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# P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

First Semester, M.Tech. - Mechanical Engineering (MMDN)

Semester End Examination; Jan. - 2020

Advanced Materials Technology

Time: 3 hrs

Max. Marks: 100

**Note:** i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.

ii) Missing data, if any, may be suitably assumed.

## UNIT - I

- 1 a. Briefly discuss;
- Atomic bonding
  - Crystal structure
  - Crystal defects
  - Strain hardening
- b. Derive an expression for Young's modulus of fiber reinforced composite under iso-strain condition.
- 2 a. Describe Thermo plastics and Thermo setting plastics with examples.
- b. What are composites? Explain the different types of composites based on the strengthening mechanism.
- c. List the important application of Composites.

## UNIT - II

- 3 a. Explain with neat sketch development of MMC using squeeze casting process.
- b. With sketch, explain fabrication of glass fiber.
- c. List the important matrix and reinforcement materials used in MMCs.
- 4 a. With neat sketch, explain super plastic forming of MMCs.
- b. Explain with neat sketch pultrusion method of manufacturing PMCs.
- c. With neat sketch, explain Spray technique process.

## UNIT - III

- 5 a. With a flow diagram, summarize the various steps involved in powder metallurgy.
- b. Explain with neat sketch Cold Isostatic Pressing (CIP). Differentiate between HIP and CIP.
- 6 a. List the methods used for the production of powders and explain any one method.
- b. What is sintering? Explain the sintering process in powder metallurgy.
- c. List the advantages and disadvantages of powder metallurgy.

## UNIT - IV

- 7 a. List the different techniques used in mechanical surface treatments and explain any two.
- b. Sketch and explain plasma spray's process. List the various process parameters.

- 8 a. With a neat sketch, explain chemical vapour deposition process. 8
- b. List the various surface defects and explain the necessity of surface treatment for manufactured products. 8
- c. Explain the importance of surfaces in engineering application. 4

**UNIT - V**

- 9 a. Write a brief note on Nanomaterials. 4
- b. Sketch and explain production of Nano powders by sol-gel and ball milling methods. 12
- c. Write a brief note on carbon nanotubes. 4
- 10 a. Explain the characterization of Nano-material by using Transmission Electron Microscopy. 10
- b. Write the properties of Carbon Nano tube and Mention the importance of nano technology in various engineering appliances. 10

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