

JEPPIAAR ENGINEERING COLLEGE

Jeppiaar Nagar, Rajiv Gandhi Salai – 600 119

DEPARTMENT OF
MECHANICAL ENGINEERING

QUESTION BANK



III SEMESTER

ME8351 – Manufacturing Technology-I

Regulation – 2017



JEPPIAAR ENGINEERING COLLEGE

Jeppiaar Nagar, Rajiv Gandhi Salai – 600 119
DEPARTMENT OF MECHANICAL ENGINEERING

QUESTION BANK

SUBJECT : ME8351 MANUFACTURING TECHNOLOGY-I

YEAR /SEM: II /III

UNIT- I METAL CASTING PROCESSES				
<p>Sand Casting : Sand Mould – Type of patterns - Pattern Materials – Pattern allowances –Moulding sand Properties and testing – Cores –Types and applications – Moulding machines– Types and applications; Melting furnaces : Blast and Cupola Furnaces; Principle of special casting processes : Shell - investment – Ceramic mould – Pressure die casting - Centrifugal Casting - CO2 process – Stir casting; Defects in Sand casting</p>				
PART – A				
CO Mapping : C204.1				
Q.No	Questions	BT Level	Competence	PO
1	State any four types of patterns.	BTL-2	Understanding	PO3,PO12
2	What are chaplets?	BTL-1	Remembering	PO1
3	Define casting.	BTL-1	Remembering	PO1,PO5,PO7
4	Mention any two advantages and disadvantages of die casting.	BTL-2	Understanding	PO1,PO7
5	Write the requirements of good pattern.	BTL-2	Understanding	PO1, PO7
6	What is core venting?	BTL-1	Remembering	PO3
7	What function of core?	BTL-1	Remembering	PO1
8	Which process is called lost waxing method? Why?	BTL-2	Understanding	PO1,PO7
9	What is the function of core print?	BTL-2	Understanding	PO1
10	What are the advantages and applications of ceramic moulds?	BTL-2	Understanding	PO1,PO7
11	What are the pattern materials?	BTL-1	Remembering	PO1,PO3
12	Explain the term fettling.	BTL-1	Remembering	PO1,PO12
13	Name the steps involved in making a casting.	BTL-2	Understanding	PO1,PO5
14	What are the applications of casting?	BTL-2	Understanding	PO1,PO12
15	Define pattern.	BTL-1	Remembering	PO1
16	List the allowances of pattern.	BTL-2	Understanding	PO1,PO3
17	What are the factors on which amount of machining depends?	BTL-2	Understanding	PO3
18	Why is a taper allowance used ?	BTL-2	Understanding	PO1
19	What is meant by grain fineness number?	BTL-1	Remembering	PO1,PO3
20	How do you eliminate warpage ?	BTL-4	Analyzing	PO5
21	Write the significance of loose moulding.	BTL-2	Understanding	PO1

22	What are the types of moulding sand?	BTL-2	Understanding	PO12
23	Why is synthetic sand better than natural sand?	BTL-2	Understanding	PO1
24	Name the different types of special sand.	BTL-2	Understanding	PO1,PO7
25	Define permeability.	BTL-1	Remembering	PO1
26	Define Muller.	BTL-1	Remembering	PO1
27	Name various methods of sand testing.	BTL-2	Understanding	PO1,PO4
28	Name the factors affecting permeability test	BTL-2	Understanding	PO4
29	Define mould and loam moulding.	BTL-1	Remembering	PO1,PO4
30	Explain in short shell moulding.	BTL-1	Remembering	PO1
PART – B & C				
1	How are the patterns classified? Describe any two types with sketches and state the uses of each of the. (AU-Nov/Dec 2016)	BTL-2	Understanding	PO1
2	Enumerate the casting defects and suggest suitable remedies. (AU-Nov/Dec 2016)	BTL-2	Understanding	PO1,PO4
3	Explain the properties required for moulding sand? Explain the preparation of moulding sand process. (April/May 2015),(AU-Nov/Dec 2016)	BTL-2	Understanding	PO1
4	Explain any one type of centrifugal casting. Name any five casting defects and explain the remedies. (April/May 2015)	BTL-2	Understanding	PO1,PO3
5	What are the pattern making allowances and briefly explain them. (Au-May/June 2006,07)	BTL-2	Understanding	PO1
6	How green sand mould is prepared? (AU-Nov/Dec 2008)	BTL-2	Understanding	PO1,PO4
7	Explain the properties of moulding sand. (Au-April/May 2008)	BTL-2	Understanding	PO1
8	Explain the properties of pattern. (Au Nov /Dec 2012)	BTL-2	Understanding	PO1,PO3
9	Briefly explain the carbon dioxide CO ₂ moulding process and state two important merits and demerits. (Au-May/June 2006)	BTL-2	Understanding	PO3
10	Explain the Centrifugal casting process Au-May/June 2007)	BTL-2	Understanding	PO1
11	List any eight casting defects, their causes and remedies (Au-April/May 2007,2008)	BTL-2	Understanding	PO1,PO4
12	Explain the Ceramic mould casting process	BTL-2	Understanding	PO7,PO5
13	Give the sequence of step in pressure die casting process. (AU-Nov/Dec 2008)	BTL-2	Understanding	PO3,PO5
14	Briefly explain the different methods for inspection of casting. (AU-Nov/Dec 2008)	BTL-2	Understanding	PO4,PO12
15	Describe the operation of a cupola furnace for melting cast iron. (AU-Nov/Dec 2009)	BTL-2	Understanding	PO3,PO4

UNIT- II JOINING PROCESSES

Operating principle, basic equipment, merits and applications of: Fusion welding processes: Gas welding - Types – Flame characteristics; Manual metal arc welding – Gas Tungsten arc welding - Gas metal arc welding – Submerged arc welding – Electro slag welding; **Operating principle and applications of:** Resistance welding - Plasma arc welding – Thermit welding – Electron beam welding – Friction welding and Friction Stir Welding; Brazing and soldering; **Weld defects:** types, causes and cure.

PART – A

CO Mapping : C204.2

Q.No	Questions	BT Level	Competence	PO
1	List out any four arc welding equipment.	BTL-2	Understanding	PO1,PO12
2	What are the special features of friction welding?	BTL-2	Understanding	PO3,PO12
3	Define resistance welding process.	BTL-1	Remembering	PO1
4	What is weld porosity? How is it caused?	BTL-1	Remembering	PO1,PO4
5	How can slag inclusions in welding be an of small hvoided?	BTL-2	Understanding	PO1
6	How does brazing differ from braze welding?	BTL-2	Understanding	PO4
7	Why is flux coated on filler rods?	BTL-2	Understanding	PO3
8	What is the application of carburizing flame?	BTL-2	Understanding	PO1,PO4
9	What are the diameter and length of the electrodes available in the market?	BTL-2	Understanding	PO4
10	Define weldability.	BTL-1	Remembering	PO1
11	State requirement of a good weldability.	BTL-2	Understanding	PO1,PO3
12	How is welding classified?	BTL-2	Understanding	PO12
13	Name the types of flames.	BTL-2	Understanding	PO1
14	Where is oxidizing flame used?	BTL-2	Understanding	PO4
15	Explain the function of flux in welding.	BTL-1	Remembering	PO1
16	Give the applications of gas welding.	BTL-2	Understanding	PO1,PO12
17	What is arc welding?	BTL-1	Remembering	PO1,PO12
18	Define arc length and arc crater.	BTL-1	Remembering	PO1
19	Define SMAW.	BTL-1	Remembering	PO1
20	What is submerged arc welding?	BTL-2	Understanding	PO1,PO12
21	Explain in short plasma arc welding.	BTL-1	Remembering	PO5
22	Write about special feature of flux cored welding.	BTL-2	Understanding	PO7
23	What are the factors affecting resistance welding?	BTL-2	Understanding	PO3
24	What is adhesive bonding?	BTL-1	Remembering	PO1
25	Explain thermoplastic adhesives.	BTL-1	Remembering	PO1,PO12
26	Explain thermosetting adhesives.	BTL-1	Remembering	PO1,PO12
27	What is brazing?	BTL-1	Remembering	PO1
28	What is thermit welding?	BTL-1	Remembering	PO1
29	What do you mean by bronze welding?	BTL-1	Remembering	PO1,PO4
30	Name different defects in weld	BTL-2	Understanding	PO4
PART – B & C				
1	What is a soldering flux? What different types of soldering fluxes are used? (Nov/Dec2016)	BTL-2	Understanding	PO1,PO4
2	Explain the spot welding process (May 2006) Explain the Arc welding process and its positions (May 2014, 2015)	BTL-2	Understanding	PO1,PO3
2	Explain the submerged arc welding process (May 2006, 2007, 2013, 2015)	BTL-2	Understanding	PO1,PO3
3	Explain the gas (Oxy Acetylene) welding process (Nov 2012, May 2010, 2015)	BTL-2	Understanding	PO3,PO5
4	Explain the electron beam welding process with a neat sketch and the merits, limitations and applications. (Nov/Dec2016)	BTL-2	Understanding	PO3,PO5
5	Distinguish between soldering and brazing. (May 2006, 2007, 2008)	BTL-4	Analyzing	PO1,PO4
6	Explain the features of neutral, reducing and oxidizing flames. Why is a reducing flame so called?	BTL-2	Understanding	PO1,PO7
7	Discuss the sequence of operations in friction welding. (Nov 2008, 2013, 2014)	BTL-2	Understanding	PO4
8	What are the no destructive test used in welding	BTL-2	Understanding	PO7,PO12

	inspection and also explain any two methods. (May 2013) Explain the TIG and MIG system of welding. Give the applications of each. (Nov 2009, 2012,2016)			
9	Explain the types of resistance welding process giving the equipment parameters controlled and the applications. (Nov 2009, May 2014)	BTL-2	Understanding	PO4,PO12
10	Sketch the different types of weld defects and mention how they occur. (Nov 2013)	BTL-3	Applying	PO2,PO4

UNIT III METAL FORMING PROCESSES

Hot working and cold working of metals – Forging processes – Open, impression and closed die forging – forging operations. Rolling of metals– Types of Rolling – Flat strip rolling – shape rolling operations – Defects in rolled parts. Principle of rod and wire drawing – Tube drawing – Principles of Extrusion – Types – Hot and Cold extrusion

PART – A

CO Mapping : C204.3

Q.No	Questions	BT Level	Competence	PO
1	What are the four major drawbacks of hot working?	BTL-2	Understanding	PO4,PO7
2	Classify the types of extrusion.	BTL-2	Understanding	PO1
3	What is the difference between a bloom and a billet?	BTL-4	Analyzing	PO1,PO4
4	What is impact extrusion ?	BTL-1	Remembering	PO1
5	Why are a number of passes required to roll a steel bar?	BTL-2	Understanding	PO4
6	How are seamless tubes produced?	BTL-2	Understanding	PO3
7	What is Sejournet process?	BTL-1	Remembering	PO1
8	What is skew rolling?	BTL-1	Remembering	PO1,PO12
9	Explain the term Extrusion process.	BTL-1	Remembering	PO1,PO12
10	What are the disadvantages of forging processes?	BTL-2	Understanding	PO1,PO7
11	What is the purpose of rolling ?	BTL-2	Understanding	PO1
12	What are the types of rolling mills?	BTL-2	Understanding	PO1,PO12
13	Explain cluster rolling mill.	BTL-1	Remembering	PO3
14	What is tandem rolling mill ?	BTL-1	Remembering	PO3
15	What is the main function of planetary rolling mill?	BTL-2	Understanding	PO3,PO4
16	Define Extrusion.	BTL-1	Remembering	PO1,PO12
17	What are the factors affecting choice of extrusion?	BTL-2	Understanding	PO4
18	Which extrusion requires less force and define it.	BTL-2	Understanding	PO3
19	What is forging?	BTL-1	Remembering	PO1
20	How is forging classified?	BTL-2	Understanding	PO1
21	Define smithing.	BTL-1	Remembering	PO1,PO12
22	Define ball peen hammer.	BTL-1	Remembering	PO1,PO4
23	Name the typical forging operations.	BTL-2	Understanding	PO4,PO12
24	Explain fullering.	BTL-1	Remembering	PO1
25	Define the term extrusion ratio.	BTL-1	Remembering	PO4
26	What happens due to swaging?	BTL-2	Understanding	PO4,PO12
27	What is cold forging?	BTL-1	Remembering	PO12
28	Define swaging.	BTL-1	Remembering	PO1,PO12
29	Compare hot and cold working.	BTL-4	Analyzing	PO4
30	What is meant by recrystallisation temperature?	BTL-1	Remembering	PO12

PART – B & C

1	(i) Classify the types of rolling mills and sketch them. May 2006, Nov 2009, 2014) (ii) Explain forging operations. (Nov 2012, 2013,2016)	BTL-2	Understanding	PO3,PO12
2	List out the various forging defects (May 2006, 2015)	BTL-2	Understanding	PO1,PO4

3	Describe the indirect extrusion process for solid and hollow work piece and hydrostatic extrusion process. (May 2006, 2010, Nov 2013)	BTL-2	Understanding	PO1,PO3
4	Explain briefly the wire drawing process. (May 2006, 2008, 2013, Nov 2014)	BTL-2	Understanding	PO1,PO5
5	Describe and specify the merits and limitations of different kinds of rolling mills. (May 2007)	BTL-2	Understanding	PO4,PO12
6	Explain hot working and cold working process (May 2013, Nov 2014)	BTL-2	Understanding	PO3,PO4
7	(i) Describe the difference between a bloom, a slab and a billet. (May 2008) (ii) Explain ring rolling and thread rolling processes. (May 2008, 2015)	BTL-4	Analyzing	PO4,PO12
8	Explain briefly with neat sketch, direct and indirect extrusion process. (May 2008, 2015, 2016, Nov 2014)	BTL-3	Applying	PO3,PO4
9	Explain with neat sketches of upsetting and drawing down operations. (Nov 2009)	BTL-3	Applying	PO1,PO4
10	What is shape rolling? Mention the products of shape rolling and explain the production of anyone of these products with sketh.(Nov 2012,2016)	BTL-3	Applying	PO1,PO3
11	Distinguish between open die and closed die forging.(Nov 2012)	BTL-4	Analyzing	PO1,PO4
12	Distinguish between wire drawing and tube drawing. (Nov 2009,2016, May 2010)	BTL-4	Analyzing	PO4,PO5

UNIT IV SHEET METAL PROCESSES

Sheet metal characteristics – shearing, bending and drawing operations – Stretch forming operations – Formability of sheet metal – Test methods –special forming processes-Working principle and applications – Hydro forming – Rubber pad forming – Metal spinning– Introduction of Explosive forming, magnetic pulse forming, peen forming, Super plastic forming – Micro forming.

PART – A

CO Mapping : C204.4

Q.No	Questions	BT Level	Competence	PO
1	What is punching operation?	BTL-1	Remembering	PO1,PO12
2	What is super plastic forming operation?	BTL-1	Remembering	PO1,PO6
3	What is press brake?	BTL-1	Remembering	PO1
4	Define hydro forming process.	BTL-1	Remembering	PO1,PO3
5	Give the difference between punching and blanking.	BTL-4	Analyzing	PO1,PO4
6	How hydro forming is is similar to rubber forming?	BTL-2	Understanding	PO4
7	What do you mean by minimum bend radius?	BTL-1	Remembering	PO1
8	Define Embossing.	BTL-1	Remembering	PO1,PO3
9	Name the operations of sheet metal working	BTL-2	Understanding	PO1,PO4
10	Explain Shearing	BTL-1	Remembering	PO1,PO3
11	Explain Bending	BTL-1	Remembering	PO1,PO3
12	Explain drawing	BTL-1	Remembering	PO1,PO12
13	Explain forming	BTL-1	Remembering	PO3,PO4
14	What is press working ?	BTL-1	Remembering	PO1,PO4
15	Why are press machines preferred?	BTL-2	Understanding	PO3
16	What is the difference between manually and power operated press?	BTL-4	Analyzing	PO1,PO4,PO5

17	Explain press operations	BTL-1	Remembering	PO3
18	Define trimming.	BTL-1	Remembering	PO1,PO12
19	Define shaving	BTL-1	Remembering	PO1,PO3
20	Define lancing	BTL-1	Remembering	PO1,PO12
21	What is spring back?	BTL-1	Remembering	PO1,PO4
22	What is clearance?	BTL-1	Remembering	PO1,PO3
23	How is clearance applied in blanking operation?	BTL-4	Analyzing	PO3,PO4
24	Why is angular clearance provided?	BTL-2	Understanding	PO4
25	What is tonnage capacity?	BTL-1	Remembering	PO1,PO5
26	What is die space and press adjustment?	BTL-1	Remembering	PO1,PO12
27	Define penetration.	BTL-1	Remembering	PO1
28	Explain bend radius.	BTL-1	Remembering	PO1,PO3
29	What do you mean by shallow and deep drawing?	BTL-2	Understanding	PO1,PO4
30	Define drawing force:	BTL-1	Remembering	PO1,PO12
31	Define formability	BTL-1	Remembering	PO1,PO3

PART – B & C

1	Explain principle of magnetic pulse forming? (May 2006, 2010, 2013)	BTL-2	Understanding	PO1,PO3
2	Describe the electro hydraulic process? (May 2006, 2008, Nov 2012)	BTL-2	Understanding	PO1,PO4
3	What is drawing operation? Explain with neat sketch (May 2006)	BTL-3	Applying	PO3,PO5
4	Describe the various test methods used in sheet metal forming (May 2008,Nov 2016)	BTL-2	Understanding	PO4,PO5
5	Explain as details the working principles and applications of any two special forming (May 2008)	BTL-2	Understanding	PO1,PO3
6	Explain the super plastic forming process. (May 2010, 2013)	BTL-2	Understanding	PO3,PO12
7	(i) Explain the rubber pad forming? (May 2016, Nov 2014) (ii) Discuss the characteristics of metal and its importance to sheet metal forming.	BTL-2	Understanding	PO1,PO12
8	Name and describe the common bending operations. (Nov 2012, 2008, May 2010)	BTL-2	Understanding	PO4,PO12
9	What is an explosive forming? Explain with the sketches? (Nov 2008, 2012, 2013)	BTL-2	Understanding	PO1,PO3
10	(i) Write short notes on hydro forming. (Nov 2009, May 2010, 2016) (ii) Explain with a neat sketch the principle of stretch forming. (Nov 2009, 2014) (iii) Explain the principle of metal spinning process. (May 2006, Nov 2009,2016)	BTL-2	Understanding	PO1,PO3,PO5

UNIT – V – MANUFACTURE OF PLASTIC COMPONENTS

Types and characteristics of plastics – Moulding of thermoplastics – working principles and typical applications – injection moulding – Plunger and screw machines – Compression moulding, Transfer Moulding – Typical industrial applications – introduction to blow moulding –Rotational moulding – Film blowing – Extrusion – Thermoforming – Bonding of Thermoplastics.

PART – A

CO Mapping : C204.5

Q.No	Questions	BT Level	Competence	PO
1	What are the characteristic of thermoplastics?	BTL-2	Understanding	PO1,PO6
2	List out the material for processing of plastics?	BTL-2	Understanding	PO1,PO7
3	List the advantage of cold forming of plastics?	BTL-2	Understanding	PO1,PO3
4	What is film blowing?	BTL-1	Remembering	PO1,PO5
5	What are the types of plastics?	BTL-2	Understanding	PO1
6	What is compression moulding?	BTL-1	Remembering	PO1,PO3
7	Name the parts made by rotational moulding	BTL-2	Understanding	PO3,PO5
8	What is parison ?	BTL-1	Remembering	PO5
9	Define degree of polyenerization.	BTL-1	Remembering	PO1,PO3
10	What is rotational mouldig of plastics?	BTL-1	Remembering	PO1,PO3
11	Name the characteristic of polymer.(Any Four)	BTL-2	Understanding	PO1,PO4
12	Give the mechanism of thermosetting polymers.	BTL-2	Understanding	PO1,PO3,PO6
13	Differentiate thermosetting and thermoplastic polymers	BTL-4	Analyzing	PO1,PO7
14	Define Isomerism.	BTL-1	Remembering	PO1,PO12
15	Define High polymers.	BTL-1	Remembering	PO1,PO5
16	Give the three methods of mechanism of polymerization?	BTL-2	Understanding	PO1,PO3
17	Define addition polymerization.	BTL-1	Remembering	PO1,PO4
18	Define condensation polymerization and give its other name?	BTL-1	Remembering	PO1,PO3
19	Why are additives used and enlist its advantages?	BTL-2	Understanding	PO3,PO4
20	Give the types of injection moulding.	BTL-2	Understanding	PO3,PO12
21	What are the applications of injection moulding?	BTL-2	Understanding	PO4,PO12
22	Enlist the types of blow moulding	BTL-2	Understanding	PO3,PO12
23	What is the difference between rolling and calendaring?	BTL-4	Analyzing	PO4,PO12
24	Define extrusion moulding.	BTL-1	Remembering	PO1,PO7
25	Explain thermoforming	BTL-1	Remembering	PO1,PO3
26	What are the processes used for thermosetting plastics?	BTL-2	Understanding	PO3,PO4
27	Give the application of compression moulding.	BTL-2	Understanding	PO1,PO12
28	What is gate moulding?	BTL-1	Remembering	PO1,PO4
29	Name the processing methods of plastics?	BTL-2	Understanding	PO3,PO12
30	Define pressure forming?	BTL-1	Remembering	PO4,PO12
31	What is draw forming?	BTL-1	Remembering	PO1,PO3
32	Explain the drupe forming?	BTL-1	Remembering	PO3,PO4
33	Define reaction injection moulding?	BTL-1	Remembering	PO1,PO3
PART B & C				
1	Sketch and explain the injection molding process for plastics.(May 2007, 2008, 2016, Nov 2009)	BTL-3	Applying	PO1,PO3
2	Discuss the advantage and application of compression and transfer molding process. (May 2007, 2016)	BTL-2	Understanding	PO4,PO7
3	Describe thermoforming and transfer molding process. (May 2008)	BTL-2	Understanding	PO3,PO7
4	Illustrate with suitable sketch the blow molding process for producing plastics serving bottles. (May 2013, 2015, Nov 2008,2016)	BTL-3	Applying	PO1,PO3,PO5
5	Explain the process of compression moulding with neat diagram (May 2016, Nov 2013)	BTL-3	Applying	PO1,PO3
6	Give the sequence of operation in transfer molding for thermosetting plastic process. (Nov 2008)	BTL-2	Understanding	PO3,PO5
7	Describe the thermoforming process and thermosetting plastics. (Nov 2008, 2009)	BTL-2	Understanding	PO3,PO6,PO7
8	Describe the various properties of plastics. (Nov 2009)	BTL-2	Understanding	PO4,PO6

9	Why is screw injection molding machine better than a ram type injection molding machine. (Nov 2009)	BTL-4	Analyzing	PO4,PO12
10	State the purpose of the following in plastics (1) Plasticizers (2) Fillers and (3) Stabilizer. (Nov-2016)	BTL-1	Remembering	PO1,PO3

UNIT- I METAL CASTING PROCESSES				
Sand Casting : Sand Mould – Type of patterns - Pattern Materials – Pattern allowances –Moulding sand Properties and testing – Cores –Types and applications – Moulding machines– Types and applications; Melting furnaces : Blast and Cupola Furnaces; Principle of special casting processes : Shell - investment – Ceramic mould – Pressure die casting - Centrifugal Casting - CO2 process – Stir casting; Defects in Sand casting.				
PART – A				
1.	State any four types of patterns.			(May 2006)
	The various types of patterns which are commonly used are as follows:			
	1) Single piece or solid pattern			
	2) Two piece or split pattern			
	3) Loose piece pattern			
	4) Cope and drag pattern			
	5) Gated pattern			
2.	What are chaplets?			(May 2008)
	Chaplets are supports that are provided with cores which are slender or too long to be Properly supported in core prints.			
3.	Define casting.			(May 2014)
	Casting is the process of forming objects by putting molten metal in moulds and letting it solidify.			
4.	Mention any two advantages and disadvantages of die casting.			(May 2006)
	Advantages:			
	• It is a very fast process.			
	• Moulds have longer life.			
	• Better surface can be obtained.			
	Limitations:			
	• Moulds are much costlier.			
	• This method is not suitable for small quantity production.			
	• Shape and weight of the casting is limited.			
5.	Write the requirements of good pattern.			(May 2007)
	• Simple in design			
	• Cheap and readily available			
	• Light in mass			
	• Surface is smooth			
	• Have high strength			
6.	What is core venting?			(May 2007)
	While pouring the mould with molten metal mould walls and cores heat up rapidly and releases large amount of gases. In order to prevent casting defects these gases must be vented out. For this purpose core venting are used. Core venting is incorporated in the core box itself.			
7.	What function of core?			(May 2008)
	Functions of core are:			
	▪ Core provides a means of forming the main internal cavity for hollow casting.			
	▪ Core provides external undercut feature.			
	▪ Cores can be inserted to obtain deep recesses in the casting.			

	<ul style="list-style-type: none"> ▪ Cores can be used to increase the strength of the mould. 	
8.	<p>Which process is called lost waxing method? Why?</p> <p>Ans: Investment casting process is also known as Lost-wax process. The term investment refers to a clock or special covering apparel. In investment casting, the clock is a refractory mould which surrounds the pre-coated wax pattern.</p>	(May 2008)
9.	<p>What is the function of core print?</p> <ul style="list-style-type: none"> • Core prints are basically extra projections provided on the pattern. • They form core seats in the mould when pattern is embedded in the sand for mould making. • Core seats are provided to support all the types of cores. • Though the core prints are the part of pattern, they do not appear on the cast part. 	(Dec 2008, 2012, May 2014)
10.	<p>What are the advantages and applications of ceramic moulds?</p> <p>Advantages:</p> <ul style="list-style-type: none"> • It is less expensive • Intricate objects can be casted. • Castings of thin sections and which do not require machining can be produced. <p>Applications:</p> <ul style="list-style-type: none"> • It is mainly used for all material using better ingredient in slurry. 	(Dec 2008)
11.	<p>What are the pattern materials?</p> <p>1) Wood 2) Metal 3) Plastic 4) Plaster 5) Wax</p>	(Dec 2008)
12.	<p>Explain the term fettling.</p> <p>Fettling is the name given to cover all those operations which help the casting to give a good appearance. It includes the removal of cores, sand, gates, risers, runners and other unwanted projections from the casting.</p>	(Dec 2009)
13.	<p>Name the steps involved in making a casting.</p> <p>Steps involved in making a casting are</p> <p>(1) Pattern making (2) Sand mixing and preparation (3) Core making (4) Melting (5) Pouring (6) Finishing (7) Testing (8) Heat treatment (9) Re-testing</p>	
14.	<p>What are the applications of casting?</p> <ul style="list-style-type: none"> • Transportation vehicles (in automobile engine and tractors) • Machine tool structures • Turbine vanes and power generators • Mill housing • Pump filter and valve 	(Nov 2014)
15.	<p>Define pattern.</p> <p>A pattern is defined as a model or replica of the object to be cast. A pattern exactly resembles the casting to be made except for the various allowances.</p>	(May 2014)
16.	<p>List the allowances of pattern.</p> <p>The following allowances are provided on the pattern :</p> <ul style="list-style-type: none"> • Shrinkage or contraction allowance • Machining allowance • Draft or taper allowance • Distortion allowance • Rapping or shake allowance 	
17.	<p>What are the factors on which amount of machining depends?</p> <p>Factors affecting machining are</p> <p>(1) Metal of casting (2) Machining method used</p>	

<p>(3) Casting method used (4) Shape and size of the casting (5) Amount of finish required on the machined portion</p>				
<p>18. Why is a taper allowance used? Draft allowance or taper allowance is given to all vertical faces of a pattern for their easy Removal from sand without damaging the mould.</p>				
<p>19. What is meant by grain fineness number? (Nov 2014) A.F.S number is a number proposed by American Foundry men's Society as a measure of the sand texture. Sands are classified into coarse, medium or fine depending on the cumulative percentage of sand retained on a set of sieves and pan of a sifter.</p>				
<p>20. How do you eliminate warpage ? To eliminate this defect, an opposite distortion is provided on the pattern, so that the effect is balanced and correct shape of the casting is produced</p>				
<p>21. Write the significance of loose moulding. Some patterns embedded in the moulding sand cannot be withdrawn, hence such patterns are made with one or more loose pieces for their easy removal from the moulding box.</p>				
<p>22. What are the types of moulding sand? All types of sands used in the foundry can be grouped as: 1. Natural sand 2. Synthetic sand 3. Special sands</p>				
<p>23. Why is synthetic sand better than natural sand? (1) It requires less proportion of binder. (2) Higher refractoriness and permeability. (3) Properties can be easily controlled. (4) Refractory grain size is more uniform.</p>				
<p>24. Name the different types of special sand. (1) Green sand (2) Loam sand (3) Core sand (4) Parting sand (5) Facing sand (6) Backing sand</p>				
<p>24. Define permeability. The sand must be porous to allow the gases and steam generated within the moulds to be removed freely. This property of sand is known as permeability or porosity</p>				
<p>25. Define Muller. It is a mechanical mixer used for mixing sand ingredients in dry state.</p>				
<p>26. Name various methods of sand testing.</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">(1) Moisture content test</td> <td style="width: 50%;">(2) Clay content test</td> </tr> <tr> <td>(3) Permeability test</td> <td>(4) Grain fineness test</td> </tr> </table>	(1) Moisture content test	(2) Clay content test	(3) Permeability test	(4) Grain fineness test
(1) Moisture content test	(2) Clay content test			
(3) Permeability test	(4) Grain fineness test			
<p>27. Name the factors affecting permeability test</p> <ul style="list-style-type: none"> ▪ Grain shape and size ▪ Grain distribution ▪ Binder and its contents ▪ Water amount in the moulding sand ▪ Degree of ramming 				
<p>29. Define mould and loam moulding. When the pattern is removed, a cavity corresponding to the shape of the pattern remains in the sand which is known as mould or mould cavity. In this, a rough structure of component is made by hand using bricks and loam sand. The sand used is known as loam sand or loam mortar.</p>				
<p>30. Explain in short shell moulding. Shell moulding is suitable for thin walled articles. It consists of making a mould that has two or more thin shell like parts consisting of thermosetting resin bonded sand.</p>				
<p>31. Name defects occurring in casting. (Nov 2013) (1) Blow holes (2) Porosity (3) Shrinkage</p>				

(4) Inclusions	(5) Hot tears or hot cracks
(6) Misrun and cold shuts	
PART – B & C	
1. How are the patterns classified? Describe any two types with sketches and state the uses of each of the. (AU-Nov/Dec 2016) Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No:	
2. Enumerate the casting defects and suggest suitable remedies. (AU-Nov/Dec 2016) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No:</i>	
3.Explain the properties required for moulding sand? Explain the preparation of moulding sand process. (April/May 2015),(AU-Nov/Dec 2016) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No:</i>	
4.Explain any one type of centrifugal casting. Name any five casting defects and explain the remedies. (April/May 2015) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No:</i>	
1. What are the pattern making allowances and briefly explain them. (Au-May/June 2006,07) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No:292</i>	
2. How green sand mould is prepared? (AU-Nov/Dec 2008) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No:294</i>	
3. Explain the properties of moulding sand. (Au-April/May 2008) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No:289</i>	
4. Explain the properties of pattern .(Au Nov /Dec 2012) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No:292</i>	
5. Briefly explain the carbon dioxide CO2 moulding process and state two important merits and demerits. (Au-May/June 2006) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No:301</i>	
6. Explain the Centrifugal casting process (Au-May/June 2007) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No:318</i>	
7. List any eight casting defects, their causes and remedies (Au-April/May 2007,2008) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No:278</i>	
8. Explain the Ceramic mould casting process. <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No:304</i>	
9. Give the sequence of step in pressure die casting process. (AU-Nov/Dec 2008) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No:313</i>	
10. Briefly explain the different methods for inspection of casting. (AU-Nov/Dec 2008) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No:324</i>	
11. Describe the operation of a cupola furnace for melting cast iron. (AU-Nov/Dec 2009) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No:326</i>	

UNIT- II JOINING PROCESSES	
Operating principle, basic equipment, merits and applications of: Fusion welding processes: Gas welding - Types – Flame characteristics; Manual metal arc welding – Gas Tungsten arc welding - Gas metal arc welding – Submerged arc welding – Electro slag welding; Operating principle and applications of: Resistance welding - Plasma arc welding – Thermit welding – Electron beam welding – Friction welding and Friction Stir Welding; Brazing and soldering; Weld defects: types, causes and cure.	
PART – A	
1. List out any four arc welding equipment. (May 2006) The most commonly used equipments for arc welding are as follows:	
<ul style="list-style-type: none"> • A.C or D.C. machine • Wire brush • Cables and connectors • Ear thing clamps • Chipping hammer 	
2. What are the special features of friction welding? (May 2007)	

- Friction welding is a solid state welding process where coalescence is produced by the heat obtained from mechanically induced sliding motion between rubbing surfaces.
- The work parts are held together under pressure.
- Its operating is simple.
- Power required for the operation is low.
- It is used for joining steels, super alloys, non-ferrous metals and combinations of metals.

3. Define resistance welding process. (May 2006, May 2007)
Resistance welding is a process where coalescence is produced by the heat obtained from resistance offered by the workpiece to the flow of electric current in a circuit of which the work piece is a part and by the application of pressure.

4. What is weld porosity? How is it caused? (May 2014)

- Porosity is the formation of small holes or pores in the weld.
- Porosity is caused by entrapment of gases during the solidification process
- The gases so entrapped mostly consists of hydrogen, oxygen and nitrogen of which hydrogen is most prominent for causing porosity

5. How can slag inclusions in welding be an of small voided? (May 2008)

- Avoid multi layer welding
- Reduce arc length
- Increase electrode angle
- Avoid using large electrode

6. How does brazing differ from braze welding? (Dec 2008)

Brazing	Braze Welding
The filler alloy is fed to one or more points in the assembly and it is drawn into the rest of the joint by capillary action.	The filler alloy is deposited directly at the point where it is desired.

7. Why flux is coated on filler rods? (Dec 2008)

- The coating improves penetration and surface finish.
- Suitable coating will improve metal deposition rates.

8. What is the application of carburizing flame? (Dec 2009)

- Carburizing flame is generally used for:
 - Welding of low alloy steel rods
 - Non-ferrous metals
 - High carbon steel

9. What are the diameter and length of the electrodes available in the market? (Dec.2009)

- Standard length of electrodes is 250 mm, 300 mm and 450 mm.
- Standard diameters of electrodes are 1.6, 2, 2.5, 3.2, 4, 5, 6, 7, 8, and 9 mm.

10. Define weld ability.
Weld ability is defined as the capacity of a material to be welded under fabrication conditions imposed in a specific and suitably designed structure and to perform satisfactorily in the intended service.

11. State requirement of a good weldability.
A metallic material with adequate weld ability should fulfill the following requirements:

- i. Have full strength and toughness after welding.

<ul style="list-style-type: none"> ii. Contribute to good weld quality even with high dilution. iii. Have unchanged corrosion resistance after welding. iv. Should not embrittle after stress relieving.
<p>12. How is welding classified?</p> <ul style="list-style-type: none"> • Gas welding • Arc welding • Resistance welding • Solid state welding • Thermo-chemical welding processes • Radiant energy welding processes
<p>13. Name the types of flames. The generated flames are classified into following three types</p> <ul style="list-style-type: none"> (a) Neutral flame (Acetylene and oxygen in equal proportion) (b) Oxidizing flame (Excess of oxygen) (c) Reducing flame or carburizing flame (Excess of acetylene)
<p>14. Where is oxidizing flame used?</p> <ul style="list-style-type: none"> i. Copper-base metals ii. Zinc-base metals iii. Ferrous metals such as manganese steel, cast iron, etc.
<p>15. Explain the function of flux in welding. (May 2008, 2016, Nov 2013, 2014) While welding, if the metal is heated in air then the oxygen from air combines with the metal to form oxides. This results in poor quality, low weld strength hence, to avoid this difficulty a flux is employed during welding. It prevents the oxidation of molten metal.</p>
<p>16. Give the applications of gas welding. Gas welding is most widely used for the following purposes:</p> <ul style="list-style-type: none"> • Joining thin materials. • Joining most ferrous and non-ferrous metals. • In automobile and aircraft industries. • In sheet metal fabricating plant.
<p>17. What is arc welding? Electric arc welding is a fusion welding process in which welding heat is obtained from an electric arc between an electrode and the workpiece.</p>
<p>18. Define arc length and arc crater. The distance between the centre of arc of the electrode tip and the bottom of arc crater is called as arc length. A small depression is formed in the base of the metal which is called as arc crater.</p>
<p>19. Define SMAW. It is an arc welding process where coalescence is produced by heating the workpiece with an electric arc set up between the flux coated electrode and the workpiece.</p>
<p>20. What is submerged arc welding ? It is an arc welding process where coalescence is produced by heating, with an electric arc set up between bare metal electrode and workpiece.</p>
<p>21. Explain in short plasma arc welding. It is an arc welding process where coalescence is produced by the heat obtained from a constricted arc set up between a tungsten electrode and the water cooled nozzle or the workpiece. The process employs two inert gases i.e. one forms the plasma arc and the second shields the plasma arc. Filler rod may or may not be added and pressure is not required for welding.</p>
<p>22. Write about special feature of flux cored welding. The electrode is flux cored i.e. flux is contained within the hollow electrode. The flux cored electrode is coiled and supplied to the arc as a continuous wire. The flux inside the wire provides the necessary shielding of the weld pool.</p>
<p>23. What are the factors affecting resistance welding?</p>

<p>Four factors are involved in operation of resistance welding:</p> <ol style="list-style-type: none"> i. Amount of current passing through the work piece. ii. The pressure that electrodes transfer to the work piece. iii. Time during which current flows. iv. Area of electrode tip in contact with the work piece. 												
<p>24. What is adhesive bonding? Adhesive bonding is the process of joining materials by using adhesives. The term adhesive includes substances such as glues, cements and other bonding agents. Main steps in adhesive bonding are</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">(1) Surface Preparation</td> <td style="width: 50%;">(2) Applying the primer</td> </tr> <tr> <td>(3) Applying the adhesive</td> <td>(4) Assembling adhesive coated components</td> </tr> <tr> <td>(5) Curing the assembly</td> <td>(6) Testing of the joints</td> </tr> </table>	(1) Surface Preparation	(2) Applying the primer	(3) Applying the adhesive	(4) Assembling adhesive coated components	(5) Curing the assembly	(6) Testing of the joints						
(1) Surface Preparation	(2) Applying the primer											
(3) Applying the adhesive	(4) Assembling adhesive coated components											
(5) Curing the assembly	(6) Testing of the joints											
<p>25. Explain thermoplastic adhesives. Thermoplastic type adhesives soften at high temperature. They are easy to use and are employed as, air drying dispersions, emulsions or solutions that achieve their strength through the evaporation of the solvent</p>												
<p>26. Explain thermosetting adhesives. Ans: Thermosetting adhesives, once hardened cannot be remelted and a broken joint cannot be rebounded by heating also. These types of adhesives cure or harden by chemical reactions like polymerisation, condensation, vulcanisation or oxidation caused by the addition of a catalyst; heat, pressure, radiations, etc.</p>												
<p>27. What is brazing? It is defined as a group of joining processes where coalescence is produced by heating to a suitable temperature and by using a filler metal having a liquidus above 470⁰ C and below the solids of the base metal.</p>												
<p>28. What is thermit welding? (Nov 2012, 2013) Thermit welding is a fusion welding process that makes use of the intense heat produced when a mixture containing iron oxide and powdered aluminium is ignited. It reduces iron oxide to thermit steel and slag.</p>												
<p>29. Name different defects in weld.</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 33%;">(a) Cracks</td> <td style="width: 33%;">(b) Distortion</td> <td style="width: 33%;">(c) Inclusions</td> </tr> <tr> <td>(d) Porosity and blow holes</td> <td>(e) Undercutting</td> <td>(f) Overlapping</td> </tr> <tr> <td>(g) Spatter</td> <td>(h) Poor fusion</td> <td></td> </tr> <tr> <td>(i) Poor weld bead appearance</td> <td>(j) Incomplete penetration</td> <td></td> </tr> </table>	(a) Cracks	(b) Distortion	(c) Inclusions	(d) Porosity and blow holes	(e) Undercutting	(f) Overlapping	(g) Spatter	(h) Poor fusion		(i) Poor weld bead appearance	(j) Incomplete penetration	
(a) Cracks	(b) Distortion	(c) Inclusions										
(d) Porosity and blow holes	(e) Undercutting	(f) Overlapping										
(g) Spatter	(h) Poor fusion											
(i) Poor weld bead appearance	(j) Incomplete penetration											
<p>30. What do you mean by bronze welding? Bronze welding does not mean the welding of bronze, but it is a welding using bronze filler rod</p>												
PART – B & C												
<p>1. What is a soldering flux? What different types of soldering fluxes are used? (Nov/Dec2016) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No:</i></p>												
<p>2. Explain the spot welding process (May 2006) Explain the Arc welding process and its positions (May 2014, 2015) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No:892,862</i></p>												
<p>3. Explain the submerged arc welding process (May 2006, 2007, 2013, 2015) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No:864</i></p>												
<p>4. Explain the gas (Oxy Acetylene) welding process (Nov 2012, May 2010, 2015) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No:859</i></p>												
<p>5. Explain the electron beam welding process with a neat sketch and the merits, limitations and applications. <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No:875</i></p>												
<p>6. Distinguish between soldering and brazing. (May 2006, 2007, 2008) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No:929,934</i></p>												
<p>7. Explain the features of neutral, reducing and oxidizing flames. Why is a reducing flame so called? <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 859</i></p>												
<p>8. Discuss the sequence of operations in friction welding. (Nov 2008, 2013, 2014) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 888</i></p>												
<p>9. What are the non-destructive tests used in welding inspection and also explain any two methods. (May</p>												

2013)

Explain the TIG and MIG system of welding. Give the applications of each. (Nov 2009, 2012)

Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No:1035

10. Explain the types of resistance welding process giving the equipment parameters controlled and the applications. (Nov 2009, May 2014)

Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No:891

11. Sketch the different types of weld defects and mention how they occur. (Nov 2013)

Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No:885

UNIT III – METAL FORMING PROCESSES

PART – A

1. What are the four major drawbacks of hot working?

- As hot working is carried out at high temperatures, a rapid oxidation or scale formation takes place on the metal surface which leads to poor surface finish and loss of metal.
- Due to the loss of carbon from the surface of the steel piece being worked, the surface layer loses its strength.
- This weakening of the surface layer may give rise to fatigue crack which results in failure of the part.
- Close tolerance cannot be obtained.
- Hot working involves excessive expenditure on account of high tooling cost.

2 Classify the types of extrusion.

(May 2006)

- Hot Extrusion
- Cold Extrusion
- Hot Extrusion
- Direct extrusion
- Indirect extrusion
- Tube extrusion

3 What is the difference between a bloom and a billet?

(May 2007)

A bloom has a square cross section with minimum size of 150x150 mm and a billet is smaller than bloom and it may have any square section from 38 mm upto the size of a bloom.

4 What is impact extrusion ?

(May 2007)

The raw material is in slug form which have been turned from a bar or punched from a strip. By using punch and dies, the operation is performed. The slug is placed in the die and struck from top by the punch operating at high pressure and speed

5 Why are a number of passes required to roll a steel bar?

(May 2008)

To reduce the thickness and to increase the width of the bar number of passes are required.

6 How are seamless tubes produced?

(May 2008)

Seamless tubing is a popular and economical raw stock for machining because it saves drilling and boring of parts. The piercing machine consists of two tapered rolls, called as **piercing rolls**.

7 What is Sojourned process?

(Dec. 2008)

That extrusion process which is based both on the use of a lubricant in a viscous condition at extrusion temperature and on a separation between the lubrication of the chamber wall and die is called Sojourned process.

8 What is skew rolling?

(Dec. 2008)

The rolls are powered and the work piece is in due to frictional force between metal and surface. The torque on the rolls is being zero.

9 Explain the term Extrusion process.

(Nov 2009)

Ans: The extrusion process consists of compressing a metal inside a chamber to force it out

<p>through a small opening which is called as die. Any plastic material can be successfully extruded. A large number of extruded shapes which are commonly used are tubes, rods, structural shapes and lead covered cables. During the process, a heated cylindrical billet is placed in the container and forced out through a steel die with the help of a ram or plunger.</p>										
<p>10 What are the disadvantages of forging processes? (Dec. 2009)</p> <ul style="list-style-type: none"> • Complicated shapes cannot be produced. • Generally used for large parts. • Because of cost of dies, process is costly. 										
<p>11. What is the purpose of rolling ? The main purpose of rolling is to convert larger sections such as ingots into smaller sections, which can be used directly in as rolled state or stock for working through other process.</p>										
<p>12. What are the types of rolling mills? According to the number and arrangement of the rolls, rolling mills are classified as follows:</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">1. Two-high rolling mill</td> <td style="width: 50%;">2. Three-high rolling mill</td> </tr> <tr> <td>3. Four-high rolling mill</td> <td>4. Tandem rolling mill</td> </tr> <tr> <td>5. Cluster rolling mill</td> <td>6. Planetary rolling mill</td> </tr> </table>	1. Two-high rolling mill	2. Three-high rolling mill	3. Four-high rolling mill	4. Tandem rolling mill	5. Cluster rolling mill	6. Planetary rolling mill				
1. Two-high rolling mill	2. Three-high rolling mill									
3. Four-high rolling mill	4. Tandem rolling mill									
5. Cluster rolling mill	6. Planetary rolling mill									
<p>13. Explain cluster rolling mill. It is a special type of four high rolling mill. In this, each of the two working rolls is backed up by two or more of the larger back up rolls.</p>										
<p>14. What is tandem rolling mill? It is a set of two or three stands of rolls set in parallel alignment. This facilitates a continuous pass through each one successively without change of direction of the metal or pause in the rolling process.</p>										
<p>15. What is the main function of planetary rolling mill? The main feature of this mill is that, it reduces a hot slab to a coiled strip in a single pass.</p>										
<p>16. Define Extrusion. (Nov 2013) The extrusion process consists of compressing a metal inside a chamber to force it out through a small opening which is called as die.</p>										
<p>17. Which extrusion requires less force and define it. As compared to direct extrusion, less total force is required in indirect extrusion. In this type, the ram or plunger used is hollow and as it presses the billet against the backwall of the closed chamber, the metal is extruded back into the plunger.</p>										
<p>18. What is forging? (Nov 2013) Forging is the process of shaping heated metal by the application of sudden blows (hammer forging) or steady pressure (press forging) and makes use of the characteristic of plasticity of the material.</p>										
<p>19. How is forging classified? According to the equipments utilized for forging, they are classified as follows:</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">1. Smith die (Open die) forging;</td> <td style="width: 50%;"></td> </tr> <tr> <td style="padding-left: 20px;">(a) Hand forging</td> <td style="padding-left: 20px;">(b) Power forging</td> </tr> <tr> <td>2. Impression die (Closed die) forging:</td> <td></td> </tr> <tr> <td style="padding-left: 20px;">(a) Drop forging</td> <td style="padding-left: 20px;">(b) Press forging</td> </tr> <tr> <td style="padding-left: 20px;">(c) Maching or upset forging</td> <td style="padding-left: 20px;">(d) Roll forging</td> </tr> </table>	1. Smith die (Open die) forging;		(a) Hand forging	(b) Power forging	2. Impression die (Closed die) forging:		(a) Drop forging	(b) Press forging	(c) Maching or upset forging	(d) Roll forging
1. Smith die (Open die) forging;										
(a) Hand forging	(b) Power forging									
2. Impression die (Closed die) forging:										
(a) Drop forging	(b) Press forging									
(c) Maching or upset forging	(d) Roll forging									
<p>20. Define smithing. Smithing is the act or art of working on forging metals, as iron, into any required shape.</p>										
<p>21. Define ball peen hammer. It is most suitable hammer for hand forging operations. It has a tough cast steel or forged steel head which is fitted to a wooden handle. One end of the head is</p>										

flat called as **face** i.e. haedened and polished. It is used for general striking and hammering purpose. Another end is half ball shaped called as **peen** i.e. used for riveting or burring-over purpose.

22. Define angle of bite for rolling. (Nov 2014)

Angle of bite is the angle between the entrance plane and the centre lane of the rolls

23. What is upsetting ? (May 2014)

It is a process through which the cross-section of a metal piece is increased with a corresponding increase in its length.

24. What is setting down?

Ans: Setting down is the operation through which the rounding of a corner is removed, to make it square by uaing a set hammer.

25. Explain fullering. (May 2013)

Fullering is also called as **spreading**. Fullering the metal along the length of the workpiece is done bu working spearate sections. In this, the axis of the work piece is positioned perpendicular to the width of the flat die.

26. Define the term extrusion ratio. (Nov 2011)

It is defined as the ratio of the cross section area of the straight billet to the final cross sectional area of the extruded section.

27. What happens due to swaging?

By swaging, one end of a tube is reduced in diameter and passed through the die, whereas on the other side of the die this end is gripped in tongs which are connected to the draw bench

28. What is cold forging?

Cold forging is a cold upsetting process adapted for large scale production of small cold upset parts from a wire stock. For example, small bolts, rivets, screws, pins, nails and small machine parts, small balls for ball bearings, etc.

29. Define swaging.

Rotary swaging is a process of reducing the cross-sectional shape of bars, rods, tubes or wires by a large number of impacting blows with one or more pairs of opposed dies.

30. Compare hot and cold working.

S. No.	Hot working	Cold working
1.	Hot working is carried out above the recrystallisation temperature but below the melting point, hence deformation of metal and recovery takes place simultaneously.	Cold working is carried out below the recrystallisation temperature and as such there is not appreciable recovery of metal.
2.	During the process, residual stresses are not developed in the metal.	During the process, residual stresses are developed in the metal.
3.	Because of higher deformation temperature used, the stress required for deformation is less.	The stress required to cause deformation is much higher.

PART – B & C

1. (i) Classify the types of rolling mills and sketch them. May 2006, Nov 2009, 2014)

(ii) Explain forging operations. (Nov 2012, 2013)

Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 367

2.List out the various forging defects (May 2006, 2015)

Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 381

3. Describe the indirect extrusion process for solid and hollow work piece and hydrostatic extrusion

process. (May 2006, 2010, Nov 2013) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 419</i>
4. Explain briefly the wire drawing process. (May 2006, 2008, 2013, Nov 2014) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 418</i>
5. Describe and specify the merits and limitations of different kinds of rolling mills. (May 2007) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 367</i>
6.Explain hot working and cold working process (May 2013, Nov 2014) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 57</i>
7.(i) Describe the difference between a bloom, a slab and a billet. (May 2008) (ii) Explain ring rolling and thread rolling processes. (May 2008, 2015) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 364,371</i>
8. Explain briefly with neat sketch, direct and indirect extrusion process. (May 2008, 2015, 2016, Nov 2014) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 419</i>
9. Explain with neat sketches of upsetting and drawing down operations. (Nov 2009) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 383</i>
10.What is shape rolling? Mention the products of shape rolling and explain the production of anyone of these products with sketch (Nov 2012) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 358</i>
11.Distinguish between open die and closed die forging.(Nov 2012) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No:383,388</i>
12. Distinguish between wire drawing and tube drawing. (Nov 2009, May 2010) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 418</i>
13.(i) Classify the types of rolling mills and sketch them. May 2006, Nov 2009, 2014) (ii) Explain forging operations. (Nov 2012, 2013) <i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 367</i>

UNIT IV – SHEET METAL PROCESSES

PART – A

1. What is punching operation ? (May 2006) It is the cutting operation with the help of which various shaped holes are produced in the sheet metal. It is similar to blanking; only the main difference is that, the hole is the desired product and the material punched out to form a hole is considered as a waste.
2. What is super plastic forming operation ? (May 2006) 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
3.What is press brake? (May 2007) Press brake (bending brake) is an open frame press used for bending, cutting and forming. Generally, it handles long workpieces in the form of strips. Usually press brake have long dies and suitable and suitable for making long straight line bends.
4.Define hydro forming process. (May 2007, 2008) Hydro forming is a process which can be carried out in two ways: 1) Hydro - mechanical forming 2) Electro - hydraulic forming Hydro - mechanical forming: In this method , the blank is placed over the punch whose shape is similar to inner of the find workpiece. 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.
5.Give the difference between punching and blaking. (May 2008) Blanking : It is the cutting operation of a flat metal sheet. The article punched out is

known as **blank**. Blank is the required product of the operation and the metal left behind is considered as a waste.

Punching: It is similiar to blanking; only the main difference is that, the hole is the desired product and the material punched out to form a hole is considered as a waste.

6. How is hydro forming is similar to rubber forming? (May 2008)

In both the sheet metal working processes sheet metal is pressed between a die and rubber block.

Under pressure, the rubber and sheet metal are driven into the die and conform to its shape by forming the part.

7. What do you mean by minimum bend radius? (Nov 2008)

It is the radius of curvature on inside surface of the bend. If the bend radius is too small, then cracking of a material on the outer tensile surface takes place. To prevent any damage to punch and die, the bend radius should not be less than 0.8mm.

8. Define Embossing. (Nov 2009)

With the help of this operation, specific shapes or figures are produced on the sheet metal. It is used for decorative purpose or giving details like names, trademarks, specifications, etc. On the sheet metal.

9. Name the operations of sheet metal working

The main operations are as follows:

- | | | | |
|---|----------|---|---------|
| • | Shearing | • | Bending |
| • | Drawing | • | Forming |

10. Explain 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

Shearing is performed either by using hand or by using machines also.

11. Explain Bending

The bending operation involves stretching of metal on the outer surface and compressing it on inner surface along a neutral axis which unchanged. Sheet metal can be bent by hammering on a base by hand or by bending machines.

12. Explain drawing

Drawing operation is used to produce thin walled hollow shapes in sheet metal. It is carried out by using a die and punch on a press machine. If the drawn length is more than the width then the operation is called as **deep drawing**.

13. Explain forming

For safety purpose, the edges of the sheet metal products are formed of folded. Also, formed edges provide stiffness to the components so that they will not retain their shapes during handling.

14. What is press working?

Press working is a chip less manufacturing process by which various components are produced from sheet metal

15. Why are press machines preferred?

Press machines are preferred for mass production of similar components, because for each component separate tool is required and the cost of every press tool is very high as compared to the cost of other cutting tools.

16. What is the difference between manually and power operated press?

The main difference between manually operated press and power press is that, the former moves by means of a screw and the latter by means of a crankshaft.

17. Explain press operations.

Press operations may be grouped into two categories i.e. cutting operations and forming

operations. In cutting operations, the workpiece is stressed beyond its ultimate strength whereas; in forming operations, the stresses are below the ultimate strength of the metal.
<p>18. Define trimming.</p> <p>It is used for cutting unwanted excess material from the periphery of a previously formed workpiece.</p>
<p>19. Define shaving</p> <p>It is almost similar to trimming, but only small amount of material is removed during the operation as compared to trimming</p>
<p>20. Define lancing</p> <p>In this operation, there is a cutting of the sheet metal through a small length and bending this small cut portion downwards</p>
<p>21. What is spring back? (May 2010, 2012, 2013, 2014, Nov 2013)</p> <p>At the end of a metal working process, when the pressure on the metal is released, there is an elastic recovery by the material. Due to this total deformation of metal will get reduced. This phenomenon is called spring back.</p>
<p>22. What is clearance?</p> <p>During metal cutting, the shape of the punch is similar to die opening except that, it is smaller on each side. This difference in dimensions between die and punch (making members of a die set) is known as clearance.</p>
<p>23. Why is angular clearance provided?</p> <p>Angular clearance is provided to enable the blank to clear the die easily and fall freely out of the die block. If the angular clearance is not provided, the punched blank would remain stuck in the die block.</p>
<p>24. What is tonnage capacity?</p> <p>The tonnage capacity of a mechanical press is calculated by, $\text{Tonnage capacity} = \text{Shear strength of a crankshaft material} \times \text{Area of crankshaft bearings.}$ The tonnage capacity of a hydraulic press is calculated by ,$\text{Tonnage capacity} = \text{Piston area} \times \text{Oil pressure in the cylinder.}$</p>
<p>25. What is die space and press adjustment?</p> <p>Die space: The available surface for mounting the die and punch components in the press. Press adjustment: The distance through which the ram can be lowered below its shut height position.</p>
<p>26. Define penetration.</p> <p>The distance which the punch enters into the stock to cause rupture is called as penetration, and generally it is given in terms of the percentage of the stock thickness. The percentage penetration depends on the material being cut and thickness of the material.</p>
<p>27. Explain bend radius.</p> <p>It is the radius of curvature on inside of the bend. If the bend radius is too small, then cracking of a material on the outer tensile surface takes place. To prevent any damage to punch and die, the bend radius should do not be less than 0.8mm.</p>
<p>28. Define formability. (Nov 2010)</p> <p>Formability represents the response and suitability of the material for forming processes.</p>
<p>29. What is process of fracturing?</p> <p>It states that, ductility of the metal is lower if its section size is larger. It refers to identical metal from which specimens of different section thickness have been machined and tested.</p>
<p>30. What is explosive forming and how is it classified?</p> <p>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. The explosives are used in the form of rod, sheet, granules, stick, liquid, etc. According to the placement of the explosive (charge) the operations are divided in two categories:</p> <ol style="list-style-type: none"> i. Stand off operation ii. Contact operation.
PART B & C
<p>1. Explain principle of magnetic pulse forming? (May 2006, 2010, 2013)</p> <p><i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 388</i></p>

2. Describe the electro hydraulic process?	(May 2006, 2008, Nov 2012)
<i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 489</i>	
3. What is drawing operation? Explain with neat sketch	(May 2006)
<i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 471</i>	
4. Describe the various test methods used in sheet metal forming	(May 2008)
<i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 444</i>	
5. Explain as details the working principles and applications of any two special forming	(May 2008)
<i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 353</i>	
6. Explain the super plastic forming process.	(May 2010, 2013)
<i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 484</i>	
7. (i) Explain the rubber pad forming?	(May 2016, Nov 2014)
(ii) Discuss the characteristics of metal and its importance to sheet metal forming.	
<i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 220,444</i>	
8. Name and describe the common bending operations.	(Nov 2012, 2008, May 2010)
<i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 459</i>	
9. What is an explosive forming? Explain with the sketches?	(Nov 2008, 2012, 2013)
<i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 487</i>	
10. (i) Write short notes on hydro forming.	(Nov 2009, May 2010, 2016)
(ii) Explain with a neat sketch the principle of stretch forming.	(Nov 2009, 2014)
(iii) Explain the principle of metal spinning process.	(May 2006, Nov 2009)
<i>Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 480,470,480</i>	

UNIT V – MANUFACTURE OF PLASTIC COMPONENTS

PART – A

1. What are the characteristic of thermoplastics ?	(May 2006, Nov 2010)
Thermoplastics polymers soften when heated and harden, when cooled. These types of polymers are soft and ductile. They have low melting temperature and can be repeatedly moulded and remoulded to the required shapes.	
2. List out the material for processing of plastics?	(May 2006)
The following mentioned are the various polymer additives used in practice:	
<ul style="list-style-type: none"> i. Filler material ii. Plasticizers iii. Stabilizers iv. Colorants v. Flame retardants vi. Reinforcements vii. Lubricants 	
3. List the advantage of cold forming of plastics?	(May 2007)
<ul style="list-style-type: none"> • Cold forming can be carried out at room temperature • It is used to produce filament and fibres • It is a simple process. 	
4. What is film blowing?	(May 2007)
In this 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. It is used for making plastic sheets and films.	
5. What are the types of plastics?	(May 2008)
Polymers are classified in two major categories:	
<ul style="list-style-type: none"> • Thermoplastic polymers (Soften when heated and harden when cooled) • Thermosetting polymers (Soften when heated and permanently hardened when cooled). 	
6 What is compression moulding?	(May 2008)
The main objective is to melt the material due to compression.	

7	Name the parts made by rotational moulding. Rotational moulding process is mostly used for the production of toys in P.V.C like horse, boats, etc. Larger containers upto 20 m ³ capacity, fuel tanks of automobile are made from polythene and nylon. This process is also used for production of large drums, boat hulls, buckets, housings and carrying cases.	(Dec 2008)									
8	What is parison ? Blow moulding consists of extrusion of the heated tubular plastic piece called as parison which is transferred to the two piece mold.	(Dec 2008)									
9	Define degree of polymerization. It is the number of repetitive units present in one molecule of a polymer. $\text{Degree of polymerization} = \frac{\text{Molecular weight of a polymer}}{\text{Molecular weight of a single monomer}}$	(Dec 2009)									
10	What is rotational moulding of plastics? <ul style="list-style-type: none"> • Rotational moulding also called as roto-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. 	(Dec. 2009)									
11.	Name the characteristic of polymer.(Any Four) The important characteristic of polymers are <ol style="list-style-type: none"> 1) Light weight 2) High Corrosion resistance. 3) Low density. 4) Low thermal and electrical properties. 5) Low mechanical properties (can be improved by fibre reinforcement of plastics). 										
12.	Give the mechanism of thermosetting polymers. These plastics are formed by condensation polymerisation. During initial heating, covalent cross-links are formed which anchor the chains together and resist the vibrational and rotational chain motions at high temperature. If heated to excessively high temperature, there occurs severance of these crosslink bonds leading to polymer degradation.										
13.	Differentiate thermosetting and thermoplastic polymers <table border="1" data-bbox="264 1417 1441 1742"> <thead> <tr> <th data-bbox="264 1417 371 1518">S. No.</th> <th data-bbox="371 1417 906 1518">Thermoplastics</th> <th data-bbox="906 1417 1441 1518">Thermosetting</th> </tr> </thead> <tbody> <tr> <td data-bbox="264 1518 371 1630">1</td> <td data-bbox="371 1518 906 1630">They are formed by addition polymerisation</td> <td data-bbox="906 1518 1441 1630">They are formed by condensation.</td> </tr> <tr> <td data-bbox="264 1630 371 1742">2</td> <td data-bbox="371 1630 906 1742">They are linear polymers composed of chain molecules.</td> <td data-bbox="906 1630 1441 1742">They are composed of three dimensional network of cross-linked molecules</td> </tr> </tbody> </table>		S. No.	Thermoplastics	Thermosetting	1	They are formed by addition polymerisation	They are formed by condensation.	2	They are linear polymers composed of chain molecules.	They are composed of three dimensional network of cross-linked molecules
S. No.	Thermoplastics	Thermosetting									
1	They are formed by addition polymerisation	They are formed by condensation.									
2	They are linear polymers composed of chain molecules.	They are composed of three dimensional network of cross-linked molecules									
14.	Define Isomerism. It is a phenomenon where different atomic configurations are responsible for the formation of same configuration.										
15.	Define High polymers. Polymers which have a very high molecular weight ranging between 10,000 and 1,000,000 g/mol. are known as High-polymers. They are mainly solids.										
16.	Give the three methods of mechanism of polymerisation : There are three general methods or mechanisms of polymerisation : <ol style="list-style-type: none"> (1) Addition Polymerisation 										

(2) Copolymerization (3) Condensation polymerisation
<p>17. Define addition polymerization. The Polymer is produced by adding a second monomer to the first, a third monomer to this dimer and so on till the long polymer chain is terminated. This process is called as addition polymerisation.</p>
<p>18. Define condensation polymerisation and give its other name. Condensation polymerisation is also known as step-growth polymerisation.</p> <p>It is the formation of polymers by step wise intermolecular chemical reactions that normally involve atleast two different monomers.</p>
<p>19. Why are additives used and enlist its advantages? Additives used to improve the properties and performance of polymers. Advantages of additives when added to the polymers are:</p> <ul style="list-style-type: none"> • Improve mechanical properties. • Reduce the cost. • Improve the thermal processing such as moldability. • Improve the appearance and aesthetic properties. <p>Improve surface and chemical characteristics of the polymers</p>
<p>20. Give the types of injection moulding.</p> <ul style="list-style-type: none"> • Ram or Plunger type Injection Moulding • Screw type Injection Moulding
<p>21. What are the applications of injection moulding? Typical parts produced by this process are cups, chairs, toys, containers, knobs, automobile parts (car dash-board, car handles, etc), air conditioner parts, plumbing fittings, electrical fittings, etc. This process is used for making components which consists of complex threads. Production of intricate shapes and thin walled parts like radiator fan can be done by this process.</p>
<p>22. Enlist the types of blow moulding. There are various types of blow moulding process which are as follows :</p> <ul style="list-style-type: none"> • Injection blow moulding • Extrusion blow moulding • Multi-larger blow moulding
<p>23. What is the difference between rolling and calendering? The main difference between rolling and calendering is that, in calendering there is appreciable thickening after the material has reached minimum thickness at the roll gap and the pre-calendered material is not in the sheet form.</p>
<p>24. Define extrusion moulding . Extrusion process is a continuous process in which the hot plasticized material forced through the die opening of required shape.</p>
<p>25. Explain thermoforming. It is a series of processes for forming thermoplastic sheet or film over a mould with the application of heat and pressure.</p>
<p>26. What are the processes used for thermosetting plastics? For processing of thermosetting plastics following processes are most commonly used:</p> <ol style="list-style-type: none"> (1) Compression moulding and (2) Transfer moulding
<p>27. Give the application of compression moulding.</p> <ul style="list-style-type: none"> • Compression moulding is used for making flatware's, gear, buttons, buckles, knobs, handles, dishes, container taps and fittings • Also used for moulding of electrical and electronic components, washing machine agitators and housings.

28. What is 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.

29. Name the processing methods of plastics?

- i) Plug and ring forming (ii) pressure forming
- (iii) Draw forming (iv) Reaction injection moulding (RIM)
- (v) Drape forming

30. Define pressure forming?

In this method, the heated plastics sheet is formed into the required shape between a pair of male and female dies. In this process vacuum is not used.

PART B&C**1. Sketch and explain the injection molding process for plastics. (May 2007, 2008, 2015, Nov 2009)**

Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 534

2. Discuss the advantage and application of compression and transfer molding process.

(May 2007, 2015)

Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 543

3. Describe thermoforming and transfer molding process. (May 2008)

Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 542,544

4. Illustrate with suitable sketch the blow molding process for producing plastics serving bottles. (May 2013, 2015, Nov 2008)

Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 539

5. Explain the process of compression moulding with neat diagram (May 2016, Nov 2013)

Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 543

6. Give the sequence of operation in transfer molding for thermosetting plastic process. (Nov 2008)

Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 544

7. Describe the thermoforming process and thermosetting plastics. (Nov 2008, 2009)

Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 204

8. Describe the various properties of plastics. (Nov 2009)

Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 198

9. Why is screw injection molding machine better than a ram type injection molding machine. (Nov 2009) Ref : Manufacturing Engineering and Technology by Kalpakjian, Pg.No: 512