

K23U 3744

Reg. No. : .....

Name : .....

III Semester B.Sc. Degree (CBCSS – Supplementary)  
Examination, November 2023  
(2017-2018 Admissions)  
CORE COURSE IN PHYSICS  
3B03 PHY : 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 only in **English**.

SECTION – A

1. A collimated beam of continuous x-ray spectrum falls on a stationary single crystal at a fixed glancing angle. This technique of x-ray diffraction is called \_\_\_\_\_.
2. The SI unit of coefficient of viscosity is \_\_\_\_\_.
3. The ratio of lateral strain to the longitudinal strain is known as \_\_\_\_\_.
4. An ideal constant current source has \_\_\_\_\_ internal resistance. (4×1=4)

P.T.O.



## SECTION – B

5. X-rays with wavelengths much shorter than the inter-planar spacing between atomic layers are not suitable for diffraction by crystals. Why ?
6. Write down Laue's equation for x-ray diffraction.
7. What do you mean by Wigner-Seitz cell ?
8. What is meant by torsion pendulum ? Give the equation for its period.
9. Water in river flows slowly at positions of more depth. Why ?
10. What is critical velocity in fluid mechanics ? Give its formula.
11. Define surface tension and give its unit.
12. State superposition theorem of electric network analysis.
13. What is resonance in series LCR circuit ? Give the expression for resonance frequency.
14. What is meant by power factor of an AC circuit ? Give its expression for series LCR circuit. (7×2=14)

## SECTION – C

15. Prove that the crystals cannot have five-fold rotation symmetry.
16. The Bragg's angle for first order reflection from (220) plane nickel (fcc) is  $38.2^\circ$  when x-rays of wavelength  $1.54 \text{ \AA}$  are employed in a diffraction experiment. Determine the lattice parameter of nickel.
17. One end of a wire of 1 mm radius and 50 cm length is twisted through an angle of  $45^\circ$ . Calculate the angle of shear on its surface.
18. Calculate the excess pressure inside a soap bubble of 3 mm diameter placed in air. The surface tension of soap solution is  $0.03 \text{ N/m}$ .



19. State and prove maximum power transfer theorem.
20. An arc lamp of 500 W, 50 V is needed to operate at 160 V (rms) , 50 Hz AC supply. Calculate the inductance of the choke coil to be connected in series with the lamp. (4×3=12)

SECTION – D

21. With a neat diagram explain the face centered cubic crystal structure. Discuss the coordination number, lattice sites per unit cell and the packing fraction of the structure. What type of solids generally exhibit close packed crystal structure ?
22. What is a cantilever ? Derive an expression for the depression at the loaded end of a cantilever.
23. State Bernoulli's theorem. Derive the Bernoulli's equation for the streamline flow of a fluid.
24. Explain in detail the theory behind the growth and decay of charge in a series RC circuit connected to a DC supply. What is meant by time constant ? (2×5=10)

