

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- September 2016

B. Tech 5th Semester (ECE)

COURSE CODE: 10B11EC513

MAX. MARKS: 15

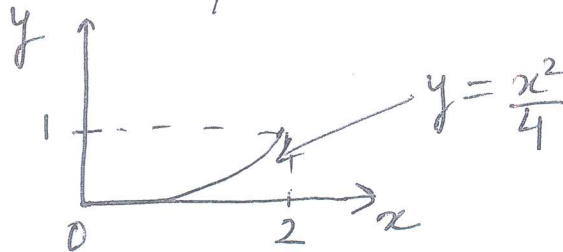
COURSE NAME: Electromagnetic Engineering

COURSE CREDITS: 4

MAX. TIME: 1Hr

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

1. (a) Given vectors $A = a_x + 3a_z$ and $B = 5a_x + 2a_y - 6a_z$, determine a unit vector parallel to $3A+B$.
 (b) Let $A = \alpha a_x + 3a_y - 2a_z$ and $B = 4a_x + \beta a_y + 8a_z$, determine the relation between α and β if vector B is perpendicular to vector A.
2. (a) A vector field is given by $A = 3xy a_x + 3yz a_y + 3zx a_z$, compute its curl vector.
 (b) Find the normal and tangential component at the point $(\rho = 2, \phi = 1^\circ, z = 1)$ on the cylinder $\rho = 2$, given vector $A = \sin \phi a_\rho + \cos z a_\phi + \rho a_z$.
3. Given the vector field, $H = \rho z \cos \phi a_\rho + e^{-2} \sin \frac{\phi}{2} a_\phi + \rho^2 a_z$. At point $(1, \frac{\pi}{3}, 0)$, Find.
 (i) $H \cdot a_x$ (ii) $H \times a_\theta$ (iii) The vector component of H normal to surface $\rho = 1$.
4. Let $A = (x^2 + y^2) a_x + 2xy a_y$, evaluate $\int_1 A \cdot dl$ along the curve as shown in fig.



5. Calculate the charge density everywhere due to the given electric flux density.

$$D = 4\rho \sin \phi a_\rho + 2\rho \cos \phi a_\phi + 2z^2 a_z \text{ C/m}^2$$