



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

## MECHANICAL ENGINEERING

### TUTORIAL QUESTION BANK

<b>Course Title</b>	<b>MANUFACTURING PROCESS</b>				
<b>Course Code</b>	AMEB05				
<b>Programme</b>	B.Tech				
<b>Semester</b>	THREE				
<b>Course Type</b>	Core				
<b>Regulation</b>	IARE - R18				
<b>Course Structure</b>	<b>Theory</b>			<b>Practical</b>	
	<b>Lectures</b>	<b>Tutorials</b>	<b>Credits</b>	<b>Laboratory</b>	<b>Credits</b>
	3	0	4	2	1
<b>Course Faculty</b>	Dr. Ch Sandeep, Associate Professor				

#### COURSE OBJECTIVES:

<b>The student will try to learn:</b>	
I	The Importance of manufacturing sciences in the day-to-day life, and study the basic manufacturing processes and tools used.
II	The knowledge in thermal, metallurgical aspects during casting and welding for defect free manufacturing components.
III	Design features that make each of these manufacturing process both harder, easier, assess design and manufacturing features on real products

#### COURSE OUTCOMES:

At the end of the course the students are able to:

<b>Course Outcomes</b>		<b>Knowledge Level (Bloom's Taxonomy)</b>
CO1	<b>Outline</b> the steps involved in making a casting the desired pattern for automotive industry components cylinder heads, engine blocks etc.	Remember

CO2	<b>Design</b> the gating and riser system needed for casting requirements to achieve defect/error free components	Apply
CO3	<b>Categorize</b> various defects and shortcomings during gas welding operation such as TIG, MIG and Spot welding etc. for real time applications.	Understand
CO4	<b>Illustrate</b> the properties and bonding techniques of plastics and various plastic molding techniques.	Understand
CO5	<b>Apply</b> the appropriate metal forming techniques, for producing components like hexagonal bolt, nut etc.,	Apply
CO6	<b>Explain</b> the working principle of hot and cold extrusion processes and their application in industries for making of pipes and tubes.	Apply
CO7	<b>Analyze</b> the manufacturing defects as well as material characterization and its application.	Apply
CO8	<b>Classify</b> the various forging techniques based on functionality, cost and time in development of critical products.	Understand
CO9	<b>Evaluate</b> the appropriate manufacturing process parameters, for effective optimization of prototype / products.	Apply

**MAPPING OF EACH CO WITH PO(s), PSO(s):**

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
<b>CO 1</b>	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>CO 2</b>	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>CO 3</b>	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
<b>CO 4</b>	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>CO 5</b>	-	4	2	-	-	-	-	-	-	-	-	-	-	-	-	2
<b>CO 6</b>	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2
<b>CO 7</b>	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2
<b>CO 8</b>	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>CO 9</b>	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## TUTORIAL QUESTION BANK

### MODULE- I

#### CASTING

#### PART - A (SHORT ANSWER QUESTIONS)

S No	QUESTIONS	Blooms Taxonomy Level	How does this Subsume the level	Course Outcomes
1	List the common pattern materials.	Remember	---	CO 1
2	List different types of sand for sand moulds.	Remember	---	CO 1
3	What are different types of binder used in sand casting?	Remember	---	CO 1
4	Define green strength of molding sand?	Remember	---	CO 1
5	Define permeability of molding sand?	Remember	---	CO 1
6	Define cope, drag and cheek?	Remember	---	CO 1
7	Define refractoriness of the sand material?	Remember	---	CO 1
8	Define flow ability or the sand material?	Remember	---	CO 1
9	Define dry strength or the sand mould?	Remember	---	CO 1
10	Define collapsibility of the sand mould?	Remember	---	CO 1
11	Define hot strength of the sand material?	Remember	---	CO 1
12	Define Adhesiveness of the sand material?	Remember	---	CO 1
13	What is the effect of cohesiveness of the sand material?	Understand	The Learner to <b>recall</b> the sand properties, and then explain mixture of various size grains, bonding material and its distribution to <b>apply</b> them on various casting process.	CO 1
14	What is the use of cone?	Remember	---	CO 1
15	What is the use of chaplets?	Remember	---	CO 1
16	What is the use of facing sand?	Remember	---	CO 1
17	Define parting line in casting.	Remember	---	CO 1
18	What is the function of a Riser?	Remember	---	CO 1
19	Define fettling process in casting?	Remember	---	CO 1
20	What is rapping allowance?	Remember	---	CO 1

**PART - B (LONG ANSWER QUESTIONS)**

1	Explain various manufacturing processes. As an engineer when would you prefer selecting Casting as a manufacturing process?	Understand	The learner to <b>define</b> the concepts of various manufacturing process and then <b>classify</b> the methods of casting.	CO 1
2	Define a mould. Make a sketch of a mould and Identify its different elements.	Understand	The learner to <b>recall</b> the concepts of various mould systems and then <b>identify</b> the elements of mould.	CO 1
3	Discuss the solidification process for pure metal and an alloy in casting.	Understand	The learner to <b>recall</b> the concepts of various solidification systems and then <b>explain</b> the generalized casting systems.	CO 1
4	Draw a sketch to describe the procedure of placing sprue and risers in sand mould.	Understand	The learner to <b>find</b> about the placing of sprue and risers to <b>discuss</b> the procedures in sand mould.	CO 1
5	What is a pattern? Explain different materials suitable for pattern making.	Remember	---	CO 1
6	Name different types of patterns. Explain with neat sketch about split pattern and discuss its use.	Understand	The learner to <b>define</b> types of patterns and then <b>describes</b> about the split patterns.	CO 1
7	What are the requirements of a good gating system? Draw a sketch of a gating system and explain the functions of various elements.	Understand	The learner first to <b>recall</b> the gating systems then <b>explain</b> about functions of various elements.	CO 1
8	What are the essential properties of molding sand? Briefly explain them.	Understand	The learner to <b>define</b> the properties of mould and then <b>enumerate</b> about properties of molding techniques.	CO 1
9	What is the function of a core? What are core prints?	Remember	---	CO 1
10	Compare the hot chamber and cold chamber method of die casting.	Understand	The learners to <b>define</b> the concepts of hot and cold chamber then <b>explain</b> its casting procedures.	CO 1
11	What are the advantages and limitations of casting process?	Understand	The learner to <b>recall</b> the concepts of casting procedures and then <b>explain</b> its advantages.	CO 1
12	What are the basic requirements of a mould? Name different mould materials.	Remember	---	CO 1
13	What factors affect the choice of a particular casting process? Discuss.	Understand	The learner to <b>recall</b> the concepts of the affects of casting process and <b>explain</b> the factors in a particular casting.	CO 1
14	Distinguish between a pattern, a mould and a casting.	Remember	---	CO 1
15	What are the allowances to be given on a pattern? Explain in detail.	Understand	The learner to <b>recall</b> the concepts of allowances of any pattern and then <b>classify</b> various errors.	CO 1
16	Discuss: (i) sweep pattern (ii) gated pattern	Understand	The learner to <b>recall</b> the concepts of sweep and gated pattern and <b>explain</b> the working principles.	CO 1
17	Differentiate between runners and risers.	Understand	The learner to <b>define</b> all the runners and risers and then <b>explain</b> the types and its characteristics.	CO 1

18	Explain various sand testing methods.	Understand	The learner to <b>define</b> the various testing measurement systems then <b>explains</b> the characteristics of various testing methods.	CO 1
19	Explain the characteristics of core. Briefly explain various types of cores.	Understand	The learner to <b>recall</b> the various types of cores and then <b>explain</b> its characteristics for practical applications.	CO 1
20	With neat sketch explain investment casting process and give its applications.	Understand	The learner to <b>define</b> casting and its process then <b>describe</b> the effects of investment casting.	CO 1
<b>PART - C (PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS)</b>				
1	Why coarse sand is better for steel casting than fine grained sand? Why is it that as castings increase in size, it is often better to use increasing coarse sand?	Analysis	The learner to <b>recall</b> the casting process, understand what type of coarse sand is better and <b>apply</b> them on increase in size.	CO 1
2	With the help of sketches, discuss the various design considerations for designing the sand mould castings.	Understand	The learner to <b>recall</b> the concept of various design considerations and then <b>explain</b> the characteristics of each component in the sand mould casting.	CO 1
3	Why die casting method is mainly used for non ferrous metals? Explain.	Understand	The learner to <b>recall</b> the concept of various castings and then <b>classify</b> the importance of die casting for non ferrous metals.	CO 1
4	Why venting is necessary in die casting and how it is used?	Understand	The learner to <b>recall</b> the concept of various castings and then <b>explain</b> the venting importance in die casting.	CO 1
5	Why are ejector pins required in die casting? Explain	Understand	The learner to <b>recall</b> the concept of various castings and then <b>explain</b> the importance of ejectors pins in the casting.	CO 1
6	Why cooling of dies is necessary during their operation?	Understand	The learner to <b>recall</b> the concept of various castings and then <b>explain</b> the necessary operation in cooling of dies.	CO 1
7	How the dies for die casting are manufactured? Explain.	Understand	The learner to <b>recall</b> the concept of various castings and then <b>classify</b> the various die manufacturing process.	CO 1
8	State and explain the shell moulding casting process with neat sketch.	Understand	The learner to <b>recall</b> the concept of various castings and then <b>explain</b> the mould casting process in real time applications.	CO 1
9	Discuss about the size of a cylindrical riser necessary to feed a steel slab casting with a side riser, casting pouring horizontally into the mould.	Remember	---	CO 1
10	Compare the solidification times for castings of three different shapes of same volume: Cubic, cylindrical(with height equal to its diameter) and spherical.	Analyze	The learner to <b>recall</b> the concept of various solidification timings in casting, <b>Understand</b> what geometry shapes available and <b>apply</b> them on	CO 1

			various geometries for solidification time.	
<b>MODULE-II</b>				
<b>WELDING</b>				
<b>PART – A (SHORT ANSWER QUESTIONS)</b>				
1	What is the use of flux in welding?	Remember	---	CO 3
2	Write a short note on butt welding.	Remember	---	CO 3
3	List out minimum six types of welding process.	Understand	The learner to <b>recall</b> the principle of welding then <b>enumerates</b> various welding process.	CO 3
4	Write a short note on the symbol of weld?	Understand	The learner to <b>recall</b> the principle of welding then <b>compare</b> various symbols of welds to know the type of welding.	CO 3
5	List out the sources of energy used for welding?	Remember	---	CO 3
6	What is the use of filler material in welding?	Understand	The learner to <b>recall</b> the classification of filler materials then <b>compare</b> the type of filler material required for different welding process.	CO 3
7	Define carburizing flame and give its ratio?	Remember	---	CO 3
8	Define oxidizing flame and give its ratio?	Remember	---	CO 3
9	Define neutral flame and give its ratio?	Remember	---	CO 3
10	Differentiate between TIG welding and MIG welding.	Remember	---	CO 3
11	Write the constituents of electrode coating with their functions.	Remember	---	CO 3
12	What is heat shrinkage in spot welding?	Remember	---	CO 3
13	What is the effect of clearance in brazing?	Remember	---	CO 3
14	What is the need of flux in brazing?	Understand	The learner to <b>recall</b> the principle of brazing operation and then <b>explain</b> the flux needed for performance of brazing operation.	CO 3
15	What are the process variables in explosive welding?	Remember	---	CO 3
16	What are the modes of metal transfer in arc welding?	Remember	---	CO 3
17	How is brazing different from welding and soldering?	Remember	---	CO 3
18	Define solid state welding?	Remember	---	CO 3
19	What are the functions of coating in coated electrode?	Remember	---	CO 3
20	What are the functions of coating in coated electrode?	Remember	---	CO 3

**PART - B (LONG ANSWER QUESTIONS)**

1	Discuss classification of welding processes.	Understand	The learner to <b>recall</b> the principles of welding process and then <b>demonstrate</b> various classifications of welding processes for different materials.	CO 3
2	Explain different types of flames with neat sketches in gas welding process. Give applications for each type.	Understand	The learner to <b>recall</b> the types of flames and then <b>explain</b> its working on different materials to be welded.	CO 3
3	Explain the advantages and limitations of oxy-acetylene welding	Understand	The learner to <b>recall</b> the concept of oxy- acetylene welding process and then <b>explain</b> the advantages and limitations of the welding.	CO 3
4	Discuss shielded metal arc welding process with a neat sketch.	Analysis	The learner to <b>recall</b> the concept of shielded metal arc welding and then <b>apply</b> various shielding gases for better welding.	CO 3
5	Explain the function of coating in shielded metal arc welding process.	Remember	---	CO 3
6	Discuss electric resistance spot welding process. Explain nugget formation.	Analysis	The learner to <b>recall</b> the principles of welding and <b>apply</b> them on electric resistance spot welding to control the nugget formation.	CO 3
7	Compare resistance spot and seam welding.	Understand	The learner to <b>recall</b> the welding principles then <b>explain</b> its working on spot and seam welding.	CO 3
8	Compare resistance upset butt and flash butt welding process	Understand	The learner to <b>recall</b> the welding principles then <b>explain</b> its working on resistance upset and flash butt welding.	CO 3
9	Explain with neat sketch thermit welding process.	Remember	---	CO 3
10	Discuss estimation of cost for shielded metal arc welding process.	Understand	The learner to <b>recall</b> the principles of shielding and then <b>explain</b> the cost estimation for developing the welding process.	CO 3
11	Compare gas welding and cutting processes.	Apply	The learner to <b>recall</b> the cutting process in welding and <b>understand</b> the principles of cutting operations in welding and <b>apply</b> them on various materials for cutting.	CO 3
12	Discuss the oxy-acetylene welding process setup.	Apply	The learner to <b>recall</b> the cutting process in welding and <b>understand</b> the principles of cutting operations in welding and <b>apply</b> them on oxy-acetylene welding process.	CO 3
13	What are the various safety aspects in gas welding? Explain.	Understand	The learner to <b>recall</b> the principles of welding and then <b>explain</b> the various safety aspects in welding process	CO 3
14	Explain the advantages and disadvantages of shielded metal arc welding.	Understand	The learner to <b>recall</b> the principles of shielding and then <b>explain</b> the advantages and disadvantages in the welding process.	CO 3

15	Define polarity as applied to DC arc welding. How is this advantageously used?	Understand	The learner to <b>recall</b> the principles of AC and DC supply and then <b>explain</b> the polarity for achieving good welding products.	CO 3
16	Discuss parameters used in resistance spot welding process. Give the industrial applications of spot welding process.	Understand	The learner to <b>recall</b> the principles of welding and then <b>explain</b> the parameters used in spot welding process for industrial applications.	CO 3
17	Explain projection welding process and its application.	Understand	The learner to <b>recall</b> the principles of welding and then <b>explain</b> the process of projection in welding process.	CO 3
18	Discuss the sequence of flash butt welding process. Give applications.	Understand	The learner to <b>recall</b> the principles of welding and then <b>explain</b> the sequence of operations in flash but welding process.	CO 3
19	Discuss the advantages and limitations of thermit welding process.	Remember	---	CO 3
20	Explain the calculation of productivity in arc welding.	Remember	---	CO 3
<b>PART – C (PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS)</b>				
1	Classify the different regions of oxy-acetylene flame and with the help of neat sketches explain their characteristics.	Understand	The learner to <b>recall</b> the principles of flames in welding and then <b>explain</b> the different types of regions in oxy-acetylene welding process.	CO 3
2	State the purpose of Thermit welding. Where would you recommend it and why?	Remember	---	CO 3
3	Why is cleaning of metal is important for successful resistance welding? Explain.	Understand	The learner to <b>recall</b> the principles of welding and then <b>explain</b> the importance of metal cleaning in resistance welding.	CO 3
4	Explain the effect of “Thermal conductivity” and “Thermal expansion” on welding process.	Understand	The learner to <b>recall</b> the principles of welding and then <b>explain</b> the effects of thermal conductivity on weld metals.	CO 3
5	Why do we do the edge preparation before welding? What are the different ways of edge preparation techniques?	Apply	The learner to <b>recall</b> the cutting process in welding and <b>understand</b> the principles of cutting operations in welding and <b>apply</b> them on various edge preparations for cutting.	CO 3
6	Write primary and secondary combustion equations in oxy- acetylene gas welding process. Is it an endothermic process or exothermic process?	Remember	---	CO 3
7	Can we join dissimilar materials? If so give those process names and describe the basic principle of working.	Apply	The learner to <b>recall</b> the joining operations concepts in welding and <b>understand</b> the principles of welding operations and <b>apply</b> them on various materials for joining similar and dissimilar metals.	CO 3



8	Explain how cracking in weldments can be avoided.	Remember	---	CO 3
9	Why DC arc welding is more used than AC arc welding in specialized applications?	Remember	---	CO 3
10	Which one of the following NDT would be used to examine a completed weld for surface defects: (a) Ultrasonics (b) Dye-penetrate (c) Radiography (d) Acoustics Explain that process.	Remember	---	CO 3

### MODULE –III

#### METAL FORMING

#### PART - A (SHORT ANSWER QUESTIONS)

1	Define recrystallization temperature?	Remember	---	CO 5
2	What are different types of rolling techniques?	Understand	The learner to <b>recall</b> the rolling methods and then <b>list the</b> suitable rolling operation for different materials to slabs and sheets.	CO 5
3	What is the process involved in making internal gears?	Understand	The learner to <b>recall</b> the concept of gears then <b>explains</b> the basic principles involved in making internal gears.	CO 5
4	What are the various forces involved in rolling process?	Remember	---	CO 5
5	Write any four disadvantages of Hot working process?	Remember	---	CO 5
6	What are the operations used for making a compound die?	Remember	---	CO 5
7	What is the process used for making the parts of circular cross-section which are symmetrical about the axis of rotation	Remember	---	CO 5
8	What are various types of rolling mills?	Remember	---	CO 5
9	Describe the process of deep drawing?	Remember	---	CO 5
10	How are tensile strength, yield strength and hardness affected with cold working process?	Remember	---	CO 5
11	Write a short note on specialized types of piercing techniques.	Remember	---	CO 5
12	Define forming in terms of bending?	Remember	---	CO 5
13	What is meant by swaging?	Remember	---	CO 5
14	List out the factors effecting shearing operation?	Remember	---	CO 5
15	What type of metals is preferred for wire drawing?	Understand	The learner to <b>recall</b> the types of metals available and then <b>explains</b> its characteristics for wire drawing operations.	CO 5

16	What is meant by grain growth?	Remember	---	CO 5
17	List out the types of presses used in sheet metal operations?	Remember	---	CO 5
18	What are the power requirements for rolling process?	Remember	---	CO 5
19	Write a short note on the process of wire drawing.	Remember	---	CO 5
20	What happens when the grain structure of metal is refined?	Remember	---	CO 5
<b>PART - B (LONG ANSWER QUESTIONS)</b>				
1	Explain advantages and disadvantages of hot and cold working.	Understand	The learner to <b>recall</b> the concept of hot and cold working and then <b>explain</b> the suitable methods for metal sheet preparation.	CO 5
2	Compare properties obtained by cold and hot working process.	Understand	The learner to <b>recall</b> the concept of hot and cold working and then <b>explain</b> the suitable methods for metal sheet preparation.	CO 5
3	Name and sketch different metal forming processes.	Understand	The learner to <b>recall</b> the concept of hot and cold working and then <b>explain</b> the suitable methods for metal sheet preparation.	CO 5
4	Name some important products manufactured by metal forming processes.	Understand	The learner to <b>recall</b> the concept of hot and cold working and then <b>explain</b> the suitable methods for metal sheet preparation.	CO 5
5	What are the types of rolling processes? What products are made by rolling processes?	Understand	The learner to <b>recall</b> the concept of hot and cold working and then <b>explain</b> the suitable methods for metal sheet preparation.	CO 5
6	Explain how do you find force and power requirement for rolling processes?	Remember	---	CO 5
7	Compare blanking and piercing.	Understand	The learner to <b>recall</b> the concept of hot and cold working and then <b>explain</b> the suitable methods for metal sheet preparation.	CO 5
8	Explain bending. How do you find the forces required for bending of sheet metal?	Understand	The learner to <b>recall</b> the concept of hot and cold working and then <b>explain</b> the suitable methods for bending sheet metal preparation.	CO 5
9	Explain wire and tube drawing.	Understand	The learner to <b>recall</b> the concept of hot and cold working and then <b>explain</b> the suitable methods for wire drawing preparation.	CO 5
10	Differentiate hot and cold spinning process.	Understand	The learner to <b>recall</b> the concept of hot and cold spinning process and then <b>explain</b> the suitable methods for metal sheet preparation.	CO 6
11	Discuss various types of presses and press tools.	Understand	The learner to <b>recall</b> the concept of hot and cold press tools and then	CO 5

			<b>explain</b> the suitable methods for metal sheet preparation.	
12	Explain how do you find the force requirement in drawing?	Understand	The learner to <b>recall</b> the concept of hot and cold drawing process and then <b>explain</b> the suitable methods for metal sheet preparation.	CO 5
13	Explain deep drawing process.	Understand	The learner to <b>recall</b> the concept of hot and cold drawing process and then <b>explain</b> the suitable methods for metal sheet preparation.	CO 5
14	What do you mean by forming limit diagram?	Understand	The learner to <b>recall</b> the concept of hot and cold drawing process and then <b>explain</b> the suitable methods for metal sheet preparation.	CO 5
15	How do you find the forces required in deep drawing?	Understand	The learner to <b>recall</b> the concept of hot and cold drawing process and then <b>explain</b> the suitable methods for metal sheet preparation.	CO 5
16	Explain compound die with a neat sketch.	Remember	---	CO 5
17	Discuss defects and remedies in deep drawing.	Understand	The learner to <b>recall</b> the concept of hot and cold drawing process and then <b>explain</b> the suitable methods for metal sheet preparation.	CO 5
18	Explain spring back in bending operation.	Analyze	The learner to <b>recall</b> the various bending operations and then <b>analyze</b> the working principle of bending operation for sheet metal.	CO 5
19	Write a short note on coining process.	Understand	The learner to <b>recall</b> the concept of hot and cold drawing process and then <b>explain</b> the suitable methods for metal sheet preparation.	CO 5
20	What are various types of stamping techniques? Explain in detail.	Understand	The learner to <b>recall</b> the concept of hot and cold drawing process and then <b>explain</b> the suitable methods for metal sheet preparation.	CO 5
<b>PART – C (PROBLEM SOLVING AND CRITICAL THINKING)</b>				
1	Explain working principle of hydraulic and pneumatic press hot working and cold working process?	Understand	The learner to <b>recall</b> the concept of hot and cold drawing process and then <b>explain</b> the suitable methods for metal sheet preparation.	CO 5
2	Differentiate hot working and cold working process.	Understand	The learner to <b>recall</b> the concept of hot and cold drawing process and then <b>explain</b> the suitable methods for metal sheet preparation.	CO 5
3	How are Blanking and piercing operations perform simultaneously in making compound die?	Understand	The learner to <b>recall</b> the concept of hot and cold blanking and piercing process and then <b>explain</b> the suitable methods for metal sheet preparation.	CO 5
4	Explain different types of sheet metal operations?	Understand	The learner to <b>recall</b> the various bending operations and then <b>analyze</b> the working principle of bending operation for sheet metal.	CO 5

5	Explain the parameters to be considered in bending a sheet metal with neat diagram?	Understand	The learner to <b>recall</b> the various bending operations and then <b>analyze</b> the working principle of bending operation for sheet metal.	CO 5
6	How are the forces calculated for performing rolling operation?	Evaluate	The learner to <b>recall</b> the concept of hot and cold working and then <b>explain</b> the suitable methods for metal sheet preparation.	CO 5
7	Differentiate flat rolling and ring rolling.	Understand	The learner to <b>recall</b> the concept of hot and cold working and then <b>explain</b> the suitable methods for metal sheet preparation.	CO 5
8	Explain strain hardening techniques involved in automobile industry	Understand	The learner to <b>recall</b> the concept of hot and cold working and then <b>explain</b> the suitable methods for metal sheet hardening preparation.	CO 5
9	Write a note on micro stamping.	Understand	The learner to <b>recall</b> the concept of hot and cold working and then <b>explain</b> the suitable methods for metal sheet preparation.	CO 5
10	How is tool life estimated in Blanking and piercing techniques?	Understand	The learner to <b>recall</b> the concept of hot and cold blanking and piercing process and then <b>explain</b> the suitable methods for metal sheet preparation.	CO 5

#### MODULE –IV

#### EXTRUSION AND RAPID PROTOTYPING

#### PART – A (SHORT ANSWER QUESTIONS)

1	What are the metals suitable for hot extrusion?	Remember	---	CO 6
2	List out the limitations of direct extrusion?	Remember	---	CO 6
3	Explain the effect of friction in extrusion process?	Remember	---	CO 6
4	Name the applications of tube extrusion?	Remember	---	CO 6
5	What is the technique used for making cold chisels?	Remember	---	CO 6
6	Name some fluids used in hydrostatic extrusion.	Remember	---	CO 6
7	How is length of the tool and pressure related in backward extrusion process?	Remember	---	CO 6
8	What is the operation used for making bolt heads?	Remember	---	CO 6
9	What is the reciprocating speed of hydraulic punch in impact extrusion?	Remember	---	CO 6
10	What are the properties that can be improved by hydrostatic extrusion?	Remember	---	CO 6

11	What are the properties that can be improved by smith extrusion?	Remember	---	CO 6
12	What are the key aspects of RPT?	Remember	---	CO 6
13	Explain the need for Rapid Prototyping in industry	Remember	---	CO 6
14	Explain in detail the process chain of Rapid Prototyping	Remember	---	CO 6
15	What is Rapid Tool?	Remember	---	CO 6
16	Explain subtractive process in rapid prototyping.	Remember	---	CO 6
17	Explain the types of Rapid Prototyping techniques.	Remember	---	CO 6
18	Explain the Rapid tool and its advantages in RP	Remember	---	CO 6
19	Explain the various types of 3D printing processes. What are the advantages, disadvantages and their limitations?	Remember	---	CO 6
20	Explain fused deposition modeling with a neat sketch.	Remember	---	CO 6

**PART – B (LONG ANSWER QUESTIONS)**

1	Explain forward and back ward extrusion.	Understand	The learner to <b>recall</b> the concepts of extrusion and then <b>explain</b> the suitable methods for back and forward extrusion.	CO 6
2	Discuss the process of impact extrusion	Understand	The learner to <b>recall</b> the concepts of extrusion and then <b>explain</b> the suitable methods for back and forward extrusion.	CO 6
3	What are the advantages of hydrostatic extrusion?	Understand	The learner to <b>recall</b> the concepts of extrusion and then <b>explain</b> the suitable methods for back and forward extrusion.	CO 6
4	Explain manufacture of seamless tubes by extrusion process.	Apply	The learner to <b>recall</b> the concepts of extrusion and then <b>explain</b> the suitable methods for back and forward extrusion.	CO 6
5	Compare hot and cold extrusion.	Understand	The learner to <b>recall</b> the concepts of extrusion and then <b>explain</b> the suitable methods for back and forward extrusion.	CO 6
6	How do you find the forces in extrusion operation?	Understand	The learner to <b>recall</b> the concepts of extrusion and then <b>explain</b> the suitable methods for back and forward extrusion.	CO 6
7	Explain tube and pipe extrusion process.	Understand	The learner to <b>recall</b> the concepts of extrusion and then <b>explain</b> the suitable methods for back and forward extrusion.	CO 6
8	Discuss defects in extrusion.	Understand	The learner to <b>recall</b> the concepts of extrusion and then <b>explain</b> the suitable methods for back and forward extrusion.	CO 6

9	Discuss factors for die design in extrusion.	Understand	The learner to <b>recall</b> the concepts of extrusion and then <b>explain</b> the suitable methods for back and forward extrusion.	CO 6
10	What are the lubricants used in extrusion processes?	Remember	---	CO 6
11	What are various types of hammers and presses?	Remember	---	CO 6
12	Explain advantages and limitations of swaging.	Remember	---	CO 6
13	Discuss the evolution of RP systems indicating the history and their growth rate in the industrial sector.	Remember	---	CO 6
14	Summarize the key aspect of rapid prototyping. Explain With an example the historical development of rapid prototype technologies	Understand	The learner to <b>recall</b> the concepts of prototyping and then <b>explain</b> the suitable methods for development of rapid technologies in manufacturing.	CO 6
15	Explain rapid prototyping, Explain the difference between traditional prototyping and rapid prototyping	Remember	---	CO 6
16	Categorize of applications in rapid prototype technology in manufacturing industries and also compare rapid prototype technology with computer numerical control technology	Remember	---	CO 6
17	Explain the difference between traditional prototyping and rapid prototyping related to commercial usage	Remember	---	CO 6
18	What is Rapid prototyping? Explain with application, advantages and disadvantages compared to any other conventional processes	Understand	The learner to <b>recall</b> the concepts of prototyping and then <b>explain</b> the suitable methods for development of rapid technologies in manufacturing.	CO 6
19	Write the prerequisites for rapid tooling in Rapid prototyping.	Understand	The learner to <b>recall</b> the concepts of prototyping and then <b>explain</b> the suitable methods for development of rapid technologies in manufacturing.	CO 6
20	Explain about any one of the additive manufacturing process with a neat sketch.	Remember	---	CO 6

**PART – C (PROBLEM SOLVING AND CRITICAL THINKING)**

1	Determine forms when a material is subjected to extension process.	Remember	---	CO 6
2	Compare the difference between forward backward and impact extension?	Remember	---	CO 6
3	What are the defects identified in forging and give remedies for each defects?	Apply	The learner to <b>recall</b> the concepts of forging and then <b>explain</b> the suitable remedies for the identified defects.	CO 6
4	What are the considerations to be taken for making a die using extrusion?	Understand	The learner to <b>recall</b> the concepts of extrusion and then <b>explain</b> the suitable methods for back and forward extrusion.	CO 6

5	How are internal cavities minimized during extrusion of a metal? Explain.	Understand	The learner to <b>recall</b> the concepts of extrusion and then <b>explain</b> the suitable methods for back and forward extrusion.	CO 6
6	Write a note on metals that are included in friction extrusion process.	Remember	---	CO 6
7	Explain the classification of rapid manufacturing process, explain merits and demerits	Understand	The learner to <b>recall</b> the concepts of prototyping and then <b>explain</b> the suitable methods for development of rapid technologies in manufacturing.	CO 6
8	Discuss the evolution of RP systems indicating the history and their growth rate in the industrial sector	Apply	The learner to <b>recall</b> the concepts of prototyping and then <b>explain</b> the suitable methods for development of rapid technologies in manufacturing.	CO 6
9	Explain in detail the process chain of Rapid Prototyping	Remember	---	CO 6
10	Explain, with suitable example, how rapid prototyping and tooling are the good examples as part of computer integrated Manufacturing.	Understand	The learner to <b>recall</b> the concepts of prototyping and then <b>explain</b> the suitable methods for development of rapid technologies in manufacturing.	CO 6

## MODULE –V

### FORGING

#### PART - A (SHORT ANSWER QUESTIONS)

1	What are the advantages of open die forging?	Remember	---	CO 8
2	What are the tools required for forging?	Remember	---	CO 8
3	Explain the effect of friction in extrusion process?	Remember	---	CO 8
4	What is the principle of forging process?	Remember	---	CO 8
5	What is the technique used for making cold chisels?	Remember	---	CO 8
6	How is length of the tool and pressure related in backward extrusion process?	Remember	---	CO 8
7	What is the principle of forging technique?	Remember	---	CO 8
8	What is the operation used for making bolt heads?	Remember	---	CO 8
9	Write any three defects of forging.	Understand	The learner to <b>recall</b> the concepts of forging and then <b>explain</b> the suitable methods for reducing forging defects.	CO 8
10	How is cross sectional area of metal affected with application of force in the direction perpendicular to length axis in smith forging?	Remember	---	CO 8
11	How is ductility of a metal affected in cold forging process?	Remember	---	CO 8
12	What are the materials used for making forging hammers?	Remember	---	CO 8
13	What is the suitable temperature for performing hot forging in aluminum alloys?	Remember	---	CO 8



14	Write a note on drop forging.	Remember	---	CO 8
15	Explain the characteristics of forging process.	Remember	---	CO 8
16	Write a short note on cold forging.	Understand	The learner to <b>recall</b> the concepts of forging and then <b>explain</b> the suitable methods for cold forging.	CO 8
17	Which characteristic of material is used in forging process?	Remember	---	CO 8
18	Explain the mechanical working processes in forging.	Remember	---	CO 8
19	Write a note on roll forging	Remember	---	CO 8
20	What is the suitable temperature for performing hot forging in alloys?	Remember	---	CO 8

**PART - B (LONG ANSWER QUESTIONS)**

1	Explain various forging processes.	Remember	---	CO 8
2	What are various types of hammers and presses?	Remember	---	CO 8
3	Discuss any five forging defects.	Understand	The learner to <b>recall</b> the concepts of forging and then <b>explain</b> the suitable methods for reducing forging defects.	CO 8
4	What do you understand by isothermal forging and incremental forging?	Understand	The learner to <b>recall</b> the concepts of forging and then <b>explain</b> the suitable methods for isothermal forging.	CO 8
5	Differentiate between drop forging and press forging.	Understand	The learner to <b>recall</b> the concepts of forging and then <b>explain</b> the suitable methods for drop and press forging.	CO 8
6	Compare open die and closed die forging.	Understand	The learner to <b>recall</b> the concepts of forging and then <b>explain</b> the suitable methods for open and closed forging.	CO 8
7	Explain advantages and limitations of roll forging.	Understand	The learner to <b>recall</b> the concepts of forging and then <b>explain</b> the suitable methods for roll forging.	CO 8
8	Explain advantages and limitations of swaging.	Analyze	The learner to <b>understand</b> the concepts of swaging and then <b>recall</b> their <b>classification</b> to <b>compare</b> the advantages and limitations.	CO 8
9	Explain how you find the forces in forging operation.	Analyze	The learner to <b>understand</b> the concepts of forging and then <b>recall</b> their force calculations to <b>analyze</b> the power and efficiency.	CO 8
10	Explain advantages and limitations of mechanical forging presses.	Understand	The learner to <b>recall</b> the concepts of forging and then <b>explain</b> the suitable methods for mechanical presses.	CO 8
11	State the various forces involved in forging process? Explain briefly. With a neat sketch	Remember	---	CO 8



12	How internal cavities are can be overcome during extrusion of a metal? Explain.	Understand	The learner to <b>recall</b> the concepts of forging and then <b>explain</b> the suitable methods for extrusion of metal.	CO 8
13	Write a note on tools and machines/equipments used for forging process.	Remember	---	CO 8
14	Discuss the design principles of roll forging?	Remember	---	CO 8
15	Compare exclusively the design principles of Roll and drop forging?	Understand	The learner to <b>recall</b> the concepts of forging and then <b>explain</b> the suitable methods for roll and drop forging.	CO 8
16	Explain in detail about defects in forging operation?	Understand	The learner to <b>recall</b> the concepts of forging and then <b>explain</b> the suitable methods for reducing defects in forging.	CO 8
17	How due the defects are overcome during the industrial forging processes	Apply	The learner to <b>recall</b> the concepts of forging and then <b>explain</b> the <b>importance</b> for reducing defects in forging.	CO 8
18	Compare the concept/process of isothermal forging and incremental forging?	Understand	The learner to <b>recall</b> the concepts of forging and then <b>explain</b> the suitable methods for incremental forging.	CO 8
19	Explain the general characteristics of forging operations with advantages in list	Understand	The learner to <b>recall</b> the concepts of forging and then <b>explain</b> the suitable methods for forging.	CO 8
20	Explain in detail about the concept of Impression-die and Closed-die Forging	Understand	The learner to <b>recall</b> the concepts of forging and then <b>explain</b> the suitable methods for impression die and closed forging.	CO 8
<b>PART – C (PROBLEM SOLVING AND CRITICAL THINKING)</b>				
1	Determine the Principle of forging and different methods of forging?	Apply	The learner to <b>recall</b> the concepts of forging and then <b>explain</b> the <b>importance</b> of forging for industrial applications.	CO 8
2	Compare the difference between smith forging and roller forging?	Remember	---	CO 8
3	What are the defects identified in forging and give remedies for each defects?	Understand	The learner to <b>recall</b> the concepts of forging and then <b>explain</b> the suitable methods for reducing forging defects	CO 8
4	What are various forces involved in forging process? Explain briefly.	Understand	The learner to <b>recall</b> the concepts of forging and then <b>explain</b> the suitable methods of forging with various forces.	CO 8
5	How are internal cavities minimized during extrusion of a metal? Explain.	Understand	The learner to <b>recall</b> the concepts of extrusion and then <b>explain</b> the concepts of internal cavities to minimize the extrusion of metal.	CO 8
6	Write a note on metals that are included in friction extrusion process.	Apply	The learner to <b>recall</b> the concepts of forging and then <b>explain</b> the <b>importance</b> of smith and roller forging	CO 8

7	Write a note on tools used for forging process.	Understand	The learner to <b>recall</b> the concepts of forging and then <b>explain</b> the suitable tools for different forging applications.	CO 8
8	Explain the forces in forging operations.	Remember	---	CO 8
9	Discuss the design principles of drop forging?	Apply	The learner to <b>recall</b> the concepts of forging and then <b>explain</b> the <b>importance</b> of design considerations in forging.	CO 8
10	What are the general considerations adopted for designing a forging job.	Remember	---	CO 8

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