

N.B. : (1) Question No. 1 is **compulsory**.

(2) Attempt any **four** questions from question Nos. 2 to 7.

(3) **Figures** to the **right** indicate **full** marks.

13/12/08

RC-5567

F.E. Sem 2 (Rev.)

Applied Physics - II

15

1. Solve any **five** :- *All branches*
- Find out similarities and dissimilarities between Newton's Ring and Wedge Shaped Experiment ?
 - Why gases are used as novel medium for laser ? How do you create a metastable in laser medium ?
 - Give the relevance of quantum mechanics in lasers, magnetism and Bio-physics ?
 - Distinguish between X-ray Diffraction (XRD) and Light-ray diffraction ?
 - What is meant by path difference ? What are its different conditions ? Give its importance ?
 - What is optical fiber ? List out the advantages of an optical fiber ?
 - State and explain Heisenberg's uncertainty principle ?
2. (a) Prove that the n^{th} dark ring of Newton's Ring is directly proportional to square root of ring number ? **5**
- (b) How lasers are different than X-rays ? Explain the following terms of laser science : **10**
- Induced Absorption
 - Spontaneous Emission
 - Stimulated Emission
 - Metastable state and
 - Population inversion.
3. (a) A light of wavelength 5500 \AA incident on thin transparent denser medium having refractive index 1.45. Determine the thickness of thin medium if the angle of refraction is 45° (consider $n = 1$). **5**
- (b) Explain the concept of molecular laser. **5**
- (c) What is Bio-physics ? How it is co-related to the Atomic Absorption Spectroscopy (AAS) ? List out the instruments involved in this branch ? **5**
4. (a) What is the importance of vacuum medium ? Differentiate between diffusion and Rotary pump ? **7**
- (b) What is Holography ? Give its construction and advantages over photographic technique. **8**
5. (a) What is the effect of temperature on paramagnetic materials ? Explain the relation of temperature and magnetic property for the same. **7**
- (b) With neat sketch explain principle, construction, energy diagram and specificity of Nd : YAG laser. **8**
6. (a) Derive an expression for Numerical Aperture of an optical fiber belongs to step index type. **7**
- (b) What is meant by diffraction grating ? How it is useful for determination of wavelength of mono-chromatic source ? **8**
7. (a) If an electron is accelerated at potential V , find out the wavelength of matter wave ? Give its importance ? **5**
- (b) A metal ring having cross-section area 5 cm^2 with its diameter 20 cm has a coil of 200 turns wound over it. Determine the reluctance and current required to produce flux of 2 milliweber ($\mu_r = 380$, neglect air gap). **5**
- (c) How Newton's Ring experiment is useful to determine Refractive Index of liquid medium ? Explain ? **5**