22232

3 Hours / 70 Marks   Seat No.

Instructions :   (1)   All Questions are *compulsory.*

(2)   Answer each next main Question on a new page.

(3)   Illustrate your answers with neat sketches wherever necessary.

(4)   Figures to the right indicate full marks.

(5)   Assume suitable data, if necessary.

(6)   Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

1.   **Attempt any FIVE of the following :**   **2 × 5 = 10**

(a)   Define crystal structure.

(b)   Define the Bragg's law.

(c)   Name two chemical properties of engineering materials.

(d)   Define thermal conductivity of material.

(e)   Give the structure of Nylon 6.

(f)   List the major constituents of ceramics.

(g)   Write the types of Irons.

2.   **Attempt any THREE of the following :**   **4 × 3 = 12**

(a)   Describe Metallic Bond and Ionic Bond.

(b)   Describe the procedure to calculate the density of air.

(c) Define impact strength and compressive strength.

(d) List the factors affecting the rate of corrosion.

(e) Calculate the heat in joules required to raise the temperature of 50 grams of water from 0 °C to 100 °C.

Data : Specific heat of water = 4.18 J/g °C.

3. **Attempt any THREE of the following :** **4 × 3 = 12**

(a) Differentiate metals and non-metals with respect to its physical and chemical properties.

(b) Explain the addition polymerization for polyethylene manufacturing.

(c) Describe the mechanism of corrosion in acidic medium with example.

(d) Differentiate ferrous and non-ferrous materials.

4. **Attempt any THREE of the following :** **4 × 3 = 12**

(a) Describe the heat capacity as an extensive property.

(b) Describe the thermal insulations.

(c) Explain chemical reactivity of iron with air.

(d) Differentiate thermoplastic and thermosetting polymers.

5. **Attempt any TWO of the following :** **6 × 2 = 12**

(a) Classify ceramic with examples.

(b) Describe the function and uses of sulpher and phosphorus as alloying elements.

(c) Explain the importance of Ziggler Natta catalyst in copolymerization reaction.

6.   **Attempt any TWO of the following :**   **6 × 2 = 12**

    (a)   Explain control and prevention of corrosion.

    (b)   Explain the effects of alloying elements.

    (c)   Explain the effects of following chemical elements on iron :

        (i)   Copper

        (ii)   Manganese

        (iii) Nickel

        (iv) Chromium

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