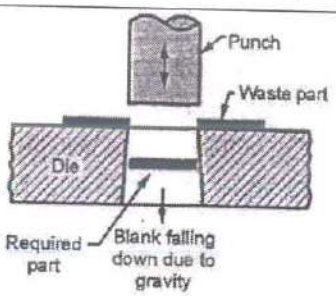
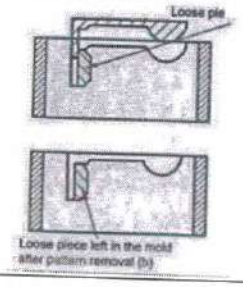
Scoring Indicators (VERSION - A)

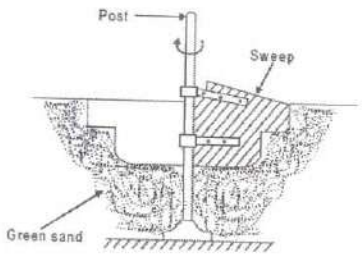
COURSE NAME : MANUFACTURING TECHNOLOGY

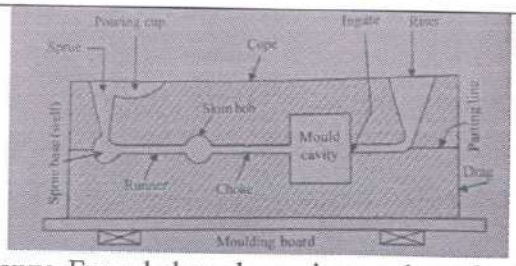
COURSE CODE : 2022 QID : 2106220018.

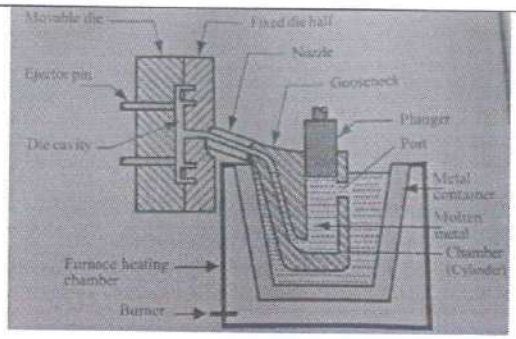
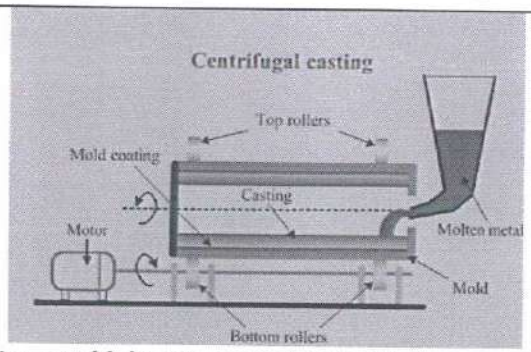
Q No	Scoring Indicators	Split score	Sub Total	Total score
	PART A			9
I. 1	Wood, Metals and alloys, Plaster, Wax, Plastics and rubber **(Mention any two)**	1	1	
I. 2	Chills	1	1	
I. 3	Direction of extrusion is opposite to the direction of motion of ram in indirect extrusion and these are in same direction in the case of direct extrusion	1	1	
I. 4	High precision parts of air crafts, turbines, cams, sewing machines, Filament of bulbs ray tubes etc. **(Any one)**	1	1	
I. 5	Solder	1	1	
I. 6	Metal pieces at the joint are heated to molten state and allowed to solidify	1	1	
I. 7	Fastening of pipe fittings, carbide tips on tools, heat exchangers, electrical parts, radiators, axles **(Any one)**	1	1	
I. 8	Used for shaping and finishing of forgings to a variety of cross sections	1	1	
I. 9	Notching	1	1	
	PART B			24
II. 1	1. The metal patterns are durable 2. Smooth surface finish. 3. Fine surface details can be given to the pattern. 4. Do not deform while in storage. 5. More accurate than wooden patterns. 6. High strength 7. They have excellent wear resistance. 8. They are far stable under different environments **(Any Three Points)**	3	3	
II. 2	**Blow holes**: Entrapped bubbles of gas existing in a casting **Scab**: Caused by the breaking down of a mould surface and the recess thus made is filled by a metal **Fins and flashes:** Thin projections of metal not intended as the part of the casting	1 1 1	3	
II. 3	1. Higher pressure and heavier equipment are needed 2. Only small sized components can be cold worked 3. Only ductile metals can be shaped through cold working		3	

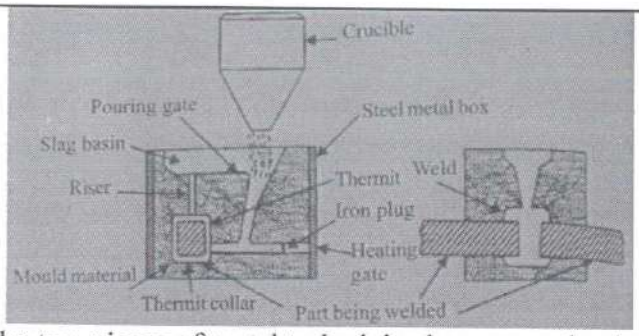
	4. Grain structure is not refined 5. Residual stresses have harmful effects on certain properties of metal **(Any three points)**	3		
II. 4	Hot rolling, Hot piercing, Hot drawing, Hot extrusion, Hot spinning	3	3	
II. 5	Sintering is a process by which the compressed metal powder is heated in a controlled atmosphere using a furnace The temperature of the furnace will be slightly below melting point of the metal powder but above the recrystallisation temperature At high temperatures the particles begin to form a strong solid-state bonding by diffusion. This results in high strength, high density, high ductility and other properties	3	3	
II. 6	1.No flux required 2.Flow of inert gas keeps air away from molten metal 3.Minimum distortion of metal near the weld 4.Non consumable electrodes are used 5.Stronger, more ductile and more corrosion resistant than ordinary shielded arc welding **(Any three points)**	3	3	
II. 7	 Blanking is a cutting operation of a flat metal sheet and the article punched out is the required product and is known as blank	$1\frac{1}{2}$ (Fig.) $1\frac{1}{2}$	3	
II. 8	**Hardie hole:** square hole which is used for securing square shank tools such as hardies, swages and fullers **Pritchel hole:** round hole used for bending rods of small diameter and as die for punching operations	$1\frac{1}{2}$ $1\frac{1}{2}$	3	
II.9	**Bolster Plate:** Lower part of the die set. All the pressure of operations and components are acted upon the bolster plate **Stripper plate:** Touches the sheet metal and holds it firmly during blanking or cutting operations	$1\frac{1}{2}$ $1\frac{1}{2}$	3	

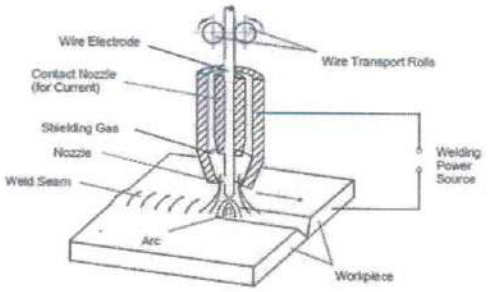
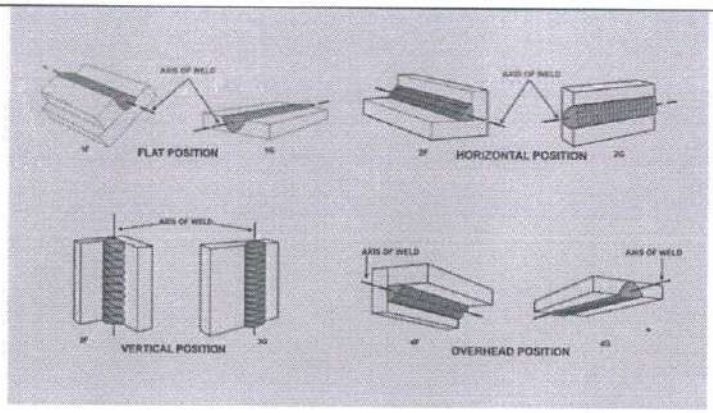
II.10	1. Simple to operate 2. Suitable for Low production volume 3. Inexpensive tooling and equipment 4. Wide range of workpiece size can be used 5. Continuous grain flow 6. Reduced chance of voids **(Any three points)**	3	3	
	PART C			42
III. 1	**Strength:** Capacity to withstand destruction under the action of external loads **Hardness:** Ability to resist wear, Scratching, abrasion, Indentation or penetration by harder bodies **Toughness:** Measure of the amount of energy a material can absorb before fracture or failure **Resilience:** Ability of the material to absorb enrgy elastically **Brittleness:** Property of breaking without much permanent distortion and appreciable deformation **Creep:** Slow and continuous deformation of a material under steady load **Fatigue strength:** Maximum value of alternating or reversible stress that can be applied for indefinitely large number of times without causing failure. **Stiffness:** Resistance of a material to elastic deformation or deflection **Ductility:** Ability of a material to be drawn from a large section to small section without rupture **Malleability:** Ability to be flattened into thin sheets without cracking **Elasticity:** Ability to regain its original size and shape after the removal of load **Plasticity:** Ability to undergo some degree of permanent deformation without rupture (Any 7)	7	7	7
III. 2	**(a)Loose piece pattern** 	2 (Fig.)		7

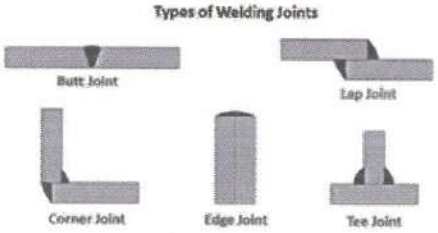
	In these types of patterns, some single piece patterns are made to have loose pieces in order to enable their easy withdrawal from the mould. After the mould is finished, the pattern is withdrawn, leaving the pieces in the sand. These pieces are later withdrawn separately through the cavity formed by the pattern as shown in the diagram.	$1\frac{1}{2}$		
	(b) Sweep pattern  	2 (Fig.)		
	This is preferred for producing large castings of circular sections and symmetrical shapes It is a form made on a wooden board which sweeps the shape of the casting into the sand all around the circumference • Sweep pattern rotates about the post • Once the mould is ready the sweep pattern and the post can be removed • This saves a lot of time and labour.	$1\frac{1}{2}$	7	
III. 3	1.**Green sand:** The green sand is the natural sand containing sufficient moisture in it. It is mixture of silica and 15 to 30% clay with about 8% water. The green sand is used only for simple and rough casting products. It is used for both ferrous and non-ferrous metals. **2.Dry sand:** When the moisture is removed from green sand, it is known as dry sand. The mould produced by dry sand has greater strength, rigidity and thermal stability. This sand is used for large and heavy castings. **3.Loam sand:** Loam sand is a mixture of 50 percent sand and 50 percent clay. Water is added in sufficient amount. It is used for large and heavy moulds e.g., turbine parts, hoppers etc. **4. Facing sand:** Sand that is used before pouring the molten			7

	metal, on the surface is called facing sand. It is specially prepared sand from silica sand and clay. It is sprinkled on the inner surface of the mold cavity to give a better surface finish to the castings. **5. Backing or Floor Sand:** The backing sand is old and repeatedly used sand of black colour. It is used to back up the facing sand and to fill the whole volume of the box. This sand is accumulated on the floor after casting and hence also known as floor sand. **6.System sand:** The sand employed in mechanical heavy castings and has high strength, permeability and refractoriness, is known as system sand **7.Parting sand:** Used to prevent the adhering of two halves of mould surfaces in each moulding box when they are separated. Consists of dried silica sand, sea sand and burnt sand. **8.Core sand:** A sand used for making cores is known as core sand. It is silica sand mixed with core oil and other binding materials It has remarkable compressive strength	7	7	
III. 4	 **Pouring cup:** Funnel shaped opening made at the top of the sprue in cope. Used to prevent the splash and the turbulence and to prevent the entry of dirt or slag in to the sprue. **Sprue: Passage** which connects pouring basin with the runner or gate. Made tapered downwards to avoid the aspiration of air during the metal flow. **Sprue base (sprue well)**: Acts as a reservoir for molten metal and to trap loose sand and undesirable particles from entering the mould. It is Usually made in the drag **Skim bob:** Enlargement in the runner to trap heavier and lighter impurities such as dross and eroded sand. **Runner:** It is a passage provided in large castings through	3 (Fig.)		7

	which the molten metal is carried from sprue base. **Gate:** A gate is a passage through which the molten metal flows from the runner to mould cavity. **Riser:** A passage made in the cope through which the molten metal rises after mould is filled	4	7	
III. 5	 With the plunger in the up position the molten metal flows by gravity through the intake port into the submerged hot chamber. When the plunger is pushed downward by the power cylinder, it shuts off the intake port. Then, with further downward movement of plunger, the molten metal is forced through the gooseneck passage and the nozzle into the die cavity. The pressure of molten metal coming out from the nozzle is about 70 to 140 bar. The pressure is maintained after the cavity is full of molten metal, for a specific time to solidify the casting completely. Then the two halves of the die are separated, casting is taken out and the cycle is repeated.	$3\frac{1}{2}$ (Fig.) $3\frac{1}{2}$	7	7
III. 6	 1. The mould is set up and rotated along a vertical or horizontal axis. 2. The mould is coated with a refractory coating. 3. Molten metal is poured into the rotating mould 4. The metal poured in will then distribute itself over the	2 (Fig.)		7

	rotating wall. 5. During cooling lower density impurities will tend to rise towards the center of rotation. 6. After the part has solidified, it is removed and finished **Applications:** For manufacturing Pipes, Tubes, Bushings, and Rings.	4 1	7	
III. 7	 1. The two pieces of metal to be joined are properly cleaned and the edge is prepared. 2. Then the wax is poured into the joint so that a wax pattern is formed where the weld is to be obtained. 3.A moulding box is kept around the joint and refractory sand is packed carefully around the wax pattern as shown in fig. providing the necessary pouring basin, sprue, riser and gating system. 4. A gas flame is introduced through the heating gate, which preheats the parts to be welded and melts the wax pattern. 5.The flame is then removed and heating gate is plugged. 6.Thermit mixture (Finely divided aluminium and iron oxide) in the crucible is ignited which results in the formation of molten iron and slag of aluminium oxide. 7.Molten iron is then poured into the mould which fuses with the part to be joined.	3 (Fig) 4	7	7

III. 8	Principle of MIG Welding  1. First, a high voltage current is changed into DC current supply with high current at low voltage. This current pass though welding electrode. 2. A consumable wire is used as electrode. The electrode is connected to the negative terminal and work piece from positive terminal. 3. A fine intense arc will generate between electrode and work piece due to power supply. This arc used to produce heat which melts the electrode and the base metal. Mostly electrode is made by the base metal for making uniform joint. 4. This arc is well shielded by shielding gases. These gases protect the weld form other reactive gases which can damage the strength of welding joint. 5. This electrode travels continuously on welding area for making proper weld joint	3 (Fig.) 4	7	7
III. 9	 **Flat position:** This type of welding is performed from the upper side of the joint. The face of the weld is approximately horizontal	3 (Fig.) 1		7

	Horizontal position: Axis of the weld lies in horizontal plane and its face in vertical plane **Vertical Position:** Axis of the weld remains either vertical or at an inclination of less than 45^0 with the vertical plane. Welding commences at bottom and proceeds upwards **Overhead position:** It is the reverse of Flat position. Welding is done from the underside of the joint. Work pieces remain over head of the welder.	1 1 1	7	
III. 10	**1.Butt joint:** A butt joint, or butt weld, is a joint where two pieces of metal are placed together in the same plane, and the side of each metal is joined by welding. Used in the fabrication of structures and piping systems **2.Lap joint:** Formed when two pieces of metal are placed in an overlapping pattern on top of each other. They are most commonly used to joint two pieces with differing thicknesses together. Welds can be made on one or both sides. **3.Corner joint:** Used to join edges of two plates which are placed at right angles to each other. Used for the construction of boxes, frames, tanks etc. **4.T-joint:** Formed when two pieces intersect at a 90° angle. Widely used in thin-walled components upto 3mm without edge preparation **5.Edge joint:** The joint formed by welding the edges of two parts together are called edge joint. This joint is used where the edges of two sheets are adjacent and are approximately parallel planes at the point of welding. In this joint the weld does not penetrate completely the thickness of joint, so it cannot be used in stress and pressure application.  	1 1 1 1 1 2 (Fig.)	7	7

III. 11	**Advantages of forging:** 1. Rapid duplication of components 2. Improves grain structure of metals and hence their mechanical properties 3. Forging enables the components to with stand heavy loads 4. Gives superior surface finish and machining qualities 5. Gives better resistance to shock 6. Gives high reliability to the workpiece due to intense working 7. Close tolerance can be maintained **Disadvantages:** 1. Initial cost of dies and their maintenance cost are high 2. Forging operation is limited to simple shapes 3. Skilled labour is needed 4. In hot forging poor surface finish is obtained due to scaling.	4 3	7	7
III. 12	**Specification of press:** **1.Press stroke:** Distance between up and down positions of ram **2.Shut height**: Distance between top of bed to the bottom of ram **3.Die space:** Available area for mounting punch and die components in the press **4.Press adjustment:** Capability of the press to adjust the length of stroke as per need **5.No. of press strokes /minute:** Indicates the ram speed to operate upon work piece .i.e no.of strokes/minute **6.Press size/Press capacity (tonnage):** Size of press is described in terms of the maximum force its ram can exert on the workpiece without affecting the structural strength of the press	1 1 1 1 1 2	7	7