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B.E. / B.Tech. (Full Time) END SEMESTER EXAMINATIONS, APRIL / MAY 2019

MATERIALS SCIENCE AND ENGINEERING BRANCH

FOURTH SEMESTER – (REGULATIONS 2015)

ML 7405 – POWDER METALLURGY

Time : 3 hrs

Max Mark: 100

Answer ALL Questions

Part – A (10 x 2 = 20 Marks)

1. Give two examples of metal powders produced by atomization and precipitation from aqueous solutions.
2. Construct a processing flow diagram for the formation of BaTiO₃ powder.
3. Apparent density is considered to be one of the critical characteristics of a powder. Give reasons.
4. Define the process of Elutriation.
5. Why is galling a major problem in Powder compaction?
6. Differentiate between Single ended and double ended compaction.
7. Enumerate the various methods of Sintering.
8. Draw the thermal cycle representing the various zones during sintering.
9. What are the most important factors that influence the properties of cemented carbides?
10. List down the various methods of preparing oxide dispersion-strengthened alloys through powder metallurgy route.

Part – B (5 x 13 = 65 Marks)

11. a. (i) Classify the Powder production methods. (3)
(ii) Discuss in detail the water atomization processes with neat diagrams. (10)
(OR)
b. Draw neat sketches of the following and explain their role in powder production.
 1. Ball milling (7)
 2. Centrifugal atomization (6)
12. a. (i) List the packing and flow characteristic of metal powders. (3)
(ii) Discuss the methods to determine the angle of repose and flow rate with neat sketches. (10)

(OR)



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b. Discuss in detail the principle and procedure involved in Sieve analysis.

13.a.(i). What is Pressure less compaction? (2)

(ii). Explain the process of Slip casting and slurry casting with neat sketches. (11)

(OR)

b. Discuss in detail the Explosive compaction and Powder rolling methods of powder compaction.

14. a. Explain the different material transport mechanisms of sintering.

(OR)

b. Briefly discuss on the various sintering furnace atmospheres.

15. a Explain the production route of the following materials by powder metallurgy processes.

(i) Cemented carbides

(ii) Bearing materials

(OR)

b. Discuss on the applications of Powder metallurgy components in Aerospace and Automobile industries.

Part – C (1 x 15 = 15 Marks)

16. Suggest a suitable powder production technique for the production of Iron powders and explain the process of production with a neat flowchart.

