Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech (CT)/SEM-7/CT-702/2010-11

2010-11
ADVANCED CERAMICS – II

Time Allotted : 3 Hours | Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A
(Objective Type Questions)

1. Answer the following questions :

   A. Fill in the blanks : 5 × 1 = 5

   i) The capacitor's basic function is ..... storage.

   ii) Pyroelectrics develop ..... spontaneoulsy and form permanent dipoles in the structure.

   iii) All ferro- and ferrimagnetic materials exhibit ..... effect.

   iv) Semiconducting $BaTiO_3$ undergoes a tetragonal to cubic phase transformation at ..... °C.

   v) Sensors operating on electrochemical principles cannot tolerate electronic conduction but must exhibit .....

B. Write True or False : $5 \times 1 = 5$

vi) Insulation resistance measures the efficiency of AC blocking.

vii) Dielectric strength values are very sensitive to specimen thickness.

viii) Ferroelectric ceramics have high dielectric constant.

ix) The spinel ferrites have the general formula of AB_2O_4.

x) The magnetocrystaline anisotropy of hexagonal ferrites is low.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. What is disc capacitor ? What is the basic difference between a thick film capacitor and a thin film capacitor ? Explain Relaxator Dielectric. 1 + 2 + 2

3. Explain the reason of intrinsic breakdown of a dielectric material. What is piezoelectricity ? 3 + 2

4. Explain the effect of different dopant, modifier on lead zirconate titanate ceramics.

5. "Each type of sensor must satisfy certain criteria". What are those criteria ? What is an intrinsic conductor ? 2 + 3

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

6. What is dielectric strength ? Discuss the effect of different factors on dielectric strength. What is electronic polarization ? Discuss the corrective modifications required for practical application of barium titanate ceramic.

2 + 3 + 3 + 7

7. Explain the hysteresis loop behaviour for typical ferrite system. What is antiferromagnetism ? Give one example of Garnet. Discuss the phenomenon of optical phase retardation in an electro - optic ceramic. 5 + 2 + 1 + 7

8. Write short notes on the following : 3 × 5

   i) Semiconducting gas sensors

   ii) Electrical properties of NTC thermistors

   iii) Applications of PTC thermistors.

9. What are the basic differences between hexagonal ferrite and spinel ferrite ? Write short note on alumina substrate. Write the advantages of ceramic membrane over polymeric membrane. 5 + 6 + 4