



Seat No. _____

HJ-003-0494005

B. Sc. / M. Sc. (Applied Physics)

(Sem.-IV) (CBCS) Examination

April - 2023

Paper-XV : Fundamentals of Materials Science

(New Course)

Faculty Code : 003

Subject Code : 0494005

Time : $2\frac{1}{2}$ Hours / Total Marks : 70

Instructions :

- (1) All questions are compulsory.
- (2) Numbers in the right indicate marks.

- 1 (A) Write answers : 4
- (1) What is solvus ?
 - (2) What is Gibbs energy ?
 - (3) Write the equation of phase rule given by Gibbs.
 - (4) Define Coring.
- (B) Write answers of any **One** : 2
- (1) Define triple point.
 - (2) Write the equation of lever rules.
- (C) Write answers of any **One** : 3
- (1) Explain Quantum numbers.
 - (2) What is metallic bonding ?
- (D) Write answers of any **One** : 5
- (1) Write short note on single component system.
 - (2) Explain the binary phase diagram of $Al_2O_3 - Cr_2O_3$ composite.
- 2 (A) Write answers : 4
- (1) What is splat cooling ?
 - (2) Write the formula of surface area to volume ratio.
 - (3) Define embryos.
 - (4) What is nuclei ?

- (B) Write answers of any **One** : 2
 (1) What is metallic glass ?
 (2) Define quenching.
- (C) Write answers of any **One** : 3
 (1) Explain to Time Scale for phase change transforms from liquid L to Crystal β .
 (2) Write short note on nucleation and growth.
- (D) Write answers of any **One** : 5
 (1) Write short note on nucleation.
 (2) Explain the phase transformation in steel.
- 3** (A) Write answers : 4
 (1) Define flexural strength.
 (2) What are the range of module of elasticity of ceramic materials ?
 (3) Classified ceramic materials.
 (4) Define glass ceramic.
- (B) Write answers of any **One** : 2
 (1) Define working point.
 (2) What is strain point ?
- (C) Write answers of any **One** : 3
 (1) What are glass ceramics ?
 (2) Write short note on cement.
- (D) Write answers of any **One** : 5
 (1) Write short note on refractories.
 (2) Write a short note on advanced ceramics.
- 4** (A) Write Answers : 4
 (1) Classify the advanced materials.
 (2) Write the full name of CFRP.
 (3) What is the range of electrical conductivity of metal at room temperature ?
 (4) Which type of material have high resistance to fracture ?
- (B) Write answers of any **One** : 2
 (1) How many grams are there in 1 AMU of materials ?
 (2) Which type of material have very low stiffness at room temperature ?
- (C) Write answers of any **One** : 3
 (1) Explain Quantum numbers.
 (2) Explain the stability and metastability.

- (D) Write answers of any **One** : 5
- (1) Write short note on Ionic Bonding.
 - (2) Explain the covalent bond in CH₄ model.
- 5 (A) Write answers : 4
- (1) What is liquidus ?
 - (2) What are solidus ?
 - (3) Write the equation of lever rules.
 - (4) Define hypereutectic alloys.
- (B) Write answers of any **One** : 2
- (1) What is the range of electrical conductivity of metal at room temperature ?
 - (2) Give the examples of covalent bonded materials which have highest melting point.
- (C) Write answers of any **One** : 3
- (1) What is metallic bonding ?
 - (2) Explain the process of Glass forming.
- (D) Write answers of any **One** : 5
- (1) Write a short note on precipitation process.
 - (2) Explain the fabrication technique of clay products.
-