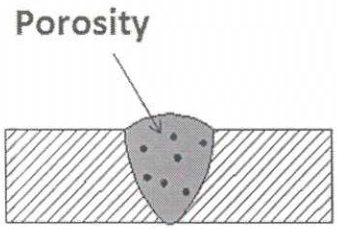
SPATTER

- When some metal drops are expelled from the weld and remain stuck to the surface, then this defect is known as Spatter



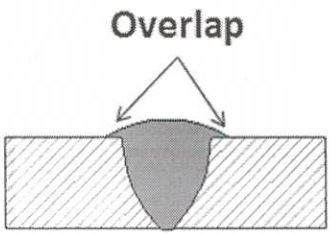
BLOW HOLES

- Small holes in the weld joint caused by the presence of moisture.



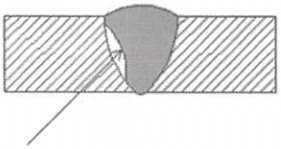
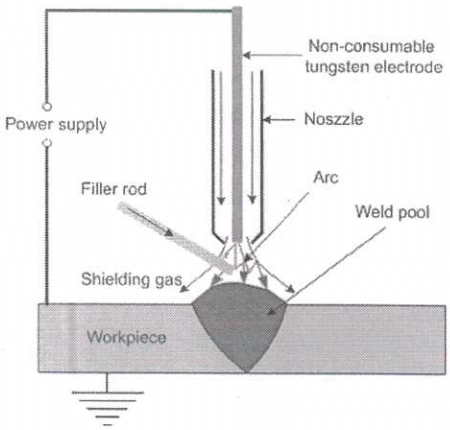
OVERLAP

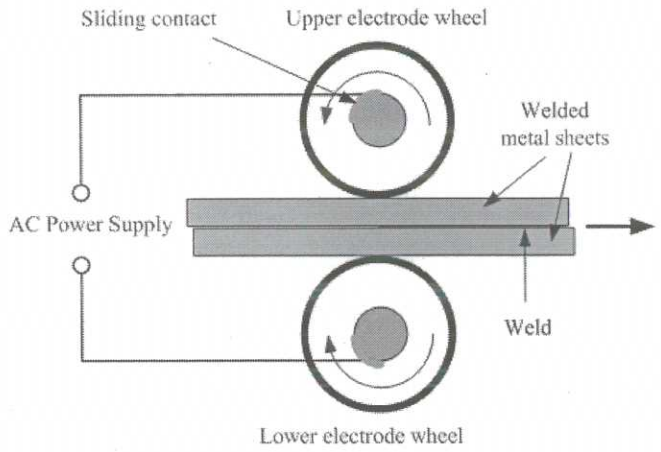
- When the weld face extends beyond the weld toe, then this defect occurs

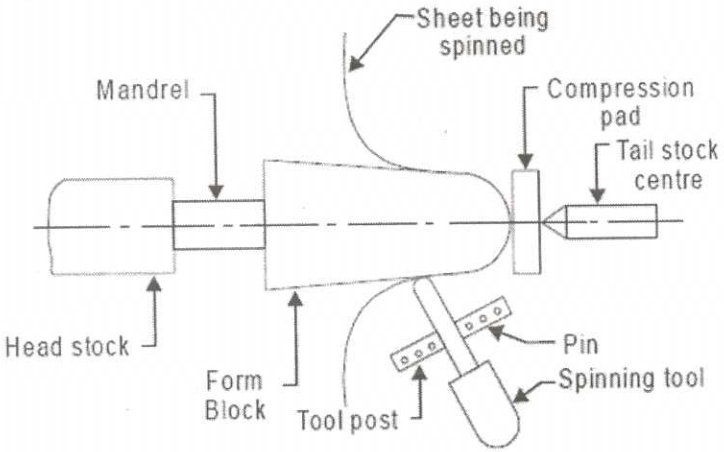
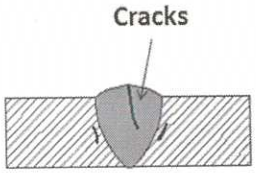


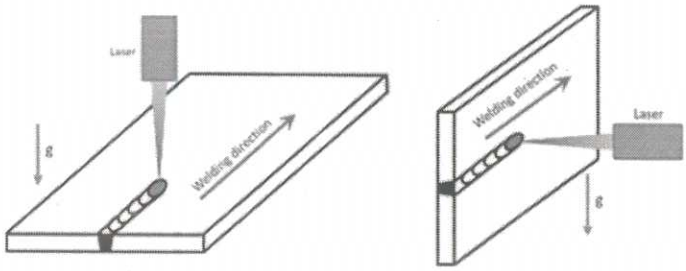
Incomplete fusion

- It occurs when the groove of the metal is not filled Completely

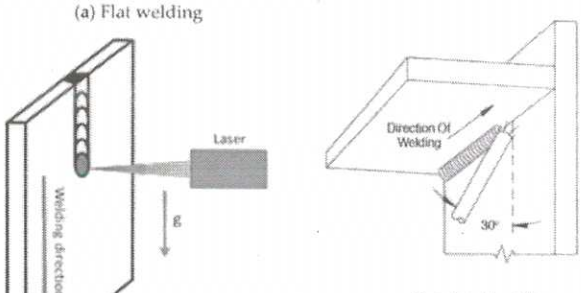
	 **Incomplete Fusion**			
III. 6	**With a neat sketch explain TIG welding process** **Tungsten inert gas arc welding** **(TIG, GTAW)**  ➢ **Tungsten Inert Gas Arc Welding (Gas Tungsten Arc Welding)** is a welding process, in which heat is generated by an electric arc struck between a tungsten non-consumable electrode and the work piece. ➢ The weld pool is shielded by an inert gas (Argon, helium, Nitrogen) protecting the molten metal from atmospheric contamination. ➢ The heat produced by the arc melts the work pieces edges and joins them. Filler rod may be used, if required. ➢ Tungsten Inert Gas Arc Welding produces a high quality weld of most of metals. Flux is not used in the process.	Fig= 4 Explanation =3	7	7
III. 7	**Explain seam welding process with a diagram**	Figure =4 Explanation =3	7	7

	Seam Welding (RSEW)  ➢ Seam Welding is a Resistance Welding (RW) process of continuous joining of overlapping sheets by passing them between two rotating electrode wheels. ➢ Heat generated by the electric current flowing through the contact area and pressure provided by the wheels are sufficient to produce a leak-tight weld.			
III. 8	**Explain different welding position in arc welding** **Flat welding** ➢ This type of welding is performed from the upper side of the joint. The face of the weld is approximately horizontal. **Horizontal welding** ➢ In horizontal welding, the weld axis is approximately horizontal	Figure =4 Explanation =3	7	7

	• **Dewaxing:** The wax inside the newly built shell is now removed. Dewaxing is done using a steam-dewaxing **autoclave or flash fire furnace.** • **Casting:** Now the desired molten metal is poured into the pre-heated mold cavity. • **Cooling**: The mold then sits to allow the molten metal to cool and solidify which then becomes the final casting. • **Shell Removal:** The shell material is then removed through processes hammer knockout, vibration, and steel grit blasting. • **Cut Off:** The finished parts are then cut free from the gating and runner system. • **Finishing**: Various finishing techniques are then employed including grinding, sand blasting and coating to achieve the final surface needed.			
III. 4	**Explain the process hot spinning with sketches**  ➢ Hot spinning is a process in which pressure and plastic flow is used to shape material. Spinning may be either hot or cold and is generally carried over a spinning lathe. ➢ shape by pressure of a blunt tool as shown in Figure. ➢ The amount of pressure of the blunt tool against the disc controls the generated heat, which helps in forming processes.	Figure =4 Explanation = 3	7	7
III. 5	**Name and explain different welding defects** **1.Crack**  ➢ This is the most unwanted defect of all the other welding defects. Welding cracks can be present at the surface, inside of the weld material or at the heat affected zones	Figure = 4 Explanation=3		



(a) Flat welding



Vertical-down welding

Over head welding

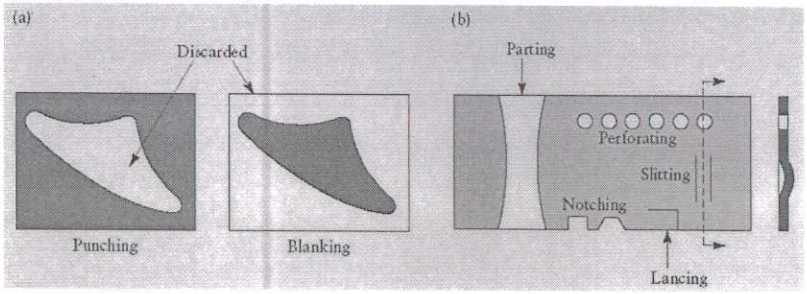
Vertical Welding

- In vertical position welding, the axis of the weld is approximately vertical.
- When welding is done on a vertical surface, the molten metal has a tendency to run downward and pile up.
- To avoid molten metal pile up normally vertical welding is carried out in down ward direction

Over head welding

- Overhead welding is performed from the underside of a joint.
- In overhead welding, the metal deposited tends to drop or sag on the plate, causing the bead to have a high crown

III. 9 **With the help of sketches explain press working operations**

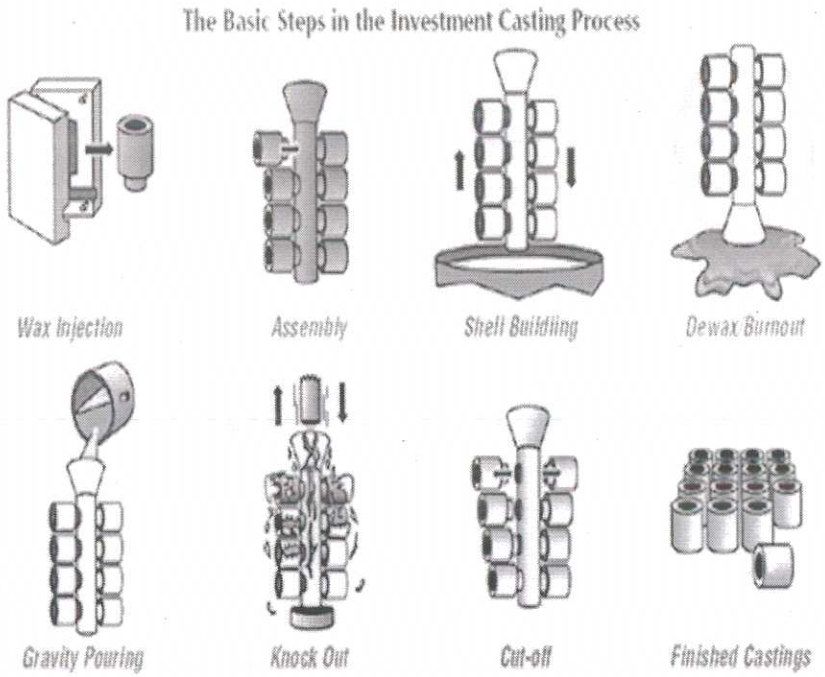


Punching (Piercing):

- It is a cutting operation by which various shaped holes are made in sheet metal.

	➢ Punching is similar to blanking except that in punching, the hole is the desired product, the material punched out to form the hole being waste. **Blanking:** ➢ Blanking is the operation of cutting a flat shape sheet metal. The article punched out is called the blank and is the required product of the operation. The hole and metal left behind is discarded as waste **Notching:** ➢ This is cutting operation by which metal pieces are cut from the edge of a sheet, strip or blank. **Perforating:** ➢ This is a process by which multiple holes which are very small and close together are cut in flat work material. **Slitting:** ➢ It refers to the operation of making incomplete holes in a work piece. **Lancing:** ➢ This is a cutting operation in which a hole is partially cut and then one side is bent down to form a sort of tab. Since no metal is actually removed, there will be no scrap. **Parting:** ➢ Parting involves cutting a sheet metal strip by a punch with two cutting edges that match the opposite sides of the blank.	Figure =3 Explanation =4	7	7

III. 10	**What are the advantages and disadvantages of forging** **Advantages:** ➢ Forging gives comparatively tougher product compare to casting. ➢ The fatigue strength and creep resistance of forge product is higher. ➢ Forge product has higher mechanical properties. ➢ Low cost operation. ➢ This process does not required special skill operator. ➢ Variety of shapes can be formed by this process. **Disadvantages:** ➢ Higher initial cost for big forging presses. ➢ Secondary finishing process required in hot forging. ➢ It cannot produce complex shapes. ➢ Size is limited due to size of press. ➢ Brittle metal cannot be forged.	Advantage = 4 marks Disadvantage = 3marks	7	7
III. 11	**Explain the different types of mouldings** **1. Floor Moulding:** ➢ The moulding done on the floor of the foundry is called floor moulding. In this method, one flask is avoided and the foundry floor itself act as a drag. ➢ Uses: Floor moulding method is used for all medium and heavy castings of metals, having a considerable depth or area **2. Bench Moulding:** ➢ The moulding done on a bench of a convenient height to the moulder, is called bench moulding. The moulder can work while standing. ➢ Uses:Bench moulding method is used for identical castings of small size for mass production. It is best suitable for non-ferrous castings and light weight castings of metals, in green sand mould. **3.Stack Moulding:**	Figure= 2mark Explanation = 5 mark	7	7

	Moisture ➢ The amount of moisture content in the molding sand varies from 2 to 8%. ➢ This amount is added to the mixture of clay and silica sand for developing bonds. ➢ This is the amount of water required to fill the pores between the particles of clay without separating them. ➢ This amount of water is held rigidly by the clay and is mainly responsible for developing the strength in the sand. **Additives** ➢ Additives are the materials generally added to the molding and core sand mixture to develop some special property in the sand. ➢ Some commonly used additives for enhancing the properties of molding and core sands are coal dust, corn flour, dextrin, sea coal, pitch, wood flour, silica flour.	Name of Constituent = 2 mark Explanation= 5 mark	7	7
III. 3	**Explain investment casting with a neat sketch**  • **Create wax pattern**: A pattern that replicates the finished part geometry is made using a wax injection die • **Wax Assembly**: Next, the wax patterns are assembled onto runners and into a finished tree which is ready to be dipped. • **Slurry Coating**: The assembly is then dipped into a high-grade ceramic slurry to build a ceramic shell around the wax tree. • **Stuccoing**: After the slurry coating is done, particles of sand are dropped onto the surface of the wet tree assembly. This helps to thicken and strengthen the layer of coating on the wax assembly surface..	Figure =4 Explanation =3	7	7

12

- Drying sand gives strength to the mould so that it used for larger castings

3. Loam sand:

- Loam sand containing up to 50 % clay.
- This sand used for moulds for making very heavy castings usually with the help of sweeps and skeleton patterns.

4.Parting sand:

- This sand used during making of the mould to ensure that
- Green sand does not stick to the pattern.
- The cope and drag parts easily separated for removing the pattern without causing any damage to the mould.
- Parting sand consists of fine grained clay free dried silica sand, sea sand or burnt sand with some parting compounds

5. Facing sand:

- Facing sand is the sand which covers the pattern all around it. The remaining box filled with ordinary floor sand.
- Facing sand forms the face of the mould and comes in direct contact with the molten metal when it poured.
- High strength and refractoriness required for this sand.
- It made of silica sand and clay without the addition of any used sand

6.Core sand:

- Core sand is the sand used for making cores. This is silica sand mixed with core oil. That is why it is also called as oil sand.
- The core oil consists of linseed oil, resin, light mineral oil with some binders.
- For larger cores, sometimes pitch / flour and water used in saving the cost.

BLUE PRINT

Mark Distribution

Module	Hr / Module	hi / ∑Hi) * 123	TYPE OF QUESTIONS							
			PART A		PART B		PART C		TOTAL	
			No of Questions	Marks	No of Questions	Marks	No of Questions	Marks	No of Questions	Marks
I	11	32	2	2	3	9	4	28	**9**	**39**
II	10	29	2	2	2	6	2	14	**6**	**22**
III	12	34	3	3	3	9	4	28	**10**	**40**
IV	10	28	2	2	2	6	2	14	**6**	**22**
Total	**43**	**123**	**9**	**9**	**10**	**30**	**12**	**84**	**31**	**123**

Cognitive Level Wise Question Analysis

Mark Distribution

Cognitive Level	% Marks	Marks	TYPE OF QUESTIONS							
			PART A		PART B		PART C		TOTAL	
			No of Questions	Marks	No of Questions	Marks	No of Questions	Marks	No of Questions	Marks
R	20	23	6	6	3	9	1	7	**11**	23
U	80	100	3	3	7	21	11	77	**20**	**100**
A	0	0	0	0	0	0	0	0	**0**	**0**
Total	**100**	**123**	**9**	**9**	**10**	**30**	**12**	**84**	**31**	**123**

page order in correct