

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2024

B.Tech-I Semester (CSE/IT/ECE/CE/BT/BI)

COURSE CODE (CREDITS):18B11PH111 (4)

MAX. MARKS: 35

COURSE NAME: ENGINEERING PHYSICS-I

COURSE INSTRUCTORS:PBB,SKK,VSA,HAZ,SKT,SBB,HSR

MAX. TIME: 2 Hours

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q.No	Question	CO	Marks
Q1	(a)For a sphere of radius R evaluate volume of sphere and three different area vector along $\hat{r}$ , $\hat{\theta}$ and $\hat{\phi}$ direction.  (b) Write unit vector $\hat{r}$ , $\hat{\theta}$ and $\hat{z}$ in cylindrical co-ordinate system and calculate volume of cylinder if radius varies from 0→R and z varies from 0→l.	1	3+3=6
Q2	Suppose you have some charge and current configuration which at time t produces electric field E and magnetic field B. Show that work done per unit time per unit volume is E.J. Also, show that energy per unit time per unit area transported by field is given as $\frac{(E \times B)}{\mu_0}$	3	4
Q3	(a)Derive an expression for continuity equation for current density J and obtain the condition for steady state current. Write the corrected amperes law. (b)The field potential in a certain region of space depends only on x coordinate as $\phi = -ax^3 + b$ , where a, and b are constant. Find the distribution of space charge $\rho(x)$ .	1	2+2=4
Q4	(b)Using Maxwell's equations, derive the wave equation in free space.	3	4
Q5.	(a)The potential of a certain electrostatic field has the form $\phi = a(x^2 + y^2) + bz^2$ , where a and b are constant. Find the magnitude and direction of the electric field strength vector.  (b) A certain oscillation results from the addition of coherent oscillations of the same direction $\xi_k = a \cos \{\omega t + (k-1)\phi\}$ , where k is the number of the oscillation (k=1,2,3,.....N), $\phi$ is the phase difference between the k <sup>th</sup> and (k-1) <sup>th</sup> oscillations. Calculate the amplitude of the resultant oscillation.	4	3+3=6

Q6.	<p>(a) A ray of light is incident on the surface of a glass plate of refractive index 1.55. Calculate the angle of incidence for which the reflected light is completely plane polarized. What is the plane of vibration of this light? What is the corresponding angle of refraction?</p> <p>(b) A sugar solution in a tube of length 20 cm produces optical rotation of 130. The solution is diluted to one-third of its previous concentration. Find the optical rotation produced by a 30 cm long tube containing the diluted solution.</p>	2	3+2=5
Q.7	<p>(a) Derive the relation for calculating the refractive index of liquid using Newton's Ring method.</p> <p>(b) Explain the basic difference in intensity pattern of single-slit and double-slit diffraction using mathematical and graphical methods.</p>		3+3=6

JUT TEST-3 EXAMINATION- DEC 2024