RollNo. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

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

MATERIALS SCIENCE AND ENGINEERING
IV Semester
ML5405 - POWDER METALLURGY
(Regulation2019)

Time:3hrs Max.Marks: 100

The Students will be able:

CO1	To classify the various powder production methods and the Powder conditioning treatments.
CO2	To interpret the various characteristics of metal powders.
CO3	To compare the different compaction processes and identify a suitable compaction methodology for a component meant for specific application
CO4	To explain the sintering mechanisms and the various types of Sintering processes as well as the finishing processes
CO5	To get acquainted with the applications of various powder metallurgy components.

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

PART- A(10x2=20Marks)
(Answer all Questions)

Q.No.	Questions	Marks	CO	BL
1	Distinguish between blending and mixing	2	1	2
2	What is shotting?	2	1	1
3	How do you calculate green strength?	2	2	1
4	What is tap density?	2	2	1
5	Name any four methods of powder compaction without application of pressure?	2	3	2
6	What are the major defects in die compaction?	2	3	2
7	What is the use of infiltration in PM?	2	4	1
8	Is resintering advisable for PM components?	2	4	2
9	Compare the properties of sintered components with rolled components.	2	5	2
10	Alloys with elements Immiscible in nature can be formed by PM method- True or false-Justify your answer	2	5	2

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

Q.No.	Questions	Marks	CO	BL
11 (a)	Suggest a suitable technique and relevant controlling parameters to produce spherical particles	13	1	3
	OR			
11 (b)	Explain how effective powder conditioning impacts the density of the green body. Provide examples of different powder conditioning.	13	1	3
12 (a)	Suggest and explain the characterization techniques for shape and surface area measurements of powders	13	2	3
	OR			

12 (b)	Plot the particle size distribution curve (assume the frequency) for a sieve of varying mesh size ranging 400,325,230,200,140,100 and 70	13	2	3
13 (a)	Suggest a suitable technique to compact Alumina powders and provide influencing factors and die design	13	3	3
	OR			
13 (b)	Design the compaction dies by following the design considerations	13	3	3
14 (a)	Apply suitable sintering techniques for sintering Alumina powers compact and explain how different variables affects the sintering	13	4	3
	OR			
14 (b)	Explain the effect of different atmosphere on sintering metals and alloys	13	4	3
15 (a)	Apply the principles of powder metallurgy to break liners	13	5	3
	OR			
15 (b)	Apply the knowledge gained in power preparation, compaction and sintering, design a PM rote to fabricate cemented carbide cutting inserts	13	5	3

PART- C(1x 15=15Marks)

(Q.No.16 is compulsory)

Q.No.	Questions	Marks	CO	BL
16.	Design a process sequence to fabricate self-lubrication bearing through PM route and suggest necessary post sintering operations	15	5	4