Electronics and Telecommunication Department

Course Code: ETU601 Date: 28/01/2016 Time: 10.30-11.30 a.m.
Course: Electromagnetic Fields Duration: 1Hr Max Marks: 15

CT-I

Attempt the following

1. Given the vectors $M = -10a_x + 4a_y - 8a_z$ and $N = 8a_x + 7a_y - 2a_z$. Find a unit vector in the direction of $-M + 2N$; the magnitude of $5a_x + N - 3M$; $|M||2N|(M + N)$ (03)
2. Consider the vector field $G = ya_x + 2.5xa_y + 3a_z$ and the point $Q(4,5,2)$. Find the scalar component of G at Q in the direction of $a_N = \frac{1}{3}(2a_x + a_y - 2a_z)$; the vector component of G at Q in the direction of a_N and the angle between $G(r_Q)$ and a_N (03)
3. Express $D = (x^2 + y^2)^{-1}(xa_x + ya_y)$ in cylindrical coordinate system. (03)
4. Point charges of 50nC each are located at $A(1,0,0)$, $B(-1,0,0)$, $C(0,1,0)$ and $D(0,-1,0)$ in free space. Find the total force on the charge at A. (03)
5. A 2μC point charge is located at $A(4,3,5)$ in free space. Find E_ρ, E_ϕ and E_z at $P(8,12,2)$ (03)

ELECTRONICS AND TELECOMMUNICATION DEPARTMENT

Course Code: ETU601 Date: 23/01/2017 Time: 10.30-11.30 a.m.

Course: Electromagnetic Fields Duration: 1Hr Max. marks: 15

CT – I

Attempt the following (any FIVE)

1.	The vector from the origin to point A is given as $(6,-2,-4)$, and the unit vector directed from the origin towards point B is $(2,-2,1)/3$. If points A and B are ten units apart, find the coordinates of point B.	03
2.	Show that the vector fields $A = \rho cos\emptyset a_\rho + \rho sin\emptyset a_\emptyset + \rho a_z$ and $B = \rho cos\emptyset a_\rho + \rho sin\emptyset a_\emptyset - \rho a_z$ are everywhere perpendicular to each other.	03
3.	A 2 μC point charge is located at $A(4,3,5)$ in free space. Find E_ρ, $E_\emptyset$ and E_z at $P(8,12,2)$.	03
4.	A uniform volume charge density of 0.2 μC/m3 is present throughout the spherical shell extending from $r = 3\ cm$ to $r = 5\ cm$. If $\rho_v = 0$ elsewhere. Find the total charge present throughout the shell.	03
5.	The cylindrical surface $\rho = 8\ cm$ contains the surface charge density, $\rho_s = 5e^{-20\|z\|}\ nC/m^2$. What is the total amount of charge present?	03
6.	Given the electric flux density, $D = 0.3r^2 a_r\ nC/m^2$ in free space. Find E at $P(r = 2, \theta = 25^0, \emptyset = 90^0$	03

GOVERNMENT COLLEGE OF ENGINEERING, AMRAVATI

(An Autonomous Institute of Govt. of Maharashtra)

Electronics and Telecommunication department

Class test I — Marks: 15

Sub: ETU 601 Electromagnetic fields — Date: 2 Feb, 2015 Solve any three

Q1. Transform the vector field $\mathbf{F}=2r\cos\varphi\mathbf{a}_r+\mathbf{a}_\varphi$ into Cartesian co-ordinates & evaluate it at P (4,-2, 3). Also find $\mathbf{a}_F$ at P. (5M)

Q2. Calculate **D** in rectangular co-ordinates at P (2,-3, 6) m produced by (5M)

a) A point charge Q_a=5.4mC at Q(-200,300,-600)cm

b) A uniform line charge ρ_l =22mC/m on the y-axis.

c) A uniform surface charge density $\rho_s=126\mu C/m^2$ on the plane z=-8m

Q3. a) Write short note on i) Scalar field ii) Vector field (2 +3M)

b) Derive the expression for **E** due to infinite uniform line charge along z-axis

Q4. a) Find the **E** at (0,φ,h) in cylindrical co-ordinates due to the uniformly charged disc $r \leq a$, z=0 (disc of radius a in xy plane).

b) Give the statement of Gauss's law and obtain relation between **D** and **E**. (3+2M)