

Enrollment No.....



Faculty of Science
End Sem (Odd) Examination Dec-2017
BC3CO12 Physics-III
Programme: B.Sc.(CS) Branch/Specialisation: Computer Science

Duration: 3 Hrs.

Maximum Marks: 60

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

- Q.1 i. In Newton's ring arrangement the diameter of rings found is proportional to **1**
 (a) λ (b) λ^2 (c) $\lambda^{1/2}$ (d) λ^3
- ii. Two sources of light are said to be coherent if waves produced by them have the same **1**
 (a) Wavelength (b) Amplitude
 (c) Constant phase difference (d) Frequency
- iii. The condition for obtaining Fraunhofer diffraction from a single slit is that the light waveform incident on the slit should be **1**
 (a) Spherical (b) Cylindrical (c) Elliptical (d) Plane
- iv. Angular width of central maxima of a diffraction pattern of a single slit does not depend upon **1**
 (a) Distance between slit and source (b) Wavelength of light used
 (c) Width of the slit (d) Frequency of light used
- v. When a plane polarised light is incident on a quarter wave plate with its vibrations making an angle 45° with the optic axis, the emergent light is: **1**
 (a) Elliptically polarized (b) Plane polarized
 (c) Circularly polarized (d) None of these
- vi. Polarisation of light proves the **1**
 (a) Corpuscular nature of light
 (b) Quantum nature of light
 (c) Transverse nature of light
 (d) Longitudinal wave nature of light

[2]

- vii. Which one of the following plane transmission grating of width e and number of line per cm N will have the maximum resolving power in the first order **1**
 (a) $e = 1 \text{ cm}, N = 5000$ (b) $e = 1.5 \text{ cm}, N = 4000$
 (c) $e = 2 \text{ cm}, N = 2400$ (d) $e = 3 \text{ cm}, N = 1500$
- viii. The criterion of resolution of optical instruments was given by **1**
 (a) Newton (b) Huygen (c) Rayleigh (d) Ramsden
- ix. The directionality of a laser beam is measured by **1**
 (a) Visibility of interference fringes
 (b) The size and aperture of laser source
 (c) The divergence angle of the beam
 (d) Nature of the lasing medium
- x. The laser used in cancer treatment is **1**
 (a) Ruby laser (b) He-Ne laser
 (c) Nd-Yag laser (d) CO_2 laser
- Q.2 i. Discuss the important condition for the interference of light. **3**
 ii. Describe Newton's ring method for measuring the wave length of monochromatic light. Give the necessary theory. **7**
- OR iii. Describe Michelson's interferometer and explain the formation of circular and straight fringes with it. **7**
- Q.3 i. What is meant by diffraction of light? Distinguish between Fresnel and Fraunhofer classes of diffraction. **3**
 ii. Describe Fraunhofer diffraction due to a single slit and deduce the position of maxima and minima. **7**
- OR iii. Give the construction and theory of plane transmission grating and explain the formation of spectra by it. **7**
- Q.4 i. Explain Brewster's law. Show from this law that when light is incident on the transparent substance at polarising angle the reflected and refracted rays are right angles. **4**
 ii. Describe the construction and working of Nicol prism. **6**
- OR iii. Describe the phenomenon of double refraction in uniaxial crystal. How is it explained by Huygen's theory. **6**

[3]

- Q.5 i. Write the expression of resolving power of grating and show how can the resolving power of grating be increased? **2**
 ii. The diameter of objective of telescope is 2.54 cm . Calculate the resolving limit and resolving power of telescope for the light of wavelength 5000 \AA . **3**
 iii. Explain the meaning of optical rotation and rotatory dispersion and state the laws of optical rotation. **5**
- OR iv. What is meant by the resolving limit of telescope. Deduce expression for it. **5**
- Q.6 i. What is an optical pumping? Explain it in detail taking a case of three level lasing system. **3**
 ii. What are Einstein's coefficient A and B ? Derive Einstein's relation between them. **7**
- OR iii. Draw a neat diagram of He-Ne laser and describe its method of working. **7**
