

01



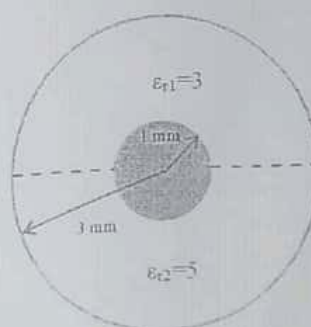
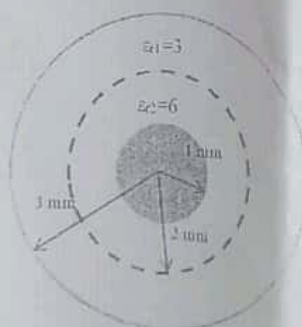
VIT
Vellore Institute of Technology

SCHOOL OF ELECTRONICS ENGINEERING
Continuous Assessment Test - I, August 2019
Fall Semester, 2019-2020

Course Code	: ECE1017	Duration	: 90 Mins
Course Name	: Electromagnetic Field Theory and Transmission Lines		
Max. Marks	: 50		
Faculty-In-Charge:	Suresh Kumar T R	Slot	: B2

Answer All the Questions

1. A 2 mC/m charge exist in $x=0, y=0$ to $-5, z=0$. Calculate \vec{E} in Cartesian coordinate system at $(5, 0, 0)$. (7)
2. In a region, $\vec{D} = 2\rho(z+1)\cos\phi\hat{a}_\rho - \rho(z+1)\sin\phi\hat{a}_\phi + \rho^2\cos\phi\hat{a}_z$, $\mu\text{C/m}^2$. Find (a) the charge density (b) total charge present in a region $0 < \rho < 2, 0 < \phi < \pi/2, 0 < z < 4$. (c) Verify the Gauss's law by calculating the flux passing through the closed surface of the above volume. (10)
3. A line $y=2, z=1$ carries uniform charge 10 nC/m. (a) If $V=0$ Volt at O $(0,0,0)$ find V at A $(5,5,5)$ (b) If $V=100$ Volts at B $(2,2,2)$, find V at C $(-2,5,3)$. (7)
4. Three point charges -1 nC, 4 nC, and 3 nC are located at $(1, 2, 3)$, $(-2, -4, -6)$, and $(-2, 6, 0)$, respectively. Find the energy in the system. (7)
5. a) Conductivity of distilled water and quartz is 2×10^{-4} and 10^{-17} S/m respectively. Relative permittivity of distilled water and quartz is 76.7 and 5 respectively. Calculate in which material relaxation time is very short. (3)
b) Determine the capacitance of the two spherical capacitors shown below filled with different permittivity. (6)



6. Two semi-infinite wires in series kept along $x=0$ to $x=-\infty$ and $z=0$ to $z=-\infty$, is carrying current of 5 A. Calculate the magnetic field at $(5, 6, 0)$. (10)



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$(2 \times 10^{-4}) / (76.7 \times 10^{-9})$
 $(10^{-17}) / (5 \times 10^{-9})$