

# ***DRONACHARYA COLLEGE OF ENGINEERING***

***DEPARTMENT OF APPLIED SCIENCE AND HUMANITIES***

***SUBJECT: PHYSICS-I CODE: PHY-101-F***

## **Question Bank**

### **SHORT ANSWER QUESTIONS:**

## **Unit-I**

### **Chapter I: Interference**

1. State the condition for sustained interference, what are coherent sources?
2. What is the function of second glass plate in Michelson Interferometer?
3. Explain why wedge shaped fringes are straight.
4. What is a wave front?
5. What do you understand by phase difference and path difference?
6. What do you understand by coherent sources?
7. What are the conditions for interference of light?
8. What is Fresnel's biprism?
9. Define Fringe width?
10. Distinguish between division of wave front and division of amplitude?
11. Explain the formation of coherent sources by the use of Fresnel's biprism?
12. What are the conditions for maxima and minima in an interference pattern?
13. What are Newton's rings?

14. Explain why Newton's rings are circular.

### ***Chapter II: Diffraction:***

1. What do you mean by diffraction?
2. What are difference between Fraunhaffer and Fresnel's Diffraction?
3. State the difference between Interference and Diffraction.
4. What is transmission grating?
5. State Raleigh's criterion for resolution.

### **Unit-II**

#### ***Chapter III: Polarization***

1. What do you mean by polarized and un-polarized light?
2. What do you mean by double refraction?
3. What do you mean by specific rotation?
4. What is uni-axial crystal?

#### ***Chapter IV: Laser***

1. Explain Spontaneous absorption and stimulated emission.
2. State the characteristics of LASER

### **Unit III**

#### ***Chapter V: Fiber Optics***

1. What is the principle of optical fiber? Explain the structure of an optical fibre.

2. Distinguish between single mode and multimode optical fibres.
3. What is meant by Attenuation in optical fibre?

### ***Chapter VI: Dielectric***

- Q.1 Discuss different polarisation mechanisms in dielectrics?
- Q.2 what is a dielectric?
- Q.3 State and prove Gauss law in dielectrics.
- Q.4 what are dielectric losses?
- Q.5 What are polar and non-polar molecules?

### **Unit IV**

#### ***Chapter VII: Special theory of Relativity***

1. What do you mean by frame of reference?
2. Write the Galilean transformations for space and time?
3. Write Lorentz transformation equation?
4. What are the postulated of special theory of relativity?

#### **Chapter VIII: Superconductor**

1. What do you mean by superconductivity?
2. Superconductor is a perfect diamagnetic why?
3. What is Meissner effect?
4. What is isotopic effect in super conductors?

5. Write London equation.

## LONG ANSWER QUESTIONS

### Unit I

#### *Chapter I: interference*

1. Explain the formation of interference fringes by means of Fresnel's biprism when a monochromatic source of light is used, and derive the expression for the fringe width. How will you measure the wavelength of monochromatic light using biprism method?
2. Discuss the effect of introducing a thin mica sheet in the path of one of the interfering beams in a experiment, Deduce an expression for the displacement of the fringes. Describe how this method is used for finding the thickness of a thin mica sheet?
3. Explain how interference fringes are formed by a thin wedge shaped film when examined by normally reflected light. Find the expression for fringe width. How will you estimate the difference of film thickness between two points?
4. With the help of a neat diagram show an experimental arrangement to produce Newton's rings by reflected sodium light. Prove that in reflected light the diameter of dark rings is proportional to the square root of the natural number.
5. Explain with the theory of Newton's rings experiment to find wavelength of monochromatic light also find refractive index of liquid.
6. Explain with theory Newton's rings method to determine the wavelength of monochromatic light in different case.
7. Describe the principle, construction, theory and working of Michelson's interferometer to find the wavelength and the difference in wavelength of a given light.

## ***Chapter II: Diffraction***

Q.1 What is diffraction? Explain clearly the difference between interference and diffraction.

Q.2 Derive an expression for the intensity distribution due to Fraunhofer diffraction at a single slit and show that the intensity of the first subsidiary maximum is about 4.5% of that of the principal maximum.

Q.3 Discuss the phenomena of Fraunhofer diffraction at a single slit and show that the relative intensities of the successive maximum are nearly

$$1 : 4/9\pi^2 : 4/25 \pi^2 : 4/49 \pi^2.$$

Q.4 Give the construction and theory of plane transmission grating and explain the formation of spectra by it.

Q.5 What is a grating? Explain the spectra, with theory, formed by a plane transmission diffraction grating. Show that the intensity is not uniformly distributed over all the maxima.

Q.6 Define resolving power and dispersive power of a grating. Obtain expressions for these in the case of plane transmission grating.

## **Unit II Chapter III: Polarization**

1. Explain the principle construction and working of Nicol prism.
2. Discuss the construction and working of Biquartz and Laurent half shade polarimeter and explain how it is used to find out specific rotation of sugar solution.

3. What are plane circularly and elliptically polarized light explain their-production and detection.

#### ***Chapter IV: laser***

1. Explain spontaneous and stimulated emission?
2. Explain the construction and working of He-Ne and semiconductor laser in detail?
3. Discuss the various characteristic of laser beam?

#### **Unit III Chapter V: Fibre Optics**

1. What do you mean by acceptance angle and numerical aperture in optical fiber and also discuss the propagation of light waves through an optical fibre in detail. What is meant by single mode and multimode fibre?
2. Write down a short note on optical fibre. Discuss the propagation of light waves through an optical fibre in detail.

#### ***Chapter VI: Dielectric***

What is a dielectric substance? Give examples. Discuss the importance of dielectrics.

Q.2 What are polar and non-polar molecules? Discuss the effect of electric field on polar dielectrics. What is meant by polarisation of dielectric?

Q.3 Discuss different types of polarisations in dielectrics.

Q.4 What happens when a non-polar molecule is placed in an electric field? Define atomic dipole moment and atomic polarisability. What are their dimensions? Give their S.I. units.

Q.5 Derive Clausius-Mosotti relation for non-polar dielectrics.

Q.6 State and prove Gauss's law in dielectrics.

Q.7 Deduce an expression for energy stored in dielectric in electrostatic field.

### **Q.5Unit IV**

#### ***Chapter VII: Special theory of relativity***

1. Derive Lorentz Transformation equations.
2. Describe the Michelson-Morley experiment. Discuss about its drawbacks.
3. Write notes on
  - i. Length contraction
  - ii. Time dilation
  - iii. Additions of velocities
  - iv. Mass energy equivalenc

#### ***Chapter VIII: Superconductivity***

1. Derive London's equations for superconductivity.
2. Describe Messner's effect.
3. Explain type-I and Type II superconductors.
4. Discuss BCS theory in superconductors.