

B. Tech-I Semester [CS, AI, DS, IOT, EC]  
**Engineering Physics (KAS-101T)**

CO	Course Outcome
CO1	To define (L1-Knowledge) and explain (L2-Comprehension) basic knowledge of physics.
CO2	To identify (L2-Comprehension) complex problems of physical science and apply (L3-Application) the same to solve (L3-Application) them numerically including unit conversion.
CO3	To use (L3-Application) basic knowledge of Quantum mechanics and Wave optics, to develop mathematical expressions like one dimensional Schrodinger's equation, Interference in thin film and intensity distribution in N-slit diffraction grating, Analyze Maxwell's equation in different forms (differential and integral) and apply them to diverse engineering problems apply (L3-Application) the same to simple physical systems (Optical fibre).
CO4	To differentiate (L4-Analysis) and analyze (L4-Analysis) various physical phenomenon closely associated with each other

Time: 1.5 Hrs.

M. M. 15

Section A

Q1. Attempt all questions:

(1X3 = 3 Marks)

- State fundamental postulates of special theory of relativity. CO1
- Differentiate between pair production and pair annihilation. CO2
- Define proper length. CO1

Section B

Q2. Attempt all questions:

(2X4 = 8 Marks)

- Illustrate expression for Lorentz-Fitzgerald contraction. CO4
  - Illustrate the Lorentz transformation equations. Explain that at lower velocities it is reduced to Galilean transformation equations. CO4
- Dramatize the relativistic velocity addition theorem. Show that no signal can travel faster than light. CO3
  - Dramatize Einstein's mass energy relation,  $E = mc^2$ . CO3

- c i) Calculate the percentage contraction of a rod moving with a velocity of  $0.8c$  in a direction inclined at  $60^\circ$  to its own length. CO2
- Or
- ii) A clock measures the proper time. Calculate velocity that it should travel relative to an observer so that it appears to go slow by 30 seconds in a day. CO2
- d i) Two photons approach each other. Calculate their relative velocity. CO2
- Or
- ii) Calculate the amount of work to be done to increase the speed of an electron from  $0.6c$  to  $0.8c$ . CO2  
Given: rest energy of electron =  $0.5 \text{ MeV}$ .

### Section C

(4X1 = 4 Marks)

Q3

- i) Apply and show that relativistic invariance of law of conservation of linear momentum leads to concept of variation of mass with velocity. CO3

Or

- ii) Illustrate expression of time dilation. Show that time dilation is a real effect. CO3

#### Physical Constants:

Planck's constant

$$h = 6.6 \times 10^{-34} \text{ J-s}$$

Rest mass of electron

$$m_0 = 9.1 \times 10^{-31} \text{ Kg}$$

Speed of light in vacuum

$$c = 3 \times 10^8 \text{ m/s}$$

0.857 x 10^7