

Semester: October 2021 –February 2022		
Examination: ESE Examination		
Programme code: 01 Programme: B.TECH	Class: FY	Semester: I (SVU 2020)
Name of the Constituent College of Somaiya Vidyavihar University: K. J. Somaiya College of Engineering		Name of the Department ETRX/EXTC/MECH
Course Code: <div style="border: 1px solid black; padding: 2px; display: inline-block;">116U06C102</div>	Name of the Course: Engineering Physics.	
Duration : 1 Hour 45 Minutes	Maximum Marks : 50	
Instructions: <ul style="list-style-type: none"> 1) Draw neat diagrams 2) Assume suitable data if necessary Avogadro's number $N_0 = 6.023 \times 10^{23}/\text{mol}$ Permittivity of free space $\epsilon_0 = 8.85 \times 10^{-12} \text{ F/m}$ Planks constant $= 6.63 \times 10^{-34} \text{ J.sec}$ Boltzman's constant $(k) = 1.38 \times 10^{-23} \text{ J/K}$ $1 \text{ e V} = 1.6 \times 10^{-19} \text{ J}$ Charge on electron $= 1.6 \times 10^{-19} \text{ C}$ 		

Question No.		Max Marks
Q1 (A)	<p style="text-align: center;">Choose most appropriate option from the given options</p> <p>1. A light is incident on an analyzer and analyzer is rotated through 360 degrees light coming out of analyzer is tested and it is observed that intensity is constant at all angles light can be</p> <p style="margin-left: 40px;">A. Unpolarized light B. Plane polarized light C. linearly polarized light D. Elliptically polarized light</p> <p>2. In spontaneous emission, the induced radiation and incident radiation have same</p> <p style="margin-left: 40px;">A. Only Wavelength B. Only Frequency C. Only Energy D. None of the above</p> <p>3. A field whose curl is zero called</p> <p style="margin-left: 40px;">A. Solenoidal field B. Irrotational field C. Gradient field D. Scalar field</p>	1x10

	<p>4. According to which of the Maxwell's equation of electromagnetism, magnetic unipole does not exist(Always dipoles)</p> <p>A. Maxwell's First equation B. Maxwell's second equation C. Maxwell's third equation D. Maxwell's fourth equation</p> <p>5. Shark has capacity to locate the prey even in very low visibility because of</p> <p>A. Strong eye sight B. Hearing ability of shark is very strong C. He has electromagnetic sense. D. Strong ability to smell</p> <p>6. Type of tropism can be compared to the skin of animal</p> <p>A. Hydrotropism B. Thigmotropism C. Gravitotropisam D. Heliotropism</p> <p>7. Growth of the roots towards moister happens in a plant because of</p> <p>A. Hydrotropism. B. Phototropism C. Gravitotropisam D. Heliotropism</p> <p>8. The total probability of finding a particle in space having boundaries at infinity must be</p> <p>A. Zero B. Infinite C. Unity D. Double</p> <p>9. Which of the following is the correct expression for the group velocity?</p> <p>A. $v\lambda$ B. $d\omega/dv$ C. dE/dk D. $d\omega/dk$.</p> <p>10. The director of liquid crystal is .</p> <p>A. Preferred direction of molecules B. Perpendicular to preffered direction of molecule C. Any direction of molecule D. None of this . E.</p>	
Q1 (B)	<p>Attempt any FIVE questions out of the following</p> <p>1. Calculate the highest wavelength which would be cut-off from reflection</p>	5x2

	<p>due to a film of thickness 1.5 micron and refractive index 1.25.</p> <ol style="list-style-type: none"> Calculate the angle of refraction of the ray if a ray of light is incident on a glass surface of refractive index 1.732 at polarizing angle. Find the gradient of a scalar function $f(x,y,z) = 3yx^2 - y^3x^2$ at (1,-2,-1) Calculate the critical angle of the optical fiber whose core RI is 1.45 and cladding RI is 1.40. Find the group and phase velocity of an electron whose speed is 0.7 c Calculate the thickness of quartz crystal if ultrasonic wave generated is of 2 Mhz. Given density of quartz $2.65 \times 10^3 \text{ kg/m}^3$ and young's modulus $8 \times 10^{10} \text{ N/m}^2$ If an excited state of atom has a lifetime of $2.56 \times 10^{-14} \text{ sec}$. What is the uncertainty with which the energy of this state can be measured? 	
Q. 2	<p>Attempt all</p> <ol style="list-style-type: none"> Derive the condition for bright interference of light reflected from a thin film of uniform thickness of oil coated on glass and it is held in an air. Obtain Ampere's law in differential form. 	<p>07</p> <p>03</p>
Q. 3	<p>Solve any two.</p> <ol style="list-style-type: none"> What is attenuation in OFC? Give its formula. What are the optical windows? state its importance . Derive Clausius-Mosotti equation What are seebeck effect and peltier effect ? briefly explain the reasons behind these effects. State importance of any one in sensor technology. 	5x2
Q. 4	<p>Solve any two</p> <ol style="list-style-type: none"> Using maxwell's equations derive the equation of the electromagnetic wave in vacuum and show that it's velocity of propagation is the velocity of light . Obtain the uncertainty principle from thought experiment of single slit electron diffraction. A trivalent impurity of 0.01 ppm is added in to silicon .The semiconductor has a resistivity of 0.25 ohm.m at 300 k .Calculate the hole concentration and its mobility .Given: Atomic wt of Si =28.1 and density of Si=$2.4 \times 10^3 \text{ kg/m}^3$ 	5x2