



R20 Regulation

Subject code: 3B1AC

**TKR COLLEGE OF ENGINEERING AND TECHNOLOGY**  
(Autonomous, Accredited by NAAC with 'A' Grade)

**B.Tech I Semester Regular Examinations, April 2022**

**ENGINEERING PHYSICS**  
(Common to CE & ME)

**Maximum Marks: 70**

Date: 05.05.2022 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 do you understand by periodic and simple harmonic oscillation?
- 2 Does a wave transmit energy or momentum? Explain
- 3 Distinguish between progressive and stationary waves.
- 4 Mention any three characteristics of wave motion.
- 5 Define Huygen's principle.
- 6 Write any 3 applications of Michelson interferometer.
- 7 Define the diffraction and mention its condition.
- 8 A transmission grating has 8000 lines/cm, the 1<sup>st</sup> order principle maximum due to a monochromatic source of light occurs at an angle of 30°. Find the wavelength of light.
- 9 Define the population inversion and meta stable state.
- 10 Highlight any 3 important applications of optical fibers.

Part-B

Answer All the following questions.

(5X10M=50Marks)

- 11 a) Derive an expression for energy decay in a damped harmonic oscillator.  
b) Differentiate between the mechanical and electrical impedance. [5+5]
- OR
- 12 a) Define damped harmonic oscillators and explain the effect of damping on oscillatory motion.  
b) Explain in detail about the quality factor, mechanical and electrical oscillators. [5+5]
  - 13 a) Discuss the phenomena of reflection and transmission of transverse wave at the boundary of two media.  
b) Deduce the Sabine's formula for the reverberation time and explain how to determine the absorption co-efficient. [5+5]
- OR
- 14 a) Write a detail note on longitudinal, transverse waves and impedance matching.  
b) Derive the Transverse wave equation on a string? [5+5]

- 15 a) What is interference of light? Describe in detail about the Young's double slit experiment.  
b) Describe the construction and working of Michelson interferometer. How can it be used to measure the wavelength of monochromatic light source. [5+5]

OR

- 16 a) Define the principle of superposition and derive an expression for the conditions for maxima and minima in an interference pattern of light.  
b) Describe and explain the formation of Newton's rings in reflected monochromatic light. Explain briefly why Newton's rings are circular. [5+5]

- 17 a) Give the difference between the interference and diffraction. Deduce the conditions for maxima and minima for diffraction at a single slit.  
b) Define the Bragg's law and show that  $2d \sin \theta = n\lambda$ . [5+5]

OR

- 18 a) What is plane diffraction grating? Explain how it is used to find the wavelength of light.  
b) What is meant by X-ray diffraction? With a neat experimental set up describe the powder method. [5+5]

- 19 a) Derive an expression for Einstein coefficients and write its importance.  
b) With the help of a block diagram, explain how communication is possible using optical fibers. [5+5]

OR

- 20 a) Discuss the construction and working of a He-Ne gas laser and mention any 4 applications of it.  
b) Explain with necessary diagrams the propagation of light in step and graded index fibers. [5+5]