A   Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code: U2P08

B.E./B.Tech. DEGREE EXAMINATION, NOV 2022

Second Semester

Electronics and Communication Engineering

21UPH208- Electromagnetic Theory

(Regulations 2021)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Highest energy level that can be occupied by an electron at 0 K   CO1-U

    (a) Excited state   (b) Conduction state   (c) Fermi energy   (d) Average energy

2. Which material is used for the manufacture of ground wire?   CO1-U

    (a) Aluminium   (b) Galvanised steel   (c) Cast iron   (d) Stainless steel.

3. The potential inside a charged hollow sphere is -----------   CO1-U

    (a) Same as that on the surface   (b) Zero

    (c) Less than that on the surface   (d) None of these

4. For a charge Q1, the effect of charge Q2 on Q1 will be   CO1-U

    (a) F1 = F2   (b) F1 = -F2   (c) F1 = F2 = 0   (d) F1 and F2 are not equal

5. What is the relationship between magnetic field strength and current   CO1-U
    density?

    (a) $\nabla.H = J$ (b) $\nabla.J = H$ (c) $\nabla \times H = J$ (d) $\nabla \times J = H$

6. Magnetic flux will be _____ if the surface area vector of a surface is   CO1-U
    perpendicular to the magnetic field.

    (a) Zero   (b) Unity   (c) Close to maximum   (d) Maximum

7. -------- is a type of photo detector, which can convert optical signals   CO1-U
    into electrical signals

    (a) PIN diode   (b) Avalanche diode   (c) zener diode   (d) schottky diode

8. In photo diode the carriers are generated in the   CO1-U

   (a) P region   (b)depletion region   (c)N region   (d) terminal of the diode

9. A material with one dimension in Nano range and the other two   CO1-U
   dimensions are large is called

   (a) micro-material   (b)quantum wire   (c)quantum well   (d) quantum dot

10. Which one of the following is an example for semiconducting nanowires?   CO1-U

    (a) Nickel   (b) Platinum   (c) Silicon   (d) All of the above

PART – B (5 x 2= 10Marks)

11. Give any two postulates of classical free electron theory.   CO1-U

12. Explain Coulomb laws of forces   CO1-U

13. Give any two properties of electric lines of force.   CO1-U

14. What is solar cell?   CO1-U

15. What are the drawbacks of QD lasers?   CO1-U

PART – C (5 x 16= 80Marks)

16. (a) Explain density of states and arrive an expression for the number   CO1-U   (16)
         of allowed states for unit volume of a solid.

                                          Or

    (b) Using Fermi function, evaluate the temperature at which there is   CO3-App   (16)
         1% probability that an electron in a metal will have an energy
         0.5eV above E_F of 5 eV

17. (a) Derive the differential form of Gauss's law. Also derive Poisson's   CO2-U   (16)
         and Laplace equations.

                                          Or

    (b) Explain electric dipole in a uniform electric field   CO2-U   (16)

18. (a) Derive the differential and integral forms of Gauss law in   CO1-U   (16)
         electrostatics

                                          Or

    (b) The magnetic field strength of copper is 10^6 ampere/meter. If the   CO6-Ana   (16)
         magnetic susceptibility of copper is -0.8 x 10^{-5}, calculate the
         magnetic flux density and magnetization in copper

19. (a) Describe the construction and working of photodiode   CO1-U   (16)
                                          Or
    (b) Explain the construction and working of Solar cell.   CO1-U   (16)

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20. (a) Describe Nano electronic devices with suitable diagram. CO1-U (16)

Or

(b) Explain quantum confinement and quantum structures in Nano CO1-U (16) material.