Roll No. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. / B. Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, May / June 2024

Materials Science and Engineering
IVth Semester
ML5405 & Powder Metallurgy
(Regulation 2019)

Time: 3hrs

Max.Marks: 100

CO 1	To classify the various powder production methods and the Powder conditioning treatments.
CO 2	To interpret the various characteristics of metal powders.
CO 3	To compare the different compaction processes and identify a suitable compaction methodology for a component meant for specific application
CO 4	To explain the sintering mechanisms and the various types of Sintering processes as well as the finishing processes.
CO 5	To get acquainted with the applications of various powder metallurgy components.

BL – Bloom's Taxonomy Levels
(L1 - Remembering, L2 - Understanding, L3 - Applying, L4 - Analyzing, L5 - Evaluating, L6 - Creating)

PART- A (10 x 2 = 20 Marks)
(Answer all Questions)

Q. No	Questions	Marks	CO	BL
1	How do the cracks in railway tracks are closed? Explain with the equation?	2	1	L4
2	Iron pillar in Delhi is not corroding. What is reason?	2	1	L4
3	Define green strength?	2	2	L1
4	What are the precautions to be taken while handling toxic powders?	2	2	L2
5	How the porosity varies with compaction pressure?	2	3	L2
6	Explain explosive powder production technique?	2	3	L1
7	When do you use liquid phase sintering?	2	4	L3
8	What is reactive sintering? give an example?	2	4	L1
9	Name the bearing materials manufactured through powder metallurgy route?	2	5	L2
10	Define cermet?	2	5	L1

PART- B (5 x 13 = 65 Marks)
(Restrict to a maximum of 2 subdivisions)

Q. No	Questions	Marks	CO	BL
11 (a)	Classify the powder production methods and explain the chemical method of powder production?	13	1	L2
	OR			
11 (b)	What are the reasons of powder conditioning and explain it in detail?	13	1	L2

12 (a)	What is surface area? How are surface area measured using Langmuir theorem?	**13**	2	L2
	OR			
12 (b)	Explain the DLS technique to determine the characteristics of powders?	**13**	2	L2
13 (a)	What happens when the pressure is applied on the powders?	**13**	3	L3
	OR			
13 (b)	How powder shaping techniques are classified? Explain CIPing process?	**13**	3	L2
14 (a)	How does the driving force achieved for the sintering process and what are the mechanisms of sintering process? Explain it?	**13**	4	L3
	OR			
14 (b)	Describe in detail about SPS?	**13**	4	L2
15 (a)	Give a suitable compaction process for manufacturing aerospace and automobile components?	**13**	5	L3
	OR			
15 (b)	Explain in detail about ODS alloys?	**13**	5	L2

PART- C (1 x 15 = 15 Marks)

(Q.No.16 is compulsory)

Q. No	Questions	Marks	CO	BL
16.	Explain the methods of pressure less compaction techniques?	**15**	3	L2