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# MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

*A Constituent Institution of Manipal University*

## I SEMESTER M.TECH. (MET) END SEMESTER EXAMINATIONS

## NOV/DEC 2016

SUBJECT: MANUFACTURING MATERIALS (MME-5122)

**REVISED CREDIT SYSTEM**
**(24/11/2016)**

Time: 3 Hours MAX. MARKS: 50

**Instructions to Candidates:**

- Answer **ALL** the questions.
- Draw neat sketches using PENCIL only
- Missing data may be suitable assumed.

1A. Explain the significance of surface technology? Explain any two mechanical surface cleaning methods. 3 marks

1B Derive an expression for modulus of elasticity under iso - strain loading of composite materials. For an industrial application, E-glass fibers are used to reinforce nylon resin are used under iso - strain loading state. If the nylon contains 35% glass fibers by volume, what fraction of the applied force is carried by the glass fibers? (The elastic modulus for E-glass fibers and nylon are $10.5 \times 10^6$ and $0.75 \times 10^6$ N/mm$^2$, respectively) 4 marks

1C. Explain unidirectional method of manufacturing MMC's. 3 marks

2A. What are the essential properties of the resin material required to fabricate a good composite structure? 3 marks

2B. Explain arc spray and flame spray thermal coatings with neat sketches. 4 marks

2C. Explain steps in PVD. Write any two differences between PVD and CVD. 3 marks

3A. Illustrate the method used for fabricating hollow or mandrel type of mechanical components from PMC's. State its advantages disadvantages. 3 marks

3B. With neat sketches explain polymer infiltration and pyrolysis method of manufacturing CMC. 4 marks

3C. What is the role of interface layer in CMC? Explain. 3 marks

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| 4A. | With neat sketches explain the ceramic slip casting process for Drain Casting. | 3 marks |
| 4B. | Why does intermetallic forms? Name any two types of intermetallics generally observed in super alloys and mention the characteristics of these intermetallics. | 3 marks |
| 4C. | What is electron compound? Classify electron compounds based on the crystal structure and e/a ratio with example. | 2 marks |
| 4D | Explain the importance of specific strength in super alloys? Compare the specific strength of Ti based super alloys and conventional alloys. | 2 marks |
| 5A. | Why thermal treatments are required for wet pressed ceramics? Name and explain any two thermal treatments for wet pressed ceramics. | 4 marks |
| 5B. | With simple sketches explain the principle of Shape Memory effect in alloys. | 3 marks |
| 5C. | Name and explain in brief about possible room temperature phases observed in Cobalt based super alloys. | 3 marks |