R18 Regulations *Subject code:* 2B1AF

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech I Year I Semester Examinations, December 2019

PHYSICS-I

(Common to EEE,ECE,CSE & IT)

Maximum Marks: 70 Date: 18.12.2019 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks **(10x2M=20 Marks)**

1. What are the types of interference and mention them.
2. Define diffraction and mention the types.
3. What is the relation between Brewster's Law and polarization? State the law.
4. Explain any two applications of interference.
5. What is population inversion? Why is this Process necessary? How is it achieved?
6. Write the characteristics of Laser which you consider to be important for making LASER as most useful?
7. Enumerate the advantages of optical fiber.
8. Calculate the numerical aperture and acceptance of an optical fiber with n1 =1·50 & n2 =1· 45.
9. State Heisenberg's Uncertainty principle.
10. X -ray photon of wave length 0.3 Å is scattered through an angle 45 degree by a loosely bound electron. Find the wave length of the scattered photon.

Part-B

Answer All the following questions. **(10M X 5=50Marks)**

11. Draw the neat diagram of a Michelson's interferometer and explain the working and a few places where the interferometer is applicable. (10M)

OR

12. Explain how Newton's rings setup can be used for the determination of wavelength of monochromatic source of light by deriving the necessary equation. (10M)

13. What is diffraction grating? Write the equation of maxima and minima for resultant intensity of light mentioning the meaning of each symbol, when monochromatic light is diffracted from grating (10M)

OR

14. What do you understand by a quarter and half wave plate? Deduce their thickness for given wavelength in terms of their refractive index (10M)

15. With the help of suitable diagrams, Explain the what, why & how about the construction and working of a semiconductor laser. (10M)

OR

16. Explain the action of He-Ne Laser. Do you consider it to be superior to Ruby Laser? Substantiate. (10M)
17. Define acceptance angle and numerical aperture and hence derive mathematical relation between the two. (10M)

OR

18. a. Optical fibers play an important role in communication. How? Explain with a neat diagram. (5M)
    b. Discuss the propagation of light in optical fiber. (5M)
19. Derive the expression for Planck's quantum theory of radiation. (10M)

OR

20. Write down Schroedinger's wave equation for a particle in a box. Solve it to obtain Eigen function and show that Eigen values are discrete. (10M)