M.Sc. 4th Semester Examination, 2021

CHEMISTRY

(Inorganic Chemistry Special)

Paper : CHEM 402E

Course ID : 41452

Time: 2 Hours **Full Marks: 40**

The figures in the right-hand side margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable

1. Answer *any five* of the following questions**:** 2×5=10

(a) Why LASER is important?

(b) Mention the differences between florescence and phosphorescence.

(c) What do you mean by piezoelectricity? Give an example of piezoelectric materials.

(d) What is NASICON?

(e) What do you mean by Second Harmonic Generation (SHG) in non-linear optics?

(f) What is fiber optics?

(g) Why $ZnFe_2O_4$ is antiferromagnetic?

2. Answer *any four* of the following questions. 5×4=20

(a) Write down the five techniques of crystallization. 5

(b) Draw the diagram of Ruby Laser and explain its working principle. 2+3=5

(c) “Liquid crystal is an intermediate of crystal and liquid state”- explain. Write down the types of liquid crystals with figure. 2+3=5

(d) "4d metal complexes behave like better catalysts than 3d and 5d." - Justify or criticize. 5

(e) “Magnetic materials that are used in information storage shows square- or rectangular-shaped hysteresis loops”. - Explain. Give two preparative methods for mesogens.

2.5 +2.5=5

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(f) What are uses of metallo mesogens? Give example of a porphyrin based metallo mesogens.

2+3=5

3. Answer *any one* of the following questions: 10×1=10

(a) Describe briefly the formulae and structure of the high-Tc cuprate superconductors. Indicate their relations to the perovskite structure and show how the coordination environment of Cu may be taken as an indicator of its oxidation state. 5+5=10

(b) (i) Define the following terms: (A) ferromagnetism (B) antiferromagnetism (C) helimagnetism.

(ii) What is CMR?

(iii) How do you show the superexchange phenomenon of two paramagnetic spins via a bridging ligand? 6+2+2=10

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