



K16U 2121

Reg. No. :

Name :

III Semester B.Sc. Degree (CBCSS – Reg./Supple./Imp.)
Examination, November 2016
(2014 Admn. Onwards)
CORE COURSE IN PHYSICS
3B03PHY : Allied Physics

Time : 3 Hours

Max. Marks : 40

SECTION – A

Answer **all** questions. Very short answer type. **Each** question carries 1 mark.

1. The packing factor of the fcc structure is
2. The unit of surface tension is
3. Excess pressure inside an air bubble in a liquid is
4. An ideal constant current source has _____ internal resistance. (4×1=4)

SECTION – B

Answer **any seven** questions. Short answer type. **Each** question carries 2 marks.

5. Explain the following terms with respect to a crystal
 - i) unit cell
 - ii) packing factor.
6. Explain Bragg's law for X-ray diffraction in crystals.
7. Show that the potential energy per unit volume of a stretched wire is $U = \frac{1}{2} \times \text{stress} \times \text{strain}$.
8. Differentiate between angle of twist and angle of shear.



9. Distinguish between streamline and turbulent motion of a liquid.
10. Give Poiseuille's formula. What are its limitations ?
11. State superposition theorem and reciprocity theorem.
12. Explain time constant of an R-C circuit.
13. Explain resonance in series LCR circuit.
14. Explain power in ac circuits.

(7×2=14)

SECTION – C

Answer **any four** questions. Short essay / problem type. **Each** question carries 3 marks.

15. A powder camera of radius 57.3 mm is used to obtain diffraction pattern of gold (fcc) having a lattice parameter of 0.408 nm. The monochromatic Mo-K_α radiation of wavelength 0.071 nm is used. Determine the first four S-values.
16. Prove that the crystals cannot have five-fold symmetry.
17. What amount of energy will be liberated, if 1000 droplets of water each 10⁻⁶ cm in diameter coalesce to form one large spherical drop ? Assume the surface tension of water to be 0.075 n/m.
18. A liquid is flowing through a 25 cm long tube of 1 mm internal diameter due to a pressure of 10 cm of mercury. Calculate
 - i) the volume of the liquid flowing out in one minute
 - ii) the velocity of the liquid on the axis of the capillary.
19. A lamp having filament of 15Ω is not allowed to pass more than 3 A. Find value of inductance which must be used in series with the lamp which is supplied by an ac of maximum emf 210 V at 50 Hz.
20. A circuit consists of a resistance of 50 Ω and inductance of 0.3 H with ohmic resistance 2Ω and a capacitor of 40μF in series and is supplied with 200 V at 50 Hz. Find the impedance, effective current, phase angle and power in the circuit.

(4×3=12)



SECTION – D

Answer **any two** question. Long essay type. **Each** question carries **5** marks.

21. What are symmetry operations ? Describe the principal symmetry operations applicable to a three dimensional lattice.
22. Derive an expression for twisting couple per unit twist on a cylindrical rod. Show that a hollow rod is a better shaft than a solid one of the same material, mass and length.
23. What is a cantilever ? Find an expression for the depression at the free end which is loaded.
24. Explain in detail the theory behind the charging and discharging of a capacitor.

(2×5=10)
