

Reg. No. :

--	--	--	--	--	--	--	--	--	--

**Question Paper Code: 92008**

B.E./B.Tech. DEGREE EXAMINATION, AUGUST 2021

Second Semester

19UPH208 – ELECTROMAGNETIC THEORY

(Electronics and Communication Engineering)

(Regulation 2019)

Duration: 1.45 hrs

Maximum: 50 Marks

PART A - (10 x 2 = 20 Marks)  
(Answer any ten of the following questions)

1. Write the classification of conducting materials. CO1 (U)
2. Obtain the relation between current density, drift velocity & mobility. CO1 (U)
3. Find the relaxation time of conduction electrons in a metal of resistivity  $1.54 \times 10^{-8}$  ohm-m if the metal has  $5.8 \times 10^{28}$  conduction electrons /  $m^3$ . CO6 (AP)
4. Find the drift velocity of the free electrons in a copper wire whose cross sectional area is  $1.0 \text{ mm}^2$  when the wire carries a current of 1A. Assume that each copper atom contributes one electron to the electron gas. Given  $n = 8.5 \times 10^{28} \text{ m}^{-3}$ . CO6 (AP)
5. Write down Poisson's and Laplace's equation. CO1(U)
6. Give the relation between electric field and potential at any point. CO1 (U)
7. Calculate the force of repulsion between two protons in a nucleus of iron, assuming a separation of  $4.0 \times 10^{-15}$  m. CO2 (AP)
8. State the uses of Gauss's law. CO1 (U)
9. Define magnetic field intensity. What is its unit? CO1 (U)
10. Define Ampere's circuital law. CO1(U)

11. A magnetic material has a magnetisation of 3000 ampere / metre and flux density of  $0.044 \text{ Wb/m}^2$ . Calculate the magnetizing force and the relative permeability of the Material. CO5 (AP)
12. Write the advantages of using Nanotechnology in Electronics. CO1 (U)
13. What are quantum dot lasers? CO1 (U)
14. Define Nanotubes & nanowires. CO1 (U)
15. What is single electron tunneling? CO1 (U)

PART - B (3 x 10 = 30 Marks)

(Answer any three of the following questions)

16. Derive an expression for density of states. Hence deduce the expression for carrier concentration in metals. CO1 (U)
17. (i) Calculate the force of repulsion between two protons in a nucleus of iron, assuming a separation of  $4.0 \times 10^{-15} \text{ m}$ . CO2 (U)  
 (ii) A point charge of  $3.5 \times 10^{-9} \text{ C}$  is placed in a medium of relative permittivity of 4. Calculate the electric field at a point  $15 \times 10^{-2} \text{ m}$  from the point charge. CO2 (U)
18. Explain force on a charged particle in electric field. CO1 (U)
19. A magnetic field strength of  $2 \times 10^5$  amperes / metre is applied to a paramagnetic material with a relative permeability of 1.01. Calculate the values of B and M. CO5 (AP)
20. Write note on Nano sensor. CO1(U)