Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem Examination Dec 2024

ME3CO18 Manufacturing Processes -I

Programme: B.Tech. Branch/Specialisation: ME

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

			Marks	BL	PO	CO	PSO
Q.1	i.	Which type of sand is commonly used for making moulds in foundries? (a) River sand (b) Silica sand (c) Beach sand (d) Clay sand	**1**	2	1	1	3
	ii.	What is the function of a binder in moulding sand? (a) To add weight (b) To hold the sand grains together (c) To provide color (d) To improve thermal conductivity	**1**	2	1	1	3
	iii.	Which of the following is a disadvantage of sand casting? (a) High setup costs (b) Good dimensional accuracy (c) Flexibility in design (d) Suitable for large castings	**1**	3	1	2	3
	iv.	What is the primary advantage of using die casting? (a) High strength of castings (b) Low production speed (c) Ability to produce complex shapes (d) High production rates and good surface finish	**1**	1	1	2	3
	v.	In extrusion, the metal is forced through a die to produce: (a) Flat sheets (b) Hollow tubes (c) Continuous profiles (d) All of these	**1**	1	1	3	3

P.T.O.

vi.	What is a key advantage of cold working in sheet metal processes? (a) Increased ductility (b) Improved strength and surface finish (c) Lower energy requirements (d) Reduced tooling costs	**1**	1	6	3	3
vii.	In which welding method is no filler material used? (a) Spot Welding (b) Gas Tungsten Arc Welding (GTAW) (c) Flux-Cored Arc Welding (FCAW) (d) Submerged Arc Welding (SAW)	**1**	2	1	4	3
viii.	What type of current is commonly used in TIG welding? (a) Alternating Current (AC) (b) Direct Current (DC) (c) Both AC and DC (d) None of these	**1**	1	1	4	3
ix.	Which method is used to produce metal powders from solid metals? (a) Atomization (b) Electrolysis (c) Compression (d) Casting	**1**	1	5	5	3
x.	What is the main advantage of using powder metallurgy? (a) High production costs (b) Ability to produce complex shapes (c) Limited material selection (d) Requires extensive machining	**1**	2	1	5	3
Q.2 i.	How do pattern allowances affect the design of moulding patterns? Why are these allowances necessary?	**4**	3	1	1	3
ii.	Evaluate the importance of draft allowance in pattern making. Explain how insufficient draft can lead to defects in the casting process.	**6**	3	2	1	3
OR iii.	Discuss the different types of patterns used in casting and describe the characteristics of each type.	**6**	1, 2	1	1	3

Q.3 i.	What are the primary components of a gating system? What is the function of each?	**4**	1	2	2	3
ii.	What are melting furnaces in the casting process? Why is furnace selection critical to the success of metal casting operations?	**6**	3	7	2	2
OR iii.	Explain the concept of directional solidification and how it helps to reduce casting defects.	**6**	2	1	2	3
Q.4 i.	What are the fundamental principles of sheet metal forming, and how does the process differ from other metalworking techniques?	**4**	1	1	3	3
ii.	What are the key types of extrusion processes? How are they classified? Explain the advantages and limitations of each type.	**6**	1	1	3	3
OR iii.	What role does temperature play in forging? How do hot forging and cold forging differ in terms of their effects on the material?	**6**	2	3	3	2
Q.5 i.	Discuss the advantages and disadvantages of Gas Metal Arc Welding compared to other arc welding processes.	**4**	2	1	4	2
ii.	What are the key factors that influence the choice of filler material in welding, and how does the selection impact the mechanical properties and integrity of the weld joint?	**6**	4	2	4	2
OR iii.	Describe the types of defects that can occur during welding, and explain the techniques used to prevent or correct these defects.	**6**	4	2	4	3
Q.6 i.	What is sintering in powder metallurgy? How does the sintering process affect the microstructure and mechanical properties of the final part?	**4**	1	1	5	3
ii.	Explain the various stages involved in the powder metallurgy process.	**6**	1	1	5	3
OR iii.	Discuss the advantages and limitations of powder metallurgy compared to conventional metalworking processes.	**6**	2	1	5	3

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Marking Scheme

ME3CO18 Manufacturing Processes -I

Q.1	i)	**Answer:** B) Silica sand	**1**
	ii)	**Answer:** B) To hold the sand grains together	**1**
	iii)	**Answer:** A) High setup costs	**1**
	iv)	**Answer:** D) High production rates and good surface finish	**1**
	v)	**Answer:** D) All of the above	**1**
	vi)	**Answer:** B) Improved strength and surface finish	**1**
	vii)	**Answer:** B) Gas Tungsten Arc Welding (GTAW)	**1**
	viii)	**Answer:** C) Both AC and DC	**1**
	ix)	**Answer:** A) Atomization	**1**
	x)	**Answer:** B) Ability to produce complex shapes	**1**
Q.2	i.	How do pattern allowances affect the design of moulding patterns? 2M Why are these allowances necessary? 2M	**4**
	ii.	Evaluate the importance of draft allowance in pattern making. 3M Explain how insufficient draft can lead to defects in the casting process. 3M	**6**
OR	iii.	The different types of patterns. 2M Their characteristics. 4M	**6**
Q.3	i.	What are the primary components of a gating system. 2M what is the function of each? 2M	**4**
	ii.	What are melting furnaces in the casting process, 3M why is furnace selection critical to the success of metal casting operations? 3M	**6**
OR	iii.	Explain the concept of directional solidification. 3M How it helps to reduce casting defects. 3M	**6**
Q.4	i.	What are the fundamental principles of sheet metal forming 2M How does the process differ from other metalworking techniques? 2M	**4**
	ii.	What are the key types of extrusion processes, how are they classified? 2M Explain the advantages and limitations of each type. 4M	**6**
OR	iii.	What role does temperature play in forging. 2M How do hot forging and cold forging differ in terms of their effects on the material? 4M	**6**
Q.5	i.	Advantages of Gas Metal Arc Welding processes. 2M Disadvantages of Gas Metal Arc Welding processes. 2M	**4**
	ii.	What are the key factors that influence the choice of filler material in welding. 3M How does the selection impact the mechanical properties and integrity of the weld joint? 3M	**6**
OR	iii.	Describe the types of defects that can occur during welding. 3M Explain the techniques used to prevent or correct these defects. 3M	**6**
Q.6	i.	What is sintering in powder metallurgy. 2M How does the sintering process affect the microstructure and mechanical properties of the final part? 2M	**4**
	ii.	Powder Production 1M Blending and Mixing 1M Compaction 1M Sintering 1M Secondary Operations (Optional) 1M Finishing 1M	**6**
	iii.	The advantages of powder metallurgy processes (minimum 3 points) 3M The limitations of powder metallurgy processes. (minimum 3 points) 3M	**6**

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