

Total No. of Questions : 4]

SEAT No. :

PC-441

[Total No. of Pages : 2

[6359]-562

**S.E. (Automobile & Mechanical/Mechanical Sandwich/  
Automation & Robotics) (Insem.)  
ENGINEERING MATERIALS AND METALLURGY  
(2019 Pattern) (Semester - III) (202044)**

*Time : 1 Hour]*

*[Max. Marks : 30*

*Instructions to the candidates :*

- 1) Answer Q.1 or Q.2, Q.3 or Q.4.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of Logarithmic tables, slide rule, electronic pocket calculator is allowed.
- 5) Assume suitable data, if necessary.

- Q1) a)** What is meant by the term Space Lattice? State the condition for the most stable arrangement of atoms in a crystal structure. What is the significance of Bravais lattice? [5]
- b)** Draw the plane in a cubic system for the following Miller indices [6]
- i) (110)
  - ii) (221)
- c)** Draw a schematic illustration of a slip in a single crystal and state as to which planes in a crystal structure are likely to undergo slip? [4]

OR

- Q2) a)** Why is Annealing done on a cold worked metal? State the changes occurring in the Recovery phase of Annealing with reference to the following parameters [5]
- i) Microstructure
  - ii) Mechanical properties
  - iii) Changes in internal stresses and corrosion resistance.
- b)** Draw a neat sketch of a Burger's vector and Burger's circuit for an Edge dislocation. What does Burger's vector indicate? [6]
- c)** What is meant by Fatigue failure? State the significance of Beach marks. [4]

*P.T.O.*

- Q3)** a) Which property of a material is tested using the cupping test? Draw a schematic sketch to demonstrate the principle of working of the test? [7]  
b) State the principle of Ultrasonic Inspection. State any two applications of Ultrasonic Inspection method. [4]  
c) What is the purpose of Spark Test? What is meant by the terms Carrier lines and spurts associated with Spark Test? [4]

OR

- Q4)** a) What is the role of X ray in testing components manufactured by Casting or welding? State the principle of working of X-ray radiography. [4]  
b) Write any two points which need to be taken care of in the procedure of Sampling during specimen preparation for microscopy. What happens when an etching reagent is applied on a polished surface? [4]  
c) What is the role of Beam of Electron in a Scanning electron microscope? Draw a diagram to demonstrate the working principle of Scanning electron microscope. [7]

