

K18U 1911

Reg. No. : .....

Name : .....

III Semester B.Sc. Degree (CBCSS – Reg./Sup./Imp.) Examination,  
November 2018  
(2014 Admn. Onwards)  
Core Course in Physics  
3B03PHY : ALLIED PHYSICS

Time : 3 Hours

Max. Marks : 40

**Instruction :** Answer the questions in **English** only.

SECTION – A

Very short answer type. **Each** carries **1** mark. Answer **all 4** questions.

1. The maximum proportion of volume available in FCC arrangement of spheres is
2. Young's modulus for a plastic body is
3. The time constant of a series R-C circuit is given by
4. Give the unit and dimension of coefficient of viscosity. (4×1=4)

SECTION – B

Very short answer type. **Each** carries **2** marks. Answer **7** questions out of 10.

5. Give one example each of material exhibiting SC, BCC, FCC and HCP structure.
6. Why Zeroth order diffraction is not considered in X-ray diffraction ?
7. Write Laue's equation for x-ray diffraction.
8. Show that theoretical limiting values of Poisson's ratio are  $-1$  and  $0.5$ .
9. Which rain drops fall faster, big ones or small ones ?
10. Water wets the glass surface while mercury does not why ?
11. State Kirchhoff's mesh rule.

P.T.O.



12. Calculate the work done in twisting a wire.

13. State maximum power transfer theorem.

14. Define the term skin depth.

(7×2=14)

### SECTION – C

Short essay/problem type. **Each** carries **3** marks. Answer **4** questions out of 6.

15. Draw a plan view of sodium chloride structure and explain.

16. A beam of X-rays incident on a sodium chloride crystal having lattice spacing 0.282 nm. The first Bragg deflection is observed at a glancing angle of  $8^\circ$ . What is the wavelength of X-rays ?

17. What amount of energy will be evolved when 1000 droplets of water of radius 0.0002 m combined to form a single drop ? Surface tension of water =  $72 \times 10^{-3}$  N/m.

18. Calculate rigidity modules and Poisson's ratio for silver, given Young's modules and bulk modules are  $7.25 \times 10^{10}$  N/m<sup>2</sup> and  $11 \times 10^{10}$  N/m<sup>2</sup>.

19. Define the term critical velocity and derive the expression for it. Also explain the significance of Reynold's number.

20. State and explain Norton's theorem.

(4×3=12)

### SECTION – D

Long essay type. **Each** carries **5** marks. Answer **2** questions out of 4.

21. Describe the rotating crystal method for diffraction of x-rays. How do layer lines form ?

22. Describe with necessary theory how you would determine the rigidity modulus of as wire experimentally by using torsion pendulum.

23. Derive Poiseuille's formula for the rate of flow of a liquid through a capillary tube. Describe a laboratory method for determining the coefficient of viscosity of a liquid at room temperature.

24. State Thevenin's theorem. Explain how to Thevenize a given circuit. Discuss how Thevenin's equivalent circuit differs from Norton's equivalent circuit.

(5×2=10)