b) Determine the Young's modulus of a composite containing 65 vol % of glass fiber ($E_f = 70\ GN/m^2$) in a matrix of eproxy resin ($E_m = 3GN/m^2$) under isostress condition.





**(Following Paper ID and Roll No. to be filled in your Answer Books)**

**Paper ID : 2289416** **Roll No.**

**B.TECH**

**Regular Theory Examination (Odd Sem-III), 2016-17**

**MATERIAL SCIENCE**

***Time : 3 Hours*** ***Max. Marks : 100***

**Note : Attempt all Sections. If required any missing data; then choose suitably.**

**Section - A**

**1. Attempt all questions in brief. (10×2=20)**

a) What is "Miller indices"?

b) Write the names of various atomic models. Explain any one of them.

c) Explain smart materials and its applications.

d) What is duralumin? Give its composition and application.

e) Differentiate between edge dislocation and screw dislocation.

f) What do you understand by engineering materials?

g) What is ceramics?

h) What is 'Avogadro's number'?

i) A hardened steel ball of .50 cm diameter is used to indent a steel specimen in Brinell Hardness Test. Diameter of indentation measured by an optical microscope of magnification 10 X is observed to be 32.5 mm. Calculate Brinell Hardness Number of steel specimen.

j) What are primary bonds?

## Section - B

**2. Attempt any three of the following : (3×10=30)**

a) Give the classification of engineering materials. Explain their importance, giving examples.

b) Explain the mechanism of fracture for brittle material (Griffith's theory).

c) Explain TTT diagram in brief. What information do you get from this diagram?

d) Define Superconductivity. Explain Type II superconductor in detail, giving their applications.

e) Write main difference between thermoplastic and thermosets with example.

## Section - C

**3. Attempt any one part of the following : (1×10=10)**

a) Derive the expression for Bragg's law. Explain its applications.





b) Derive the relationship between interplanar spacing and cube edge. Explain its importance.

**4. Attempt any one part of the following : (1×10=10)**

a) What do you understand by lever rule? Determine the mass fraction of the phases present at 184°C in a sample of lead & tin with 45% tin in it.

b) Differentiate between ductile fracture and brittle fracture. Explain the significance of ductile brittle transition temperature.

**5. Attempt any one part of the following : (1×10=10)**

a) Distinguish between full annealing and process annealing.

b) State the comparison among cast iron, wrought iron, mild steel and high carbon steel.

**6. Attempt any one part of the following : (1×10=10)**

a) Draw & explain B-H curve for hard steel.

b) What is P-N junction diode? How does it work?

**7. Attempt any one part of the following : (1×10=10)**

a) State the advantage of ceramic materials. Name some important ceramic materials, giving them applications.