

**PSN COLLEGE OF ENGINEERING AND TECHNOLOGY**  
**(An Autonomous Institution Affiliated to Anna University)**

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**Department of Mechanical Engineering**



## **QUESTION BANK**

**Degree/Branch: B.E. Mechanical Engineering**

**Semester: III**

**Subject Code/Title: ME630203/ MANUFACTURING TECHNOLOGY-I**

**Regulation: R2022**

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<b>Unit I – METAL CASTING PROCESS</b>			
<b>Part A ( 2 marks)</b>			
<b>Q.No</b>	<b>Question</b>	<b>BT Level*</b>	<b>Competence#</b>
1	Define mould	BTL-1	Remembering
2	What are the pattern materials?	BTL-1	Remembering
3	Define casting	BTL-1	Remembering
4	Name any four types of commonly used patterns	BTL-1	Remembering
5	State the important factors to be considered for choosing a pattern materials	BTL-2	Understanding
6	List any four allowance considered while designing a pattern	BTL-1	Remembering
7	What are the properties of good moulding sand ?.	BTL-1	Remembering
8	State the various methods for testing moulding sand .	BTL-2	Understanding
9	What is core print? Mention its purpose	BTL-1	Remembering
10	what are the merits of co2 process	BTL-1	Remembering
11	What is lost-wax method?	BTL-1	Remembering
12	What is meant by precision investment casting ?	BTL-1	Remembering
13	What are the different type of moulding sand ?	BTL-1	Remembering
14	What are the uses of runner and riser?	BTL-1	Remembering
15	What are the causes for formation of blow holes in the sand casting?	BTL-2	Understanding
16	Which types of furnace are suitable for melting of ferrous material and why?	BTL-1	Remembering

17	How does hot chamber die casting process differ from cold chamber die casting process?	BTL-2	Understanding
18	What is die casting?	BTL-1	Remembering
19	Name any four casting defects	BTL-1	Remembering
20	Mention any two reasons of occurring swell in casting	BTL-2	Understanding
<b>Part B (13 marks)</b>			
Q.No	Question	BT Level*	Competence#
1	Explain the various types of pattern used for making mould	BTL-2	Understanding
2	What are pattern allowance? Explain briefly each	BTL-2	Understanding
3	Explain various properties required for the moulding sand	BTL-2	Understanding
4	Describe constructional feature and working of a cupola furnace	BTL-2	Understanding
5	Describe shell moulding process with neat sketches	BTL-2	Understanding
6	Explain the centrifugal casting process and its applications, advantages and disadvantages	BTL-2	Understanding
7	Discuss the CO <sub>2</sub> process in molding machines. Explain how CO <sub>2</sub> is used to improve the mold quality and casting properties. Describe the functioning of CO <sub>2</sub> molding machines and their advantages over other molding processes.	BTL-2	Understanding
8	Compare and contrast investment casting and pressure die casting processes. Discuss their applications, advantages, and limitations. Explain the key differences in terms of mold preparation, casting techniques, and the types of products produced.	BTL-2	Understanding
<b>Part c (15 marks)</b>			
1	Explain the centrifugal casting process and its applications. Discuss the advantages of centrifugal casting over other casting methods and provide examples of products that are commonly produced using this technique.	BTL-2	Understanding
2	Discuss common casting defects encountered in metal casting processes. Explain the causes, effects, and preventive measures for each defect. Illustrate your answer with suitable examples.	BTL-2	Understanding

\* BT Levels – BTL1 to BTL6

# Competence – Remember, understand, apply, analyze, evaluate, create

**Unit II – METAL JOINING PROCESS****Part A ( 2 marks)**

<b>Q.No</b>	<b>Question</b>	<b>BT Level*</b>	<b>Competence#</b>
1	Name two types of gas welding techniques.	BTL-1	Remembering
2	What are the common equipment used in gas welding?	BTL-1	Remembering
3	What is the function of electrode coatings in welding?	BTL-1	Remembering
4	Name two types of resistance welding techniques	BTL-1	Remembering
5	Describe the characteristics of a neutral flame in gas welding	BTL-1	Remembering
6	List three components of an arc welding setup	BTL-2	Understanding
7	What is the principle behind gas metal arc welding (GMAW)?	BTL-1	Remembering
8	Which welding process uses a consumable electrode and a granulated flux?	BTL-1	Remembering
9	What is the primary purpose of tungsten inert gas (TIG) welding?	BTL1	Remembering
10	Name a welding process that uses a high-temperature chemical reaction to join metals.	BTL-2	Understanding
11	Identify three common defects that can occur in welds	BTL-1	Remembering
12	What is the main difference between brazing and soldering?	BTL-1	Remembering
13	Name two typical filler materials used in gas welding	BTL-1	Remembering
14	What are the fluxes used in gas welding?	BTL-1	Remembering
15	Which welding process utilizes a focused plasma arc for joining metals?	BTL-1	Remembering
16	What is the purpose of flux in thermit welding?	BTL-1	Remembering
17	Name a welding process that uses a high-energy beam of electrons to melt and join metals	BTL-2	Understanding
18	Which welding process utilizes a highly focused laser beam for precision welding?	BTL-1	Remembering
19	Describe two welding defects commonly encountered in welding processes.	BTL-2	Understanding
20	Difference between brazing and soldering processes in terms of temperature requirements and joint strength.	BTL-2	Understanding

**Part B (13 marks)**

<b>Q.No</b>	<b>Question</b>	<b>BT Level*</b>	<b>Competence#</b>
1	Describe with a neat diagram the components of oxy-acetylene gas welding equipment	BTL-2	Understanding
2	Sketch the three types of flames in oxy-acetylene gas welding and state their characteristics	BTL-2	Understanding
3	Explain MIG welding and TIG welding process with suitable diagram	BTL-2	Understanding
4	Critically analyze the various types of welding defects that can occur in welding processes. Discuss the causes of these defects, their impact on the joint integrity, and the measures that can be taken to prevent or minimize their occurrence.	BTL-2	Understanding
5	Describe submerged arc welding with suitable sketch and mention their merits ,demerits and applications	BTL-2	Understanding

<b>6</b>	Investigate the principles and process capabilities of friction stir welding (FSW) and its applications in joining dissimilar materials. Evaluate the advantages of FSW over conventional fusion welding methods in terms of joint strength, microstructure, and heat-affected zone.	<b>BTL4</b>	<b>Analyzing</b>
<b>7</b>	What is the principle of thermit welding? Explain with a neat sketch of welding arrangement	<b>BTL-2</b>	<b>Understanding</b>
<b>8</b>	Evaluate the challenges and advancements in laser beam welding (LBW) technology. Discuss the factors affecting LBW process efficiency, joint quality, and productivity. Analyze the applications and benefits of LBW in industries such as aerospace and automotive.	<b>BTL-5</b>	<b>evaluating</b>
<b>Part C (15 marks)</b>			
<b>1</b>	. Critically assess the principles and applications of ultrasonic welding (USW) in joining plastic components. Discuss the factors that affect the weld quality in USW and the measures taken to optimize the process parameters for achieving reliable and strong joints.	<b>BTL-2</b>	<b>Understanding</b>
<b>2</b>	Describe PLASMA arc welding with suitable sketch and mention their merits ,demerits and applications	<b>BTL-2</b>	<b>Understanding</b>

\* **BT Levels – BTL1 to BTL6**

# **Competence – Remember, understand, apply, analyze, evaluate, create**

<b>Unit III – FUNDAMENTALS OF MACHINING</b>			
<b>Part A ( 2 marks)</b>			
<b>Q.No</b>	<b>Question</b>	<b>BT Level*</b>	<b>Competence#</b>
<b>1</b>	Define material removal processes and provide two examples	<b>BTL-1</b>	<b>Remembering</b>
<b>2</b>	Name two types of machine tools commonly used in machining operations	<b>BTL-1</b>	<b>Remembering</b>
<b>3</b>	Explain the concept of chip formation in metal cutting	<b>BTL-2</b>	<b>Understanding</b>
<b>4</b>	Describe orthogonal cutting and its significance in machining	<b>BTL-2</b>	<b>Understanding</b>
<b>5</b>	What are shear zones in metal cutting? Explain their role in the machining process.	<b>BTL-1</b>	<b>Remembering</b>
<b>6</b>	Explain the Merchants circle and its application in metal cutting	<b>BTL-2</b>	<b>Understanding</b>
<b>7</b>	Discuss the importance of cutting tool geometry in machining operations	<b>BTL-1</b>	<b>Remembering</b>

8	Name two commonly used cutting tool materials and their respective advantages.	BTL-1	Remembering
9	Define tool wear and explain its impact on machining performance	BTL1	Remembering
10	What is meant by tool life in machining? How is it determined?	BTL-1	Remembering
11	Explain the significance of surface finish in machining operations	BTL-1	Remembering
12	How do cutting fluids influence the machining process? Name two functions of cutting fluids.	BTL-1	Remembering
13	. Discuss the influence of tool angles on machining performance	BTL-1	Remembering
14	Explain the influence of tool height on machining operations	BTL-1	Remembering
15	Describe the concept of metal cutting theory and its relevance in machining	BTL-2	Understanding
16	What are the three primary types of cutting tool materials used in machining?	BTL-1	Remembering
17	Discuss the factors that affect tool life in metal cutting.	BTL-2	Understanding
18	Explain the role of cutting fluids in controlling chip formation and improving tool life	BTL- 2	Understanding
19	What are the advantages of using high-speed steel (HSS) cutting tools in machining?	BTL-1	Remembering
20	How does the selection of cutting tool geometry impact surface finish in machining?	BTL-1	Remembering

**Part B (13 marks)**

Q.No	Question	BT Level*	Competence#
1	Describe the mechanics of metal cutting in detail, including the various forces involved and their effects on the workpiece and cutting tool	BTL-2	Understanding
2	Explain the concept of chip formation in metal cutting, discussing the different types of chips and the factors that influence their formation.	BTL-2	Understanding
3	Discuss the significance of tool wear in machining operations. Explain the different types of tool wear and their effects on the machining process	BTL-2	Understanding
4	Explain the principles of the Merchants circle and its application in optimizing cutting conditions for achieving desired tool life and surface finish	BTL-2	Understanding
5	Discuss the factors that influence tool life in machining. Explain how cutting speed, feed rate, depth of cut, and tool material affect tool life	BTL-2	Understanding
6	Describe the influence of cutting fluids on machining operations. Discuss the functions of cutting fluids and the factors to consider when selecting a suitable cutting fluid.	BTL-2	Understanding

7	Explain the role of cutting tool geometry in metal cutting. Discuss the importance of tool angles, such as rake angle and relief angle, and their impact on cutting forces and surface finish	BTL-2	Understanding
8	Discuss the different cutting tool materials used in machining. Compare and contrast the characteristics of high-speed steel (HSS), carbide, and ceramic tool materials.	BTL-2	Understanding
<b>Part C (15 marks)</b>			
1	Explain the concept of surface finish in machining. Discuss the factors that affect surface finish, such as cutting speed, feed rate, and tool geometry.	BTL-2	Understanding
2	Discuss the influence of cutting parameters, such as cutting speed, feed rate, and depth of cut, on the surface roughness and dimensional accuracy of the machined part.	BTL-2	Understanding

\* BT Levels – BTL1 to BTL6

# Competence – Remember, understand, apply, analyze, evaluate, create

<b>Unit IV – GEAR MANUFACTURING AND SURFACE FINISHING</b>			
<b>Part A ( 2 marks)</b>			
Q.No	Question	BT Level*	Competence#
1	What are the three gear manufacturing processes?	BTL-1	Remembering
2	Name a gear machining process used for creating gears through material removal	BTL-1	Remembering
3	What is the primary purpose of gear shaping?	BTL-1	Remembering
4	Which abrasive process is commonly used for cylindrical grinding?	BTL-1	Remembering
5	What is the goal of surface grinding?	BTL-1	Remembering
6	Name a type of grinding process that does not require a center point	BTL-1	Remembering
7	What factors should be considered when selecting a grinding wheel?	BTL-1	Remembering
8	Name a fine finishing process used to improve the surface quality of gears	BTL-1	Remembering
9	What is powder metallurgy ?	BTL-1	Remembering
10	Name a process used for removing small amounts of material from a gear surface	BTL-1	Remembering
11	What is the primary objective of polishing and buffing in surface finishing?	BTL-1	Remembering
12	Name a process used for cleaning and deburring gears using rotating brushes	BTL-1	Remembering

13	What is the purpose of tumbling in gear manufacturing?	BTL-1	Remembering
14	What is the main advantage of metal spraying in surface finishing?	BTL-1	Remembering
15	Name a method used for applying a metallic coating to a gear surface	BTL-1	Remembering
16	What is the purpose of gear extrusion in gear manufacturing?	BTL-1	Remembering
17	Name a gear machining process that involves the use of a rotating cutter and a gear blank.	BTL-1	Remembering
18	What is the primary advantage of powder metallurgy in gear manufacturing?	BTL-1	Remembering
19	Name a common type of grinding process used for achieving a precise and accurate gear profile	BTL-1	Remembering
20	What is the function of gear hobbing in gear manufacturing?	BTL-1	Remembering
<b>Part B (13 marks)</b>			
Q.No	Question	BT Level*	Competence <sup>#</sup>
1	Explain the gear manufacturing processes of extrusion, stamping, and powder metallurgy in detail. Discuss their advantages and limitations.	BTL-2	Understanding
2	Describe the gear machining process of gear hobbing. Discuss the steps involved and explain how accurate gear teeth profiles are achieved.	BTL-2	Understanding
3	Discuss the different types of abrasive processes used for surface finishing in gear manufacturing. Compare and contrast cylindrical grinding, surface grinding, and centerless grinding.	BTL-2	Understanding
4	Explain the factors that should be considered when selecting a grinding wheel for gear manufacturing. Discuss the importance of grinding wheel specifications in achieving desired surface finishes.	BTL-2	Understanding
5	Describe the fine finishing processes of honing, lapping, and superfinishing. Discuss their applications in gear manufacturing and explain how they improve surface quality.	BTL-3	applying
6	Discuss the principles and applications of gear forming processes such as extrusion, stamping, and powder metallurgy. Compare and contrast these processes, highlighting their advantages and limitations	BTL-2	Understanding
7	Explain the gear generating process and gear shaping in detail. Discuss the differences between these two methods of creating gear teeth and their applications in gear manufacturing.	BTL-2	Understanding
8	Describe the surface finishing processes of polishing, buffing, and power brushing in gear manufacturing. Discuss their	BTL-2	Understanding

	objectives and the techniques used to achieve desired surface finishes.		
<b>Part C (15 marks)</b>			
<b>1</b>	Discuss the process of gear metallization in surface finishing. Explain its purpose, advantages, and applications in gear manufacturing.	<b>BTL-2</b>	<b>Understanding</b>
<b>2</b>	Compare and contrast the gear manufacturing processes of extrusion, stamping, and powder metallurgy. Discuss their suitability for different gear applications and the factors to consider when selecting the appropriate process.	<b>BTL-2</b>	<b>Understanding</b>

\* BT Levels – BTL1 to BTL6

# Competence – Remember, understand, apply, analyze, evaluate, create

<b>Unit V – MACHINE TOOLS FOR NON-CIRCULAR COMPONENTS AND HOLE MAKING</b>			
<b>Part A ( 2 marks)</b>			
<b>Q.No</b>	<b>Question</b>	<b>BT Level*</b>	<b>Competence#</b>
<b>1</b>	Name three types of reciprocating machine tools used for shaping and planing operations	<b>BTL-1</b>	<b>Remembering</b>
<b>2</b>	What is the main function of a shaper machine?	<b>BTL-2</b>	<b>Understanding</b>
<b>3</b>	Describe the construction details of a slotter machine	<b>BTL-1</b>	<b>Remembering</b>
<b>4</b>	What are the two main types of milling machines based on their spindle orientation?	<b>BTL-2</b>	<b>Understanding</b>
<b>5</b>	Discuss the specifications and parts of a horizontal milling machine	<b>BTL-1</b>	<b>Remembering</b>
<b>6</b>	What are milling cutters? Explain their function in milling operations	<b>BTL-1</b>	<b>Remembering</b>
<b>7</b>	Name a work holding device used in milling operations to hold the workpiece securely	<b>BTL-2</b>	<b>Remembering</b>
<b>8</b>	Describe the operations performed on a milling machine	<b>BTL-2</b>	<b>Understanding</b>
<b>9</b>	What is the purpose of hole making processes in machining?	<b>BTL-2</b>	<b>Understanding</b>
<b>10</b>	Name a common hole making process used for creating holes of varying diameters.	<b>BTL-1</b>	<b>Remembering</b>
<b>11</b>	Explain the process of drilling in hole making.	<b>BTL-2</b>	<b>Understanding</b>
<b>12</b>	What is the purpose of reaming in hole making?	<b>BTL-1</b>	<b>Remembering</b>
<b>13</b>	Name a process used for enlarging an existing hole to achieve a precise diameter and surface finish.	<b>BTL-1</b>	<b>Remembering</b>
<b>14</b>	Describe the tapping process in hole making	<b>BTL-2</b>	<b>Understanding</b>

15	What is the purpose of sawing in hole making?	BTL-1	Remembering
16	What are the construction parts of a planer machine ?	BTL-1	Remembering
17	Explain the specifications and parts of a vertical milling machine	BTL-2	Understanding
18	What is the function of milling cutters in milling machines?)	BTL-1	Remembering
19	Name a work holding device used in hole making processes.	BTL-1	Remembering
20	Describe the operations performed in hole making processes such as drilling, reaming, boring, and tapping.	BTL-2	Understanding

**Part B (13 marks)**

Q.No	Question	BT Level*	Competence#
1	. Explain the construction details of a milling machine and discuss the functions of its main components. Provide labeled diagrams to support your answer.	BT-L2	Understanding
2	Compare and contrast the operations performed on a shaper machine and a planer machine. Discuss their respective advantages and limitations.	BTL-2	Understanding
3	Discuss the types of milling cutters used in milling operations. Explain their design features, applications, and advantages.	BTL-2	Understanding
4	Describe the process of hole making using drilling, reaming, boring, and tapping operations. Discuss the tools, techniques, and considerations for each operation.	BTL-2	Understanding
5	Compare and contrast the horizontal milling machine and the vertical milling machine. Discuss their respective advantages, applications, and limitations.	BTL-2	Understanding
6	Explain the principles and applications of non-circular machining processes, such as gear shaping and gear hobbing. Provide examples and discuss the advantages of each process	BTL-2	Understanding
7	What are the types of work holding devices used in milling operations. Explain their design, applications, and advantages for holding different work pieces securely.	BTL-2	Understanding
8	Describe the different surface finishing processes used in machining, such as grinding, honing, lapping, and polishing. Discuss their principles, applications, and advantages.	BTL-2	Understanding

**Part C (15 marks)**

1	Explain the principles and applications of metal spraying and metallization in surface finishing processes. Discuss their advantages, limitations, and typical applications.	BTL-2	Understanding
2	Discuss the principles and applications of sawing in hole making processes. Explain the different types of sawing machines and their advantages for cutting various workpiece materials.	BTL-2	Understanding

\* **BT Levels – BTL1 to BTL6**

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