Vidyavardhini's College of Engineering and Technology, Vasai

First Year Engineering

Internal Assessment Test-II (IAT-II)

Subject: Applied Physics **NEP-2020** **Sem: I**

Max. Marks / Duration: 15 / 1 Hr **Date: 04/12/24**

Note: All Questions are compulsory.
Figures to the right indicates full marks.

Q. No.	Questions	IAT of Marks (15)	BL	CO
Q1	**Each question of two marks (solve any three)**	**5**		
1(a)	What is the divergence of a vector field? Find the divergence of a field for $\vec{A} = x^2y\,\boldsymbol{i} - 3xy\boldsymbol{z^2}\,\boldsymbol{j} + 2\boldsymbol{xy}\,\boldsymbol{k}$ at (1,1,1) **OR** What is the curl of a vector field? Find the curl of a Vector field for $\vec{E} = 4x\,\boldsymbol{i} + 2y\,\boldsymbol{j} + 3z\,\boldsymbol{k}$	2	2	4
1(b)	Derive Maxwell's 3rd equation in differential form, which describes how the electric field circulates around the time-varying magnetic field. **OR** Derive Maxwell's first equation in differential form for static electric field produced by charge enclosed within a closed surface.	3	2	
Q2	**Solve any one**	**5**		
(a)	What is Heisenberg's Uncertainty Principle? Prove that electron cannot exist in the nucleus using H.U.P.	5	2	5
	OR			
(b)	Derive Schrodinger Time dependent Wave Equation.			
Q3	**Solve any one**	**5**		
(a)	Explain conductivity and mobility. Calculate the conductivity of a Ge specimen if the donor impurity added to Ge is 1.5×10^{25} atoms / m^3. Given mobility of electron is 3900 cm^2/V-sec.	5	3	6
	OR			
(b)	Explain Fermi-Dirac distribution function. If the fermi level in K is 2.2eV, Calculate the energy for which the probability of occupancy at 300°K is 0.98?			

BL -Bloom's Taxonomy Levels
(1- Remembering, 2- Understanding, 3- Applying, 4- Analyzing, 5- Evaluating, 6 - Creating)
CO - Course Outcomes
CO4: Illustrate the significance of Maxwell's equations in the field of modern technology.
CO5: Apply the foundations of quantum mechanics for the development of modern technology.
CO6: Explain the types of semiconductors based on variations in fermi level with temperature and doping concentration.