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JY-003-497007 Seat No. _____

B. Sc. / M. Sc. (Applied Physics) (Sem. VII) (CBCS) Examination

October - 2019

Core Paper - IV : Advanced Materials & Applications

(New Course)

Faculty Code : 003
Subject Code : 497007

Time : **2:30** Hours] [Total Marks : **70**

1 Attempt any **seven** short questions : (Two marks each) **14**

(1) What are the type of Magnetoresistance?

(2) Draw a well-labelled diagram of ABO_3 type Perovskite structure.

(3) Define (i) Magnetoelectric (ME) effect and (ii) Ferrites.

(4) Draw a Schematic diagram of MnO_6 Octahedra.

(5) Describe classification of Composite based on Reinforced material.

(6) Define Multiferroic. What are types of Multiferroic?

(7) Draw a well-labelled crystal structure of Y-123 Superconductor (Orthorhombic).

(8) Define composites with their classifications.

(9) What are Thermoplastic Polymers. Give example.

(10) What are the two types of Elastomers? Write their uses.

2 (a) Write answers of any **two** : **10**

(1) Write a short note on GMR and TMR.

(2) Discuss the Jahn - Teller Effect.

(3) Write down the common features for cuprate superconductor.

(4) Draw well-labeled diagram of Y-123 O_6 and Y123 O_7 crystal structure.

(b) Write answers of any **one** : 4

(1) Discuss the Physical properties of Manganites.

(2) Write down the chemical reaction for synthesis of YBCO superconductor using SSR and comment on Cu - valency in $YBa_2Cu_3O_7$ and $YBa_2Cu_3O_6$.

3 (a) Write answers of any **two** : **10**

(1) What are the applications of Ferrites?

(2) Draw a well-labeled diagram of $BiFeO_3$ crystal structure and discuss about its phase stability.

(3) Write a note on Lone Pair Multiferroic.

(4) Write a note on Perovskite Multiferroic

(b) Write answers of any **one** : 4

(1) What are the challenges in $BiFeO_3$ Multiferroic? Write down the approaches to overcome their spin spiral structure.

(2) Differentiate between Soft and Hard Ferrites.

4 (a) Write answers of any **two** : **10**

(1) Explain Glass Fibre Reinforced Polymer (GFRP) composite.

(2) Explain Natural composite : Wood

(3) What is polymer matrix composite? Give two examples.

(4) Describe Carbon - Carbon composite.

(b) Write answers of any **one** : 4

(1) What is fiberglass? Give classification, characteristics and applications of fiberglass.

(2) Explain Ceramic Matrix Composites.

5 (a) Write answers of any **two** : **10**

(1) Write a detailed note on additives. Comment on its importance.

(2) Explain the mechanism of Polymerization by Step Growth process using suitable example.

(3) Write down the full forms of PVC, PS, CA, PP, PE, PTFE, PVA, PMMA.

(4) Explain Thermosetting and Thermoplastic Polymers with suitable examples.

(b) Write answers of any **one** : **4**

(1) What are the techniques of Polymer processing? Comment on their advantages and disadvantages.

(2) Describe various factors affecting the melting and Glass transition temperature in Polymers.

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