



MUTHAYAMMAL ENGINEERING COLLEGE

(An Autonomous Institution)

(Approved by AICTE, New Delhi, Accredited by NAAC & Affiliated to Anna University)
Rasipuram - 637 408, Namakkal Dist., Tamil Nadu.



MUST KNOW CONCEPTS

MKC

MECH

2021-22

Course Code & Course Name : 21GES15 / MANUFACTURING PROCESSES

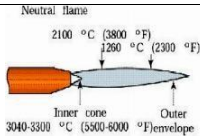
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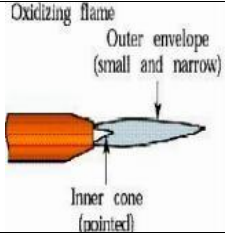
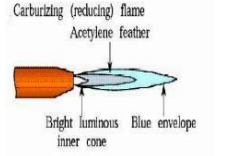
S.No	Term	Notation (Symbol)	Concept/Definition/Meaning/Units/Equation/Expression	Units
UNIT I CASTING PROCESSES				
1.	Pattern		The model of the required casting made in wood, metal or plastics	
2.	Casting		Producing metal parts by pouring molten metal into the mould cavity of the required shape and allowing the metal to solidify	
3.	Four Types Of Patterns		Solid pattern or single-piece pattern. Split pattern. Loose piece pattern. Match plate pattern.	
4.	Any four casting defects		Blow holes, Honey comb, Porosity, Misrun	
5.	Function of runner		It is used to make a sprue a hole in the cope. It receives the molten metal from the pouring basin and passes to the cavity	
6.	Function of riser		i) It supplies excess molten metal to the solidifying casting. ii) It allows the escape of air.	
7.	Core print		A core print is an extra projection on the pattern to support the core	
8.	Flask		A metal or wood frame, without fixed top or bottom, in which the mould is formed	
9.	Drag		Lower moulding flask	
10.	Cope		Upper moulding flask	
11.	Cheek		Intermediate moulding flask used in three piece moulding	
12.	Parting line		This is the dividing line between the two moulding flasks that makes up the mould	
13.	Facing sand		The small amount of carbonaceous material sprinkled on the inner surface of the mould cavity to give a better surface finish to the castings	

14.	Core		A separate part of the mould, made of sand and generally baked, which is used to create openings and various shaped cavities in the castings	
15.	Pouring basin		A small funnel shaped cavity at the top of the mould into which the molten metal is poured	
16.	Sprue		The passage through which the molten metal, from the pouring basin, reaches the mould cavity	
17.	Gate		A channel through which the molten metal enters the mould cavity	
18.	Basic steps in making sand castings		(i) Pattern making, (ii) Core making, (iii) Moulding, (iv) Melting and pouring, (v) Cleaning	
19.	Pattern allowance		The difference that is made in the shape and size of the pattern compared to the final product is called as pattern allowance	
20.	Types of pattern allowance		Machining allowance, Rapping allowance, Shrinkage allowance, Draft allowance, Distortion allowance	
21.	Pattern materials		Wood, metal, plastics, plaster and synthetic materials	
22.	Applications of centrifugal casting		I. Water pipes ii. Bush bearings iii. Brake drums iv. Gun barrels	
23.	Permeability		One of the property of moulding sand by which it allows the hot air to escape through it	
24.	Refractoriness		Refractoriness is the property of moulding sand to withstand the high temperature	
25.	Advantages of investment casting		<ul style="list-style-type: none"> • Parts of great complexity and intricacy can be cast • Close dimensional control and good surface finish • Wax can usually be recovered for reuse 	

UNIT II: FABRICATION PROCESSES

26.	Welding		A metal joining process in which two or more parts are joined or coalesced at their contacting surfaces by suitable application of heat or/and pressure	
27.	Fusion welding		Heat is applied to melt the base metals. In many fusion welding processes, a filler metal is added to the molten pool during welding to facilitate the process and provide strength to the welded joint	
28.	Type of fusion welding		Arc welding, Resistance welding, Oxyfuel gas welding, electron beam	

			welding, laser welding	
29.	Arc welding		Electric arc is used to produce heat energy and the base metal is heated	
30.	Resistance welding		Electric resistance is generated to the flow of current that generates heat energy between two contacting surfaces that are held in pressure	
31.	Gas welding		Oxyfuel gas welding is a welding operation in which heat is generated by a hot flame generated mixture gas of oxygen and acetylene. This heat is used to melt base material and filler material, if used	
32.	Solid state welding		Joining is done by coalescence resulting from application of pressure only or a combination of heat and pressure	
33.	Diffusion welding		Two part surfaces are held together under pressure at elevated temperature and the parts join by solid state diffusion	
34.	Friction welding/Stir welding		Joining occurs by the heat of friction and plastic deformation between two surfaces	
35.	Ultrasonic welding		Moderate pressure is applied between the two parts and an oscillating motion at ultrasonic frequencies is used in a direction parallel to the contacting surfaces	
36.	Flux		Used mainly to protect the weld region from formation of oxides and other unwanted contaminants	
37.	Welding defects		Porosity, Shrinkage voids, Solid inclusions, Incomplete fusion	
38.	Brazing		It is a joining process in which a filler metal is melted and distributed by capillary action between the contact surfaces of the metal parts being joined	
39.	Soldering		A joining process in which a filler metal with melting point not exceeding 450°C is melted and distributed by capillary action	
40.	Solder		Alloys of Tin and Lead	
41.	Causes for the porosity		<ul style="list-style-type: none"> • Presence of gases in the metal • Moisture in the flux • Rust on the welded edges or filler material 	
42.	Neutral flame	 <p>The diagram shows a neutral flame with an inner cone and an outer envelope. The inner cone has a temperature of 2100 °C (3800 °F). The outer envelope has a temperature of 2800 °C (5000 °F). The inner cone is labeled 'Inner cone' and the outer envelope is labeled 'Outer envelope'. The temperatures are also given in Fahrenheit: 3800 °F for the inner cone and 5000 °F for the outer envelope.</p>	Equal proportions of oxygen and acetylene	

43.	Oxidizing flame	 <p>Oxidizing flame Outer envelope (small and narrow) Inner cone (pointed)</p>	Oxygen High, Acetylene Low	
44.	Carburizing flame	 <p>Carburizing (reducing) flame Acetylene feather Bright luminous inner cone Blue envelope</p>	Acetylene High, Oxygen Low	
45.	Electrode		A solid rod in arc welding process to produce electric arc by passing the current through the work piece and electrode	
46.	Types of Electrode		(i) Consumable electrodes <ul style="list-style-type: none"> • Bare electrodes • Lightly coated electrodes • Heavily coated electrodes (ii) Non -Consumable electrodes	
47.	Weld interface		A narrow boundary that separates the fusion zone from heat affected zone	
48.	Fusion zone		It consists of a mixture of filler metal and base metal that have completely melted	
49.	Heat affected zone		This zone is between weld interface and base material. Which affected by temperature below melting point, but sufficient enough to change the microstructure and hence the mechanical properties.	
50.	Applications of Shielded metal arc welding		Ship building, construction, machine structures etc	

UNIT III: BULK DEFORMATION PROCESSES

51.	Cold Working		Metals are plastically deformed below their recrystallization temperature.	
52.	Hot Working		Metals are plastically deformed above their recrystallization temperature.	
53.	Rolling		Rolling is metal forming process	
54.	Drawing		Drawing is frequently used in Commercial illustration, animation, architecture, engineering and technical drawing.	

55.	Forging		Shaping of metal by using compressive forces.	
56.	Extrusion		Extrusion is a process used to create objects of a fixed cross-sectional profile. The Materials include metals, polymers, ceramics, concrete, modeling clay.	
57.	Extrusion Defects		Mould design, material selection and processing.	
58.	Drawing of rods		Tensile forces to stretch metal or glass.	
59.	Swaging		Increase the diameter of tubes/rods.	
60.	Buckling Defects		Due to high Compressive stress.	
61.	Types of shape rolling		A) ring rolling B) thread rollinG	
62.	Two advantages of cold extrusion		I) high speed of operation Ii) product uniformity Iii) no wastage	
63.	Fullering		The metal along the length of the workpiece is done by working separate sections	
64.	Upsetting		A process through which the cross-section of a metal piece is increased with a corresponding increase in its length	
65.	Various forming process		I) bulk deformation process Ii) sheet metal working processes	
66.	Types of defects in parts produced by drawing		I) Surface defects Ii) Internal structural defects	
67.	Drop forging		When the rolls are released, the ram will fall down and produce a working stroke, then it is said to be drop forging	
68.	Angle of bite		The angle subtended by the centre of the roll with radial force in rolling operations is called angle of bite or angle of contact	
69.	Extrusion ratio		$\text{Extrusion ratio} = \frac{\text{cross section area of billet}}{\text{cross section area of product}}$	

70.	Defects of forging		<ul style="list-style-type: none"> • Defective metal structure • Presence of cold shuts or cracks at corners or surfaces: • Incomplete components: • Mismatched forging 	
71.	Recrystallisation temperature		The minimum temperature at which completes recrystallisation of cold worked metal takes place within a specified time is known as recrystallisation temperature	
72.	Skew rolling		The rolls are powered and the workpiece is in due to frictional force between metal and surface	
73.	Seamless tubes		Seamless tubing is a popular and economical raw stock for machining because it saves Drilling and boring of part	
74.	Plastic deformation		Stresses beyond yield strength of the workpiece material is required	
75.	Coining		Simple application of closed die forging in which fine details in the die impression are impressed into the top or/and bottom surfaces of the work piece.	

UNIT IV: METAL FORMING PROCESSES

76.	Metal stamping		Convert flat metal sheets into specific shapes.	
77.	Forming		Shape of partly finished products.	
78.	Bending		V-shape, U-shape, or channel shape.	
79.	Deep drawing		Depth of the drawn part exceeds its diameter.	
80.	Blanking		Cutting the flat shape from the Sheet metal.	
81.	Embossing		Matched male and female roller dies.	
82.	Notching		Metal pieces are cut from the edge of a sheet, strip or blank.	

83.	Sheet metal		To form a various shape along 3mm to 5mm thickness with simple hand tools and machine.	
84.	Press forming		It is a forming technology where a pressing force is applied to a material.	
85.	Defects of sheet metal working		Wrinkling in the flange surface, scratches, Tearing.	
86.	Punching		Cutting operation with the help of which various shaped holes are produced in The sheet metal	
87.	Super plastic forming operation		Superplastic forming is a metalworking process for forming sheet metal. It works upon the theory of superplasticity, which means that a material can elongate beyond 100% of its original size.	
88.	Clearance		This difference in dimensions between die and punch(making Members of a die set) is known as clearance	
89.	Explosive forming		Explosive forming makes use of the pressure wave generated by an explosion in a fluid, for applying the pressure against the wall of the die	
90.	Types of explosive forming		According to the placement of the explosive (charge) the operations are divided in two categories: 1. Stand off operation 2. Contact operation.	
91.	Hydro forming types		1.hydro - mechanical forming 2. Electro - hydraulic forming	
92.	Hydro - mechanical forming		The blank is placed over the punch whose shape is similar to inner of the find workpiece.	
93.	Electro - hydraulic forming		This method involves the conversion of electrical energy into mechanical energy in a liquid medium. Electric spark in a liquid produces shock waves and Pressures which can be used for metal forming	
94.	Rubber pad forming		It is metal working process where sheet metal is pressed between a die and rubber block.	
95.	Shot peening		Shot peening process consists of throwing a blast of metal shots on to the surface of a Component.	

96.	Strech forming		Strech forming is used for forming smoothly contoured parts or those having double curvatures on the same curved surface out of large and thin sheets of metal	
97.	Lancing		In this operation, there is a cutting of the sheet metal through a small length and Bending this small cut portion downwards	
98.	Shearing		It is process of cutting a straight line across a strip, sheet or bar shearing process has Three important stages; 1. Plastic deformation 2. Fracture (Crack propagation) 3. Shear	
99.	Hand tools used in sheets metal working		Hammers mallet . Swages tongs punches and shears stakes tri square and scribers wing compass	
100	Shaving		It is almost similar to trimming, but only small amount of material is removed During the operation as compared to trimming	

UNIT V: PLASTIC AND COMPOSITE MATERIAL PROCESSES

101	Plastics process		Plastics are made from synthetic resins by applying heat and pressure.	
102	Injection moulding		Producing parts by injecting molten material into a mould.	
103	Thermo forming		Plastic sheet is heated to a pliable forming temperature.	
104	Advantages of plastics		Plastics is versatile, hygenic, lightweight, flexible and highly durable.	
105	Thermo plastics		The material becomes more soft when heated and hard when cooled.	
106	Composite material		The material made from two or more constituent materials with physical or chemical properties.	
107	Extrusion		A material is pushed through a die of the desired cross-section.	
108	Types of plastics		Polyethylene, Polypropylene and Polyvinylchloride.	

109	Polymerization		Chemical reaction in which two or more molecules combine to form larger molecules.	
110	Plunger		It is a part of a device or mechanism that works with thrusting movement.	
111	Material for processing of plastics		(1) Filler material (2) Plasticizers (3) Stabilizers (4) colorants (5) Flame retardants (6) Reinforcements (7) Lubricants.	
112	Film blowing		Process a heated doughy paste of plastic compound is passed through a series of hot rollers, where it is squeezed into the form of thin sheet of uniform thickness	
113	Compression moulding		The main objective is to melt the material due to compression and moulding into the desired shapes	
114	Parison		Blow moulding consists of extrusion of the heated tubular plastic piece called as parison which is transferred to the two piece mold	
115	Degree of polymerization		The number of repetitive units present in one molecule of a polymer	
116	Rotational moulding		A measured amount of polymer powder is placed in a thin walled metal mould and the mould is closed. Then the mould is rotated about two mutually perpendicular axes as it is heated	
117	Monomer		It is a small molecule that consists of a single unit / building block	
118	Polymer		It is macromolecule that is formed by repeated linking of many monomers	
119	Three methods of polymerisation		(1) Addition Polymerisation (2) Copolymerisation (3) Condensation polymerisation	
120	Usage of stabilizers		(1) They prevent deterioration of polymer due to environmental effects. (2) Also prevent deterioration due to ultraviolet radiation. (3) Help to extend the life of the finished product.	
121	Gate moulding		This is the process of forming articles in a closed mould, where the fluid plastic material is conveyed into the mould cavity under pressure from outside of the mould	

122	Polythene		Polythene is a tough, light flexible synthetic resin made by polymerizing ethylene, chiefly used for plastic bags, food containers, and other packaging	
123	Types of compression moulds		1.Flash type 2.positive type 3.semipositive type	
124	Common thermosetting plastics		Polyester, polyurethanes, vulcanized rubber, Bakelite, melamine	
125	Polyaddition		Polyaddition is an addition reaction, where many monomers bond together via rearrangement of bonds without the loss of any atom or molecule	

QUESTIONS FOR PLACEMENT TRAINING

126	Current used in TIG welding		Both A.C. and D.C	
127	Swing over carriage is		The maximum diameter of workpiece that can be rotated over lathe saddle	
128	In cold working process, Chances of crack propagation are		More	
129	When the tool of centre lathe moves perpendicular to the axis of rotation, The operation is called as		Facing	
130	Plasticizers added with polymers for		Improving flexibility and to reduce the temperature and pressure required for moulding of plastics	
131	Arc welding suitable for joining non-ferrous metals is		D.C. Arc welding	
132	The characteristic of material that is used in forging process is		Characteristics of plasticity of material	
133	Joining medium in brazing operation		Copper-zinc alloy	
134	An example of fusion welding		Atomic hydrogen welding	
135	The volume of metal that enters the rolling stand will		Be same after rolling process	
136	The plastic materials contain strong cross linkings in their		Thermosetting materials	

	molecular structure are			
137	Thermosetting materials are		The plastics which require heat and pressure to mould them into shape	
138	Soldering is a process ---		Of joining two pieces of metal with a different fusible metal applied in a molten state	
139	The most common cutting method of roll forming is		Post-cutting	
140	Spacers are used in roll forming machines ----		To fix the rolls in exact position	
141	Type of sand used in shell moulding		Dry and fine sand	
142	Another name of Gravity Die Casting is		Permanent mould casting	
143	Centrifugal casting method is usually used to make		Hollow pipes	
144	Pressure range for low pressure die casting is		0.3-1.5 bars	
145	Cupola furnace is made up of		Cast iron	
146	Flux used in Brazing		Fluorides, Chlorides and Borates	
147	Flux used in Soldering		Tin alloy and Lead alloy	
148	Thermit welding is defined as		Heat generated by Exothermic chemical reaction between components of the thermit is used for welding	
149	Arc welding Equipments		Generator, Electrode, Two cables, Gloves and Protective shield.	
150.	Gas welding gases are		Acetylene, Hydrogen, Propane and Butane	