

Roll No.:.....

National Institute of Technology, Delhi

Name of the Examination: B. Tech.

Branch : Electrical Engineering.

Semester : 3rd

Title of the Course : Electromagnetic Field Theory

Course Code : EELB 201

Time: 1.5 Hours

Maximum Marks: 25

Note : 1. Do not write anything on the question paper except Roll number
2. Assume any data suitably if found missing

CO – Course Outcomes; BL – Bloom's Taxonomy Levels (1- Remembering, 2- Understanding, 3 – Applying, 4 – Analyzing, 5 –Evaluating, 6 - Creating);

Q. No.	Questions	Marks	CO	BL
1	Give the points $M(r = 5, \theta = 20^\circ, \Phi = 120^\circ)$ and $N(r = 3, \theta = 90^\circ, \Phi = 30^\circ)$ (a) Find the distance from M to N (b) Give a unit vector in cartesian coordinates at M that is directed towards N (c) Give a unit vector in spherical coordinates at M that is directed towards N	6	CO1	L3
2	A sheet of charge $\rho_s = 4nC/m^2$, is present at the plane $x = 2$ in free space, and line charge $\rho_L = 25nC/m$, is located at $x = 2, z = 3$. (a) Find the value of electric field intensity at the origin; (b) Find the direction of \vec{E} at $P(6, 5, 8)$; (c) What is the force per meter length on the line charge?	6	CO1	L3,4
3	For the point $P(3, 60^\circ, 2)$ in cylindrical coordinates and the potential field $V = 10(\rho + 1)z^2 \cos \Phi$ V in free space, find at P; (a) V; (b) \vec{E} ; (c) \vec{D} ; (d) ρ_v ; (e) dV/dN ; (f) \hat{a}_N	6	CO2	L4
4	Determine the numerical value of divergence at the point indicated if: $\vec{A} = \sin \theta \cos \phi \hat{a}_r + \cos \theta \cos \phi \hat{a}_\theta - \sin \phi \hat{a}_\phi$ C / m ² at $P_C(2, \pi/3, \pi/6)$	1	CO1	L3
5	A point charge of $6\mu C$ is located at the origin, a uniform line charge density of $180nC/m$ lies along the x-axis, and a uniform sheet charge equal to $25nC/m^2$ lies in the $z = 0$ plane. (a) Find \vec{D} at $A(0, 0, 4)$; (b) Find \vec{D} at $B(1, 2, 4)$; (c) Calculate the total flux leaving the surface of a sphere of 4 m radius centered at the origin	6	CO2	L5