Reg. No. : ....

Name : ....

Third Semester B.Sc. Degree (CBCSS – Supplementary) Examination, November 2022
(2016 – 18 Admissions)
CORE COURSE IN PHYSICS
3B03PHY : Allied Physics

Time : 3 Hours

Max. Marks : 40

Instructions :
1) Section – **A** : Answer **all** questions (very short answer type, **each** question carries **1** mark).
2) Section – **B** : Answer **any seven** questions (short answer type, **each** question carries **2** marks).
3) Section – **C** : Answer **any four** questions (short essay/ problem type, **each** question carries **3** marks).
4) Section – **D** : Answer **any two** questions (long essay type, **each** question carries **5** marks).
5) Write answers in **English** only.

SECTION – A

1. Define the term symmetry operations.

2. The packing fraction of a BCC structure is

3. As per Stokes law the viscous force acting on a spherical drop of radius a moving with velocity v is

4. Inductive reactance of an ac circuit is

(4×1=4)

SECTION – B

5. Explain the terms Lattice and Basis.

6. Sketch (1 0 0) and (1 0 1) planes in simple cubic cell.

7. Write a short note on :
   1) Unit cell and
   2) Primitive cell.

8. Describe simple cubic; face centred cubic and the hexagonal close packed structure.

9. Explain equation of continuity in the case of a liquid flow.

10. Explain neutral surface and neutral axis of a beam.

11. State and explain superposition theorem.

12. Distinguish between streamline and turbulent motion of liquid.

13. Define Q factor of an LCR circuit.

14. Explain Kirchoff's laws.

<div align="right">(7×2=14)</div>

SECTION – C

15. Explain the powder method of crystal structure analysis.

16. Calculate the glancing angle on the plane (1 0 0) of a rock salt crystal (a = 2.84 Å) corresponding to second order diffraction maximum for X-ray wavelength 0.8 Å.

17. State and prove maximum power transfer theorem.

18. An air bubble of radius 1 mm is allowed to rise through a long cylindrical column of a viscous liquid and travels at a steady rate of 2.1 cm s^{-1}. If the density of the liquid is 1470 K gm^{-3}, find its viscosity. Assume g = 9.8 m/s^2, neglect the density of air.

19. If the excess pressure inside a spherical bubble is balanced by that due to a column of oil (relative density 0.8) 2 mm high when r = 1 cm, find the surface tension of the soap bubble.

20. Explain the growth of current in a CR circuit.

<div align="right">(4×3=12)</div>

SECTION – D

21. a) What are Miller indices ? How are they determined ?

    b) The orthorhombic crystal has lattice parameters in the ratio 0.424 : 1 : 0.366. Find the Miller indices of a crystal plane whose intercepts are in the ratio 0.212 : 1 : 0.183.

22. Show that Young's modulus Y, modulus of rigidity η and Poisson's ratio σ are related by the equation Y = $2\eta(1 + \sigma)$.

23. State and prove Bernoulli's theorem and mention any 2 applications.

24. Derive an expression for impedance of an LCR series circuit. Explain Resonance. Obtain an expression for resonant frequency.

<div align="right">(2×5=10)</div>