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| <b>3E1632</b>  | Roll No. : <u>16EEBME75</u> | Total Printed Pages : <b>3</b> |
|  | <b>3E1632</b>               |                                |
| <b>B. Tech. (Sem. III) (Mercy Back) Examination, December - 2017</b><br><b>Mechanical Engg.</b><br><b>3ME2A Material Science &amp; Engg.</b> |                             |                                |

Time : 3 Hours

Maximum Marks : 80  
Min. Passing Marks : 24

*Attempt any five questions, selecting one question from each unit.  
All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.*

*Use of following supporting material is permitted during examination.  
(Mentioned in form No. 205)*

1. \_\_\_\_\_ Nil \_\_\_\_\_ 2. \_\_\_\_\_ Nil \_\_\_\_\_

**UNIT - I**

- 1 (a) With neat sketches, explain crystal lattice of BCC and FCC. 8
- (b) Explain with neat sketches, the various types of crystal imperfections. 8

OR

- 1 (a) Explain slip and twinning mechanisms with neat sketches. 8
- (b) What is recovery, recrystallization and grain growth ? Draw suitable graph to explain. 8

### UNIT - II

2 (a) Distinguish between homogeneous and heterogeneous nucleation for solidification of a pure metal.

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(b) Draw an equilibrium diagram of binary isomorphous alloy system, also explain it.

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OR

2 Draw iron carbon equilibrium diagram and label the various phase, fields and temperature. Discuss in brief different reactions that take place in the system.

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### UNIT - III

3 Describe all the transformation which appear in TTT curve for steel.

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OR

3 Explain briefly the following heat treatment operations :

- (i) Annealing
- (ii) Normalising
- (iii) Hardening
- (iv) Tempering.

4×4=16

### UNIT - IV

4 (a) What are properties and engineering applications of PMMA, ABS, PVC, PA and PTFE ?

(b) Write a short note on urea and phenol formaldehyde.

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OR

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- 4 (a) Explain the effects of addition of Si, Cr, Mo, V and W alloying elements on the properties of steel. 10
- (b) Write short notes on : 6
- (i) Stainless steel
  - (ii) Tool steel.

UNIT - V

- 5 (a) Explain Rockwell hardness testing method with sketch. 8
- (b) Discuss Izod and Charpy impact test for the materials with sketch. 8

OR

- 5 (a) Discuss the properties and applications of  $Al_2O_3$ ,  $Si_3N_4$ , SiC and PSZ. 8
- (b) Explain various properties and applications of Nano structured materials. 8