Time: 3 hours   **Max. Marks: 75**

PART A (1.5 marks each)

Q1 (a) Define coordination number for any crystal structure.

    (b) How ceramics differ from alloys?

    (c) How is young's modulus important for engineering materials?

    (d) How does Vickers indenter differ from Brinell Indenter?

    (e) Ilustrate the fatigue limit with the help of S-N curve.

    (f) For what types of materials does normal stress theory of failure apply and why?

    (g) Draw a characteristic unary phase diagram by showing phases on it.

    (h) Ilustrate Peritectic reaction with respect to Fe-C system.

    (i) Show Austempering process on an isothermal TTT curve.

    (j) Differentiate between brass and bronze on the basis of their composition.

PART B

Q2 What are unit cell parameters? Illustrate seven crystal systems with the help of neat diagrams and there unit cell parameters.   (15)

Q3 (a) Compare between the true stress strain and engineering stress strain diagrams with the help of neat illustrations.   (7.5)

    (b) Compare between the Rockwell and Brinell hardness tests.   (7.5)

Q4 Discuss the advantages of nondestructive testing of materials over destructive testing. Describe magnetic particle testing and Eddy current testing methods in detail.   (15)

Q5 Explain the cooling of 0.5% carbon steel from liquid state to room temperature with help of Iron-Carbon phase diagram and interpret the microstructure developed during the process by neat illustrations.   (15)

Q6 (a) Why is heat treatment needed in case of alloys? ifferentiate between the isothermal TTT curve and continuous cooling curve. (10)

(b) How is flame hardening different from carburizing? (5)

Q7 Write notes on following:

(i) Stainless steels and their types. (5)

(ii) Types of cast iron. (5)

(iii) Nickel based super-alloys. (5)