UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program : First Semester – Fall 2021

Roll No. .....

Paper: Waves, Oscillations and Optics **Course Code: PHY-102** **Time: 3 Hrs. Marks: 60**

Q.1. Give short answers of the following: (15x2=30)

1. Discuss Brewster's law for the polarizing angle.
2. What is thin film interference?
3. Differentiate standing waves from the travelling waves?
4. Why Newton's rings appear circular?
5. Describe construction and operation of Michelson interferometer?
6. What is hologram? How it can be recorded and viewed?
7. How does circular and elliptical polarizations of light differ?
8. How would you describe angular simple harmonic motion?
9. Describe Fresnel biprism and its applications.
10. What are the ways to improve resolution of a grating spectrograph?
11. Give the construction and operation of polarizing filters.
12. Derive a mathematical expression for Bragg's law.
13. Find a relation for the rate of change of total mechanical energy of damped oscillations.
14. How does X-ray diffraction investigate structure of matter?
15. Discuss Malus's law for the incident linearly polarized light passing through the analyzer.

Q.2. Give brief answers of the followings. (3x10=30)

1. **Derive and discuss the expressions for phase, amplitude and total mechanical energy of a body exhibiting simple harmonic motion (SHM). Also discuss vertical and circular SHM.**
2. Explain Doppler effect of sound waves by discussing various relative rest and moving states of source and listener.
3. How would you derive a wave equation for a wave traveling in the positive and negative x-direction?