Duration: 2hr **Marks: 60**

N.B. 1 Question No.1 is Compulsory
2 Attempt any three questions from the remaining questions Nos.2 to 6
3 Assume Suitable data wherever required.
4 Figures to the right indicate marks.

Q1 **Attempt any five from the following (3 marks each)** **15**

1(a) How interference of light is produced by (i) division of wave front and (ii) division of amplitude

(b) What is the difference between LASER and Ordinary Light?

(c) Calculate V number for an optical fiber having numerical aperture 0.25 and core Diameter 20 micrometer if it is operated at 1.55 micrometer.

(d) What is curl of vector? Explain its significance

(e) What is CRO? Draw its block diagram

(f) Enlist various properties of nanomaterial's

(g) A grating has 620 rulings/mm and is 5.05mm wide. What is the smallest wavelength interval that can be resolved in the third order at λ=481nm?

Q2 A Derive the conditions for maxima and minima due to interference in transmitted system of light from thin film of uniform thickness**.** **08**

B Derive the expression for numerical Aperture for a step index fiber. The N.A. of an optical fiber is 0.5 and core R.I. is 1.54. Find refractive index of cladding **07**

Q3 A With neat sketch explain principle, construction, working& energy diagram of He-Ne Laser **08**

B What is meant by diffraction & diffraction grating? How it is useful for determination of wavelength of monochromatic source? **07**

Q4 A Define a field. What are scalar and vector fields?

B Explain the construction & working of CRO **05**

C Diameter of the 15th dark ring was 0.59 cm in a Newton's ring experiment. When a liquid is used in placed of air, the diameter of that ring is decreased by 0.09 cm. What is the refractive index of the liquid? **05**

Q5 A Explain the working of SEM with a neat diagram &its applications **05**

B Derive point form of all Maxwell's equations **05**

C An electron enters a uniform magnetic field (B) =0.23 wb/m2 at an angle 45^0 to B determine the radius and pitch of the helical path. Speed of electron is $3x10^7$m/s.**05**

Q6 A What is divergence of vector in Cartesian? Explain its significance. **05**

B What is pumping in LASE?Give the types of pumping **05**

C What do you understand by anti-reflection coating? Derive the conditions with proper diagram **05**
