B. CHEM. 3RD. YR 2ND SEM. EXAM. – 2017 (Old)

MATERIAL SCIENCE & ENGG.   Time: **3 hr.**   Full Marks: **100**

Attempt any five questions

Q1. i) Show that for a bcc, average number of atoms and coordination number are 2 (two) and 8 (eight) respectively. (5+5)

ii) Explain how Miller-Bravais Indices for hexagonal system are different from Miller indices for cubic systems. Draw a typical cubic unit cell and show the following planes and directions: (101); (102); [011], [111] and [211]. (5+5)

Q2. i) What is atomic density of a crystal? How will you calculate it? (10)

ii) What are the close pact planes and directions in a fcc crystal? Will it be same for bcc – explain. (10)

Q3. What crystal imperfections? Classify the different types of imperfections. With the help of neat sketches explain at least one type of imperfection from each category. (20)

Q4. Differentiate between an alloy and a mixture. Give suitable example for each from metallic systems. Draw a well labeled binary phase diagram for an eutectic system exhibiting limited solid solubility. Identify the eutectic alloy in the system and explain invariant point. 5x4

Q5. i) Differentiate between diffusion of atoms in an alloy and motion of atoms in liquid alloy by convection. (5)

ii) What are the different mechanisms of diffusion of atoms in solid state? (5)

iii) What is Kirkendal effect and what does it establishes? (10)

Q6. i) With the help of neat diagram and example establish that corrosion is an electrochemical reaction. (8)

ii) What is 'Galvanic Corrosion/'? How can it be prevented and how is it usefully applied for protecting metal and alloys against corrosion? (12)

Q7. Write an essay on different types of polymers. (20)

Q8. Write short notes on any four (5x4)

    i)   Slip system
    ii)   Solidification
    iii)   Lever Rule
    iv)   Chemical potential
    v)   Stainless steels