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

(An Autonomous Institution affiliated to VTU, Belgaum)

First Semester, M. Tech – Mechanical Engineering (MCIM)

Semester End Examination; Jan/Feb. - 2016

Advanced Materials Technology

Time: 3 hrs

Max. Marks: 100

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

UNIT - I

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|---|----|---|----|
| 1 | a. | Briefly describe a twin and a twin boundary with neat sketch. | 4 |
| | b. | Explain covalent bond and secondary bonds. | 6 |
| | c. | Define composite material and explain the classification of composites. | 10 |
| 2 | a. | What fiber factors contribute to the mechanical performance of a composite? | 4 |
| | b. | Prove that $E_f = E_f V_f + E_m V_m$ also write the assumptions. | 10 |
| | c. | Differentiate between thermo sets and thermo plastics. | 6 |

UNIT - II

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|---|----|--|----|
| 3 | a. | Explain with a neat sketch development of MMC using diffusion bonding. | 10 |
| | b. | List the important requirement of reinforcement material used in MMC. | 4 |
| | c. | Sketch and explain the manufacturing process of glass fibers. | 6 |
| 4 | a. | Describe the following with respect to composite processing : | |
| | | i) Filament winding | 14 |
| | | ii) Pultrusion. | |
| | b. | With a neat sketch explain hand Layup process. | 6 |

UNIT - III

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|---|----|---|----|
| 5 | a. | List the methods used for the production of powders. Explain any one method. | 8 |
| | b. | Differentiate between CIP and HIP clearly. | 4 |
| | c. | Explain HIP with neat sketch. What parameters are crucial in the process? Explain. | 8 |
| 6 | a. | With a neat flow diagram, explain powder metallurgy rate for the production of metal matrix composites. | 10 |
| | b. | Explain Sintering and compaction. | 4 |
| | c. | List the application of the powder metallurgy. | 6 |

UNIT - IV

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|---|----|---|---|
| 7 | a. | With a neat sketch explain surface treatment of metal. | 6 |
| | b. | What do you understand by surface texture and surface integrity? Elaborate. | 6 |
| | c. | List various surface defects and explain why the surface treatment of manufactured products may be necessary. | 8 |

- 8 a. Briefly describe the different techniques used in mechanical surface treatment. 10
- b. Explain the chemical vapour deposition process with a neat sketch. List its advantages and applications. 10

UNIT - V

- 9 a. Write a brief note on nanomaterials. 5
- b. Explain clearly plasma arcing method used for preparing nanomaterials with a neat sketch. 10
- c. With a neat sketch explain the Sol-gel method. 5
- 10 a. Write a note on nanotubes. 6
- b. With neat sketches, briefly explain AFM and SPM techniques for nano characterization. 14

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