

Roll No.

--	--	--	--	--	--	--	--

TPH-101

B. Tech. (First Semester)

End Semester EXAMINATION, 2017

(All Branches)

ENGINEERING PHYSICS

Time : Three Hours] [Maximum Marks : 100

Note : (i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

Section—A

1. Fill in the blanks : (1×5=5 Marks)

(a) Resolving power of a diffraction grating is

(b) A polarized beam falls on a Nicol prism such that its optic axis makes an angle θ with the light vector of the incident polarized beam. The intensity of emergent light is

(c) The process of recording of holograms involves the phenomenon of

(d) In an optical fiber the refractive index of core is (greater/lesser) than the refractive index of cladding.

(e) Ruby Laser is a level laser.

2. Attempt any *five* parts : (3×5=15 Marks)
- Explain the terms numerical aperture and acceptance angle in an optical fiber and derive the necessary expression.
 - Einstein's postulate of special theory of relativity.
 - Describe the phenomenon of stimulated emission of radiation.
 - Write a short note on Carbon Nano tubes.
 - Calculate the de-Broglie wavelength of an electron having kinetic energy of 1 eV.
 - Explain Heisenberg uncertainty principle with necessary expression.
 - Explain the working of Laurent's half shade Polarimeter.

Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c). (10×2=20 Marks)
- Discuss displacement method to determine the distance between the virtual sources in Fresnel Bi-prism experiment.
 - In a Fresnel's bi-prism experiment the distance between the slit and bi-prism is 30 cm. The distance between bi-prism and eyepiece is 50 cm. The obtuse angle of bi-prism is 179° and its refractive index is 1.42. If the width of the fringe (β) is 0.012 cm, calculate the wavelength (λ) of light.

- Derive the expression to determine the refractive index of an unknown transparent liquid using Newton ring experiment.
4. Attempt any *two* parts of choice from (a), (b) and (c). (10×2=20 Marks)
- Discuss the Michelson-Morley experiment. How are the negative results of the experiment interpreted ?
 - An experimenter observes a radioactive atom moving with a velocity of 0.25 C. The atom then emits a beta particle which has a velocity of 0.9 C relative to the atom in the direction of its motion. What is the velocity of the beta particle as observed by the experimenter ?
 - What do you understand by time dilation ? Derive an expression for time dilation and show that time dilation is a real effect.
5. Attempt any *two* parts of choice from (a), (b) and (c). (10×2=20 Marks)
- Derive Maxwell four equations and give the physical significance of each equation.
 - A sugar solution (optically active-Dextrorotatory) in a tube of 25 cm produces optical angle of 13° . The solution is then diluted to one-fourth of its previous concentration. Find optical rotation produced by 35 cm long tube containing the diluted solution.

- (c) Using Schrödinger's wave equation derive an expression for the energy of a particle confined in one-dimensional infinite potential box.

6. Attempt any *two* parts of choice from (a), (b) and (c). (10×2=20 Marks)

- (a) Discuss the production and detection of elliptically and circularly polarized light.

- (b) Calculate the de-Broglie wavelength associated with a electron moving with a velocity equal to 0.03 C. Also discuss why de-Broglie matter waves cannot be experienced in daily life.

- (c) Derive the expression for Schrödinger time independent wave equation.