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EAST POINT COLLEGE OF ENGINEERING & TECHNOLOGY
An Autonomous Institution Affiliated to Visvesvaraya Technological University (VTU) Belagavi

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EPPHE202

Second Semester B.E. Degree Examination, May 2026
APPLIED PHYSICS FOR EES

TIME:3 hrs. Max.Marks:100

Note: 1. Answer any FIVE full questions, choosing ONE question from each MODULE
2. Formula Hand Books Permitted
3. M: Marks, L: Bloom's level, C: Course outcomes.

		Module-1	M	L	C
Q.1	a	Obtain the expression for Eigen value and Eigen function for particle in a 1D potential well of width "a".	9	L2	CO1
	b	State Heisenberg's Uncertainty Principle? Show that electron does not exit inside the nucleus using Heisenberg's Uncertainty Principle	6	L2	CO1
	c	The speed of electron is measured with an uncertainty of $2\times10^4 ms^{-1}$ in one dimension. What is the minimum width in which the electron is confined in the atom?	5	L3	CO1
		OR			
Q.2	a	Derive Time independent Schrodinger Wave Equation in one dimension.	8	L2	CO1
	b	State De-Broglie hypothesis. Show that the de-Broglie wavelength of an electron is found to be equal to $\frac{12.26_0}{\sqrt{V}}$ A.	7	L2	CO1
	c	A particle of mass 0.5 MeV/c^2 has kinetic energy 100eV. Find its de Broglie wavelength where c is the velocity of light.	5	L3	CO1
		Module–2			
Q.3	a	Define Fermi factor? Discuss the dependence of the same on temperature and energy.	8	L2	CO2
	b	What are dielectrics? Derive Clausius- Mossotti equation.	7	L2	CO2
	c	Find the temperature at which there is 1% probability that a state with an energy 0.5 eV above the Fermi energy is occupied.	5	L3	CO2
		OR			
Q.4	a	What is Polarization? Discuss types of polarization in dielectric materials.	8	L2	CO2
	b	What is Meissner Effect. Discuss MAGLEV vehicles	7	L2	CO2
	c	Lead has a superconducting transition temperature 7.26K. if the initial field at 0 K is 50×10^3 Am^{-1}, calculate the critical field at 6K.	5	L3	CO2
		Module–3			
Q.5	a	With neat diagrams, explain different types of optical fibers.	8	L2	CO3
	b	Explain the conditions and Requisites of a Laser system.	7	L2	CO3
	c	A 5W pulsed laser emits light of wavelength 694 nm. If the duration of each pulse is 20 ns, calculate the number of photons emitted per pulse.	5	L3	CO3
		OR			
Q.6	a	With neat diagram derive an expression for numerical aperture and arrive at the condition for propagation of a signal in an optical fiber	8	L2	CO3

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	b	With neat diagram explain the construction and Working of Semiconductor diode Laser.	7	L2	CO3
	c	The angle of acceptance of an optical fiber is 30° when kept in air. Find the angle of acceptance when it is in a medium of refractive index 1.33.	5	L3	CO3
		Module–4			
Q.7	a	State and prove Gauss divergence theorem.	8	L2	CO4
	b	What is displacement current? Derive the expression for displacement current.	7	L2	CO4
	c	Determine the constant C such that, the vector is solenoidal. Given, $\vec{A} = (x + ay)\hat{a}_x + (y+bz)\hat{a}_y + (x + cz)\hat{a}_z$.	5	L3	CO4
		OR			
Q.8	a	Explain the terms gradient of a scalar, divergence and curl of a vector.	8	L2	CO4
	b	Explain Faraday's Laws of Electromagnetic induction.	7	L2	CO4
	c	Calculate the curl of $\overrightarrow{A}$, given, $\overrightarrow{A} = (1 + yz^2)\hat{a}_x + xy^2\hat{a}_y + x^2y\hat{a}_z$.	5	L3	CO4
		Module–5			
Q.9	a	What are semiconductors? Derive the relation between Fermi energy & energy gap for an intrinsic semiconductor.	8	L2	CO5
	b	Derive expression for electrical conductivity of a semiconductor.	7	L2	CO5
	c	The Hall co-efficient of a material is -3.68×10^{-5} m^3/C. What is the type of charge carriers? Also calculate the carrier concentration.	5	L3	CO5
		OR			
Q.10	a	What is Hall effect? Obtain expression for Hall voltage in terms of Hall coefficient.	8	L2	CO5
	b	Explain construction and working of Phototransistor and mention its application	7	L2	CO5
	c	The resistivity of intrinsic semiconductor when 27° C is equal to 0.47Ω m assuming electron and hole mobilities are 0.38 and $0.18 m^2V^{-1}s^{-1}$ respectively, calculate intrinsic carrier density.	5	L3	CO5

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