JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2023

BTech-1 Semester (CSE/IT/ECE/CE)

COURSE CODE (CREDITS): 18B11PH111 (4) MAX. MARKS: 15

COURSE NAME: Engineering Physics-1

COURSE INSTRUCTORS: PBB, SKK, VSA, SKT, HAZ, SBA, HSR, MAX. TIME: 1 Hour

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Note: (a) All questions are compulsory.

(b) Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems

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Q1. Prove that EM waves are transverse in nature. **[3 marks] [CO-1]**

Q2. If $A = 3x^2y - yz^2$ find gradient of A at $(1, 2, -1)$ and divergence of gradient of A.

[2 marks] [CO-4]

Q3. If $\vec{A} = \hat{\rho}\, \rho\, \sin\varphi + \hat{\varphi}\, 2\rho\, \cos\varphi + \hat{k}\, 2z^2, find\, \vec{\nabla}.\vec{A}\, and\, \vec{\nabla} \times \vec{A}.$ **[3 marks] [CO-4]**

Q4. Prove that $\vec{\nabla} \times \vec{E} = -\frac{\partial B}{\partial t}$ and $\vec{\nabla} \times \vec{H} = \vec{J} + \frac{\partial D}{\partial t}.$ **[3 marks] [CO-1]**

Q5. From the Gauss's law prove the Coulomb's law. **[2 marks] [CO-1]**

Q6. Charge is distributed along z-axis from $z = 5$ meter to ∞ and from $z = -5$ meter to $-\infty$ with density of 20 nC/m. Find $|\vec{E}|$ at $(2,0,0)$. **[2 marks] [CO-1]**

$\varepsilon_0 = 8.85 \times 10^{-12}$ F/m; $\mu_0 = 4\pi \times 10^{-7}$ H/m; e=1.6×10^{-19} C