

**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE –**  
**RAIGAD -402 103**  
**Winter Semester Examination – Dec. 2019**

**Branch: B Tech Mechanical Engineering**

**Sem.:- III**

**Subject:- Material Science and Metallurgy (BTMEC302)**

**Marks: 60**

**Date:- 12/12/2019**

**Time:- 3 Hr.**

**Instructions to the Students**

1. Each question carries 12 marks.
2. Attempt **any five** questions of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly

|                                                                                                               | (Marks)     |
|---------------------------------------------------------------------------------------------------------------|-------------|
| <b>Q.1.</b>                                                                                                   | <b>(12)</b> |
| a) Explain in short different imperfections in crystal structures                                             | 6           |
| b) Draw stress strain diagram for mild steel, show effect of Carbon content on shape of stress strain diagram | 6           |
| <b>Q2.</b>                                                                                                    | <b>(12)</b> |
| a) What is solid solution? Differentiate between substitutional and interstitial solid solution?              | 6           |
| b) Draw Fe-Fe <sub>3</sub> C equilibrium diagram. Show all temperatures and phases                            | 6           |
| <b>Q3.</b>                                                                                                    | <b>(12)</b> |
| a) Draw neat labeled TTT diagram for eutectoid steel and give stepwise experimental procedure for drawing it. | 6           |
| b) What is annealing? List different types of annealing along with their purpose.                             | 6           |
| <b>Q4.</b>                                                                                                    | <b>(12)</b> |
| a) Explain with neat sketches different types of flame hardening.                                             | 6           |
| b) What is surface hardening? Explain induction hardening with neat sketch.                                   | 6           |
| <b>Q5.</b>                                                                                                    | <b>(12)</b> |
| a) Explain steps in specimen preparation for microscopy.                                                      | 6           |
| b) For spark test draw the sparks for the following specimen<br>1. CI      2. MS      3. HSS                  | 6           |
| <b>Q6.</b>                                                                                                    | <b>(12)</b> |
| a) Write a note on strain hardening                                                                           | 6           |
| b) Explain dye penetrant test. What is its application?                                                       | 6           |

**Paper End**