Roll No: | | | | | | | | | | | | | |

BTECH
(SEM II) THEORY EXAMINATION 2021-22
ENGINEERING PHYSICS

Time: 3 Hours   Total Marks: 100

Notes:
- Attempt all Sections and assume any missing data.
- Appropriate marks are allotted to each question, answer accordingly.

SECTION-A	Attempt All of the following Questions in brief	Marks(10X2=20)	CO
Q1(a)	What is frame of reference in motion?		1
Q1(b)	Show that massless particles can exist only if they move with the speed of light and their energy E and momentum p must have the relation E= pc.		1
Q1(c)	In an electromagnetic wave, the electric and magnetic fields are 100V/m and 0.265A/m. What is the maximum energy flow.		2
Q1(d)	Define the concept of Skin depth for high and low frequency waveforms.		2
Q1(e)	What is Compton effect and Compton shift?		3
Q1(f)	Why is black the best radiator?		3
Q1(g)	Why the center of Newton's ring in reflected system is dark?		4
Q1(h)	Explain Rayleigh's criterion of resolution.		4
Q1(i)	What do you mean by acceptance angle and cone for an optical fiber?		5
Q1(j)	Differentiate spontaneous emission and stimulated emission.		5

SECTION-B	Attempt ANY THREE of the following Question	Marks(3X10=30)	CO
Q2(a)	What is special theory of relativity? Derive Lorentz transformation equation.		1
Q2(b)	Assuming that all the energy from a 100 watt lamp is radiated uniformly, calculate the average values of the intensities of electric and magnetic fields of radiation at a distance of 2m from lamp.		2
Q2(c)	Calculate the energy difference between the ground state and first excited state for an electron in a one-dimensional rigid box of length 20 Å.		3
Q2(d)	Newton's rings are observed in reflected light of wavelength 5890Å. The diameter of 10th dark ring is 0.5cm. Find the radius of curvature of the lens.		4
Q2(e)	A step index fibre has μ₁ =1.466 and μ₂ = 1.46 where μ₁ and μ₂ are refractive indices of core and cladding respectively. If the operating wavelength of the rays is 0.85 μm and the diameter of the core = 50 μm, calculate the cutoff parameter and the number of modes which the fibre will support.		5

SECTION-C	Attempt ANY ONE following Question	Marks(1X10=10)	CO
Q3(a)	What was the object of conducting Michelson-Morley experiment? Illustrate the experiment with proper diagram and necessary mathematical derivations. Also state the outcomes.		1
Q3(b)	Deduce Einstein's mass -energy relation E= mc². Give some evidence showing its validity.		1

SECTION-D	Attempt ANY ONE following Question	Marks(1X10=10)	CO
Q4(a)	Deduce the Maxwell's equations for free space and prove that electromagnetic waves are transverse in nature.		2
Q4(b)	Define radiation pressure and momentum of electromagnetic wave. Also determine an expression for radiation pressure and momentum.		2