

## P.G. Semester-IV Examination, 2023

### CHEMISTRY

Course ID : 41452

Course Code : CHEM-402E

Course Title : Inorganic Chemistry Special

Time : 2 Hours

Full Marks : 40

*The figures in the right-hand margin indicate 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

- What is the difference between superconductor and semiconductor?
- What is NASICON?
- What do you mean by second harmonic generation (SHG) in nonlinear optics?
- Draw the unit cell structure of perovskite ( $\text{XYO}_3$ ) and determine the chemical formula from its unit cell arrangement.
- Define pyroelectricity and piezoelectricity.
- Write down the differences between stimulated emission and spontaneous emission.
- Why  $\text{ZnFe}_2\text{O}_4$  is antiferromagnetic?

[Turn over]

2. Answer any **four** of the following questions :

5×4=20

- Draw the diagram of Ruby Laser and explain its working principle. 5
- "Liquid crystal is an intermediate of crystal and liquid state."— Explain. Write down the types of liquid crystals with figure. 5
- Differentiate between fluorescence and phosphorescence. Draw the Jablonski Diagram. 2+3=5
- Write down the different techniques of crystallization. 5
- What are the uses of metallomesogens? Give example of a porphyrin based metallomesogens. 2+3=5
- What is Sol-Gel synthesis? How  $\text{S}_4\text{N}_4$  and  $(\text{SN})_x$  are synthesized? What are the use of MoF? 2+2+1=5

3. Attempt any **one** of the following questions:

10×1=10

- Describe briefly the formulae and structure of the high- $T_c$  cuprate superconductors. Indicate their relation 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) Write short notes with figure of following magnetic phenomena (I) paramagnetism (II) ferrimagnetism (III) anti-ferromagnetism (IV) ferrromagnetism (V) helimagnetism (VI) spin glass.
- ii) What is CMR? Explain antiferromagnetic exchange of NiO.  $6+(2+2)=10$
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