

B.Sc. (Honours) Examination, 2019

Semester - II

Physics (Allied)

Allied Course: BPA-21

Time: Three Hours

Full Marks: 40

Questions are of value as indicated in the margin.
Answer *any four* questions taking at least *one* from each group.

Group-A

1. a) Define Young modulus and Poisson's ratio. What are the limiting values of Poisson's ratio? 2+1
b) What is the dimension of modulus of elasticity? 2
c) Show that for an elongated wire, work done per unit volume is equal to the half of the product of the stress and the strain. 2
d) A solid rod and a hollow tube are made of same material. Their length and diameters are equal. Which one will have higher rigidity? 3
2. a) What is surface energy? How it is related to surface tension? 1+1
b) What is the angle of contact? On what factors does it depend? 1+1
c) Explain why water rises in a capillary tube dipped partially in water. Find an expression for the height to which a liquid may rise in a capillary tube. 2+4
3. a) Define coefficient of viscosity of a liquid? What is its unit? 2+1
b) What is Reynold's number? Distinguish between streamline flow and turbulent flow of a liquid. 1+2
c) State Stoke's law. Obtain an expression for the terminal velocity of a small spherical body falling through a liquid. 1+3

Group-B

4. a) Define 'optical path-length' between two points in a medium of refractive index μ . 2
b) What is Snell's law of refraction? State the condition for its validity. 2
c) State and explain Fermat's principle. Using this principle, establish the laws of reflection in a plane surface. 2+4
5. a) Explain the terms dispersion and dispersive power. 2+2
b) What is the condition for no emergent ray from a prism? 1
c) Explain what is meant by minimum deviation of a ray of light in passing through a prism? 2
d) A parallel beam of light is incident at an angle 60° on a prism having angle of refraction 60° . What will be the refractive index of the material of the prism if the deviation produced by the ray is minimum? 3
6. a) Define the first and the second principal foci of a lens. 2
b) A convex lens of focal length 15 cm is combined with a concave lens of focal length 9 cm. Find the equivalent focal length of the combination. 2
c) What is chromatic aberration? Find the condition of achromatism of two thin lenses in contact with each other. What happens if the two lenses be of the same material? 2+3+1
7. a) What is meant by a wavefront? Explain the Huygen's principle for the wave propagation of light. 2+2
b) Can two real sources of light act as coherent sources? 2
c) Is the conservation of energy principle violated in interference? Explain. 4