Name:

Enrolment No:

UPES
UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
Online End Semester Examination, May 2020

Course: Electromagnetic Theory **Semester: VI**
Program: B. Sc Physics **Time 03 hrs.**
Course Code: PHYS 3003 **Max. Marks: 100**

SECTION A

1. **Each Question will carry 5 Marks**
2. **Instruction: Complete the statement / Select the correct answer(s)**

S. No.	**Question**	**CO**
Q 1	Define momentum density and angular momentum density?	**CO1**
Q2	Define refractive index, dielectric constant and wave impedance.	**CO2**
Q3	Explain Brewster law	**CO3**
Q4	Define optical activity? Explain optical rotation.	**CO1**
Q5	Define skin depth? Explain the significance of skin depth.	**CO2**
Q6	Write the differences between planar wave guide and rectangular wave guides (minimum 5)	**CO2**

SECTION B

1. **Each question will carry 10 marks**
2. **Instruction: Write short / brief notes**

Q 1	Explain Poynting Theorem and Derive the expression for Poynting Vector.	**CO1**
Q 2	Explain how the ionosphere plays an important role in the propagation of electromagnetic waves. Obtain the expression for angular frequency and permittivity of ionosphere.	**CO1**
Q 3	The electric field intensity of a linearly polarized uniform plane wave propagating in the + z direction in sea water is $\boldsymbol{E} = \boldsymbol{a_x}\, 100\, cos(10^7 \Pi t)(^{\boldsymbol{V}}/_{\boldsymbol{m}})$ at $z = 0$. The constitutive parameters of sea water are ε_r = 80, $\mu_r = 1$ and $\sigma = 4$ $(^{S}/_{m})$ a) Determine the attenuation constant, phase constant, intrinsic impedance, phase velocity, wavelength, and skin depth. b) Find the distance at which the amplitude of **E** is 1% of its value at $z = 0$.	**CO2**
Q 4	Explain the production and detection of circularly polarized light.	**CO2**
Q 5	Derive the Fresnel's Formulae for parallel polarization cases (Oblique incidence) OR What are retardation Plates. Explain the working of Quarter-Wave and Half-Wave Plates .	**CO1**

Section C **1. Each Question carries 20 Marks.** **2. Instruction: Write long answer.**		
Q1	a) Explain the construction and working Babinet Compensator and its Uses. b) Two Nicol's have parallel polarizing directions so that the intensity of transmitted light is maximum through what angle must either Nicol be turned if the intensity is to drop by one fourth of its maximum OR c) Derive a pair of time-harmonic transmission-line equations for phasors $\boldsymbol{V}(z)$ and $\boldsymbol{I}(z)$. d) Neglecting losses and assuming the substrate of a stripline to have a thickness 0.4 mm and a dielectric constant 2.25, (i) Determine the required width **w** of the metal strip in order for the stripline to have a characteristic resistance of 50 (Ω) (ii) Determine L and C of the line. And (iii) Determine phase velocity along the line.	**CO4**