

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE
End Semester Examination – SUMMER 2019

Course: B. Tech in Mechanical Engineering

Sem: III

Subject Name: Material Science and Metallurgy

Subject Code: BTMEC302

Max Marks: 60

Date: 29-05-2019

Duration: 3 Hr.

Instructions to the Students:

1. Solve **ANY FIVE** questions out of the following.
2. The level question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

Q. 1 Solve Any Two of the following.

Marks

12

- A) What is plastic deformation? Explain with neat sketch plastic deformation by slip.
- B) Define the term coordination number, packing density and atomic radius. And prove the packing density of the FCC unit cell is 0.74
- C) Classify crystal imperfections and explain screw dislocation in details.

Q.2 Solve Any Two of the following.

12

- A) Derive relation between engineering and true stress-strain and also draw true stress-strain curve for mild steel.
- B) Classify hardness tests. Explain Rockwell hardness test in detail.
- C) Explain with neat sketch Izod impact test. How Izod impact test is different from charpy impact test.

Q. 3 Solve Any two of the following.

12

- A) Explain Iron-Iron carbide equilibrium diagram with neat sketch.
- B) With neat sketch describe the mechanism of transformation of austenite to bainite.
- C) Define the critical cooling rate of a steel and show the critical cooling rate on a TTT diagram.

Q.4 Solve Any Two of the following.

12

- A) What is annealing? State the purpose of annealing and also plot the heating temperature band for full annealing.
- B) Define hardenability. Explain Jominy-End quench test for hardenability with neat sketch.
- C) Classify surface hardening processes. Explain any one in detail.

Q. 5 Solve Any two of the following.

12

- A) Explain the procedure followed in specimen preparation in metallography.
- B) Describe spark test. What observations to be noted and also draw spark patterns for low and high carbon steels

undefined

- C) State and explain working principle of metallurgical microscope with neat sketch.

Q. 6 Solve Any two of the following.

12

- A) Explain magnetic particle inspection and also enumerate the limitations of magnetic particle inspection.
- B) What are the various strengthening mechanisms? Explain any one method in detail.
- C) Explain the principles of the following methods of the inspection.
 - 1). Dye Penetrant inspection
 - 2). Ultrasonic inspection.
 - 3). Eddy current testing,

***** End *****