

Dronacharya Group of Institutions, Gr. Noida

Department of Applied Sciences (First Year)

Even Semester (2020-2021)

Objective Question Bank

Subject Name & Code: ENGINEERING PHYSICS & KAS-201T

Unit No. 2nd & Unit Name: Electromagnetic Field Theory

1. Find the current when the charge is a time function given by $q(t) = 3t + t^2$ at 2 seconds.
a) 3
b) 5
c) 7
d) 9
2. The continuity equation is a combination of which of the two laws?
a) Ohm's law and Gauss law
b) Ampere law and Gauss law
c) Ohm's law and Ampere law
d) Maxwell law and Ampere law
3. Calculate the charge density for the current density given $20\sin x \mathbf{i} + y\cos z \mathbf{j}$ at the origin.
a) $20t$
b) $21t$
c) $19t$
d) $-20t$
4. Compute the conductivity when the current density is 12 units and the electric field is 20 units. Also identify the nature of the material.
a) 1.67, dielectric
b) 1.67, conductor
c) 0.6, dielectric
d) 0.6, conductor
5. Find the electron density when convection current density is 120 units and the velocity is 5m/s.
a) 12
b) 600
c) 24
d) 720

6. Calculate the electric field when the conductivity is 20 units, electron density is 2.4 units and the velocity is 10m/s. Assume the conduction and convection current densities are same.

- a) 2.4
- b) 4.8
- c) 3.6
- d) 1.2

7. Find the mobility of the electrons when the drift velocity is 23 units and the electric field is 11 units.

- a) 1.1
- b) 2.2
- c) 3.2
- d) 0.9

8. Find the resistance of a cylinder of area 200 units and length 100m with conductivity of 12 units.

- a) 1/24
- b) 1/48
- c) 1/12
- d) 1/96

9. Calculate the potential when a conductor of length 2m is having an electric field of 12.3units.

- a) 26.4
- b) 42.6
- c) 64.2
- d) 24.6

10. On equating the generic form of current density equation and the point form of Ohm's law, we can obtain $V=IR$. State True/False.

- a) True
- b) False

11. The H quantity is analogous to which component in the following?

- a) B
- b) D
- c) E
- d) V

12. The magnetic flux density is directly proportional to the magnetic field intensity. State True/False.

- a) True
- b) False

13. Ampere law states that,

- a) Divergence of H is same as the flux
- b) Curl of D is same as the current
- c) Divergence of E is zero
- d) Curl of H is same as the current density

14. Given the magnetic field is 2.4 units. Find the flux density in air(in 10^{-6} order).
- a) 2
 - b) 3
 - c) 4
 - d) 5
15. Find the electric field when the magnetic field is given by $2\sin t$ in air.
- a) $8\pi \times 10^{-7} \cos t$
 - b) $4\pi \times 10^{-7} \sin t$
 - c) $-8\pi \times 10^{-7} \cos t$
 - d) $-4\pi \times 10^{-7} \sin t$
16. Find the height of an infinitely long conductor from point P which is carrying current of 6.28A and field intensity is 0.5 units.
- a) 0.5
 - b) 2
 - c) 6.28
 - d) 1
17. Find the magnetic field intensity due to a solenoid of length 12cm having 30 turns and current of 1.5A.
- a) 250
 - b) 325
 - c) 175
 - d) 375
18. Find the magnetic field intensity at the radius of 6cm of a coaxial cable with inner and outer radii are 1.5cm and 4cm respectively. The current flowing is 2A.
- a) 2.73
 - b) 3.5
 - c) 0
 - d) 1.25
19. Find the magnetic field intensity of a toroid of turns 40 and radius 20cm. The current carried by the toroid be 3.25A.
- a) 103.45
 - b) 102
 - c) 105.7
 - d) 171
20. The magnetic field intensity of an infinite sheet of charge with charge density 36.5 units in air will be
- a) 18.25
 - b) 11.25
 - c) 73
 - d) $1/36.5$
21. The first Maxwell law is based on which law?
- a) Ampere law
 - b) Faraday law
 - c) Lenz law

d) Faraday and Lenz law

22. The benefit of Maxwell equation is that

- a) Any parameter can be calculated
- b) Antenna can be designed
- c) Polarisation of the wave can be calculated
- d) Transmission line constants can be found

23. The correct sequence to find H, when D is given is

- a) D-E-B-H
- b) D-B-E-H
- c) It cannot be computed from the data given
- d) D-H

24. The curl of the electric field intensity is

- a) Conservative
- b) Rotational
- c) Divergent
- d) Static

25. Which of the following identities is always zero for static fields?

- a) $\text{Grad}(\text{Curl } V)$
- b) $\text{Curl}(\text{Div } V)$
- c) $\text{Div}(\text{Grad } V)$
- d) $\text{Curl}(\text{Grad } V)$

26. Find the Maxwell first law value for the electric field intensity is given by $A \sin \omega t \hat{a}_z$

- a) 0
- b) 1
- c) -1
- d) A

27. Maxwell second equation is based on which law?

- a) Ampere law
- b) Faraday law
- c) Lenz law
- d) Coulomb law

28. The Maxwell second equation that is valid in any conductor is

- a) $\text{Curl}(\mathbf{H}) = \mathbf{J}_c$
- b) $\text{Curl}(\mathbf{E}) = \mathbf{J}_c$
- c) $\text{Curl}(\mathbf{E}) = \mathbf{J}_d$
- d) $\text{Curl}(\mathbf{H}) = \mathbf{J}_d$

29. In dielectric medium, the Maxwell second equation becomes

- a) $\text{Curl}(\mathbf{H}) = \mathbf{J}_d$
- b) $\text{Curl}(\mathbf{H}) = \mathbf{J}_c$
- c) $\text{Curl}(\mathbf{E}) = \mathbf{J}_d$
- d) $\text{Curl}(\mathbf{E}) = \mathbf{J}_d$

30. Find the displacement current density of a material with flux density of $5 \sin t$

- a) $2.5 \cos t$

- b) $2.5\sin t$
- c) $5\cos t$
- d) $5\sin t$

31. Find the conduction current density of a material with conductivity 200units and electric field 1.5 units.

- a) 150
- b) 30
- c) $400/3$
- d) 300

32. In the conversion of line integral of H into surface integral, which theorem is used?

- a) Green theorem
- b) Gauss theorem
- c) Stokes theorem
- d) It cannot be converted

33. An implication of the continuity equation of conductors is given by

- a) $J = \sigma E$
- b) $J = E/\sigma$
- c) $J = \sigma/E$
- d) $J = j\omega E\sigma$

34. Find the equation of displacement current density in frequency domain.

- a) $J_d = j\omega\epsilon E$
- b) $J_d = j\omega\epsilon H$
- c) $J_d = \omega\epsilon E/j$
- d) $J_d = j\epsilon E/\omega$

35. The total current density is given as $0.5i + j - 1.5k$ units. Find the curl of the magnetic field intensity.

- a) $0.5i - 0.5j + 0.5k$
- b) $0.5i + j - 1.5k$
- c) $i - j + k$
- d) $i + j - k$

36. At dc field, the displacement current density will be

- a) 0
- b) 1
- c) J_c
- d) ∞

37. Both the conduction and displacement current densities coexist in which medium?

- a) Only conductors in air
- b) Only dielectrics in air
- c) Conductors placed in any dielectric medium
- d) Both the densities can never coexist

38. The charge density of a electrostatic field is given by

- a) Curl of E
- b) Divergence of E
- c) Curl of D

d) Divergence of D

39. In the medium of free space, the divergence of the electric flux density will be

- a) 1
- b) 0
- c) -1
- d) Infinity

40. In a medium other than air, the electric flux density will be

- a) Solenoidal
- b) Curl free
- c) Irrotational
- d) Divergent

41. For a solenoidal field, the surface integral of D will be,

- a) 0
- b) 1
- c) 2
- d) 3

42. In a dipole, the Gauss theorem value will be

- a) 1
- b) 0
- c) -1
- d) 2

43. From the Gauss law for electric field, we can compute which of the following parameters?

- a) B
- b) H
- c) E
- d) A

44. The Gauss law employs which theorem for the calculation of charge density?

- a) Green theorem
- b) Stokes theorem
- c) Gauss theorem
- d) Maxwell equation

45. Which quantity is solenoidal in the electromagnetic theory?

- a) Electric field intensity
- b) Electric flux density
- c) Magnetic field intensity
- d) Magnetic flux density

46. Which equation will be true, if the medium is considered to be air?

- a) $\text{Curl}(\mathbf{H}) = 0$
- b) $\text{Div}(\mathbf{H}) = 0$
- c) $\text{Grad}(\mathbf{H}) = 0$

d) $\text{Div}(\mathbf{H}) = 1$

47. Find the sequence to find \mathbf{B} when \mathbf{E} is given.

- a) E-D-H-B
- b) B-E-D
- c) H-B-E-D
- d) V-E-B

48. The Gauss law for magnetic field is valid in

- a) Air
- b) Conductor
- c) Dielectric
- d) All cases

49. The sequence for finding \mathbf{H} from \mathbf{E} is

- a) E-B-H
- b) E-V-H
- c) E-D-H
- d) E-A-H

50. The reason for non existence of magnetic monopoles is

- a) The magnetic field cannot be split
- b) Due to permeability
- c) Due to magnetization
- d) Due to magnetostriction

51. The non existence of the magnetic monopole is due to which operation?

- a) Gradient
- b) Divergence
- c) Curl
- d) Laplacian

52. Which equation will hold good for a magnetic material?

- a) Line integral of \mathbf{H} is zero
- b) Surface integral of \mathbf{H} is zero
- c) Line integral of \mathbf{B} is zero
- d) Surface integral of \mathbf{B} is zero

53. The dipole formation in a magnet is due to

- a) Interaction between the north and south poles together
- b) Interaction between the north pole with the air
- c) Interaction between the south pole with the air
- d) Interaction of north and south pole separately with air

54. Find the power of an EM wave, given that the cross product of the \mathbf{E} and \mathbf{H} component is $2 + 3\mathbf{j}$.

- a) 2
- b) 1
- c) 4

d) 8

4. The power in a electromagnetic wave with electric field and magnetic field intensities 12 and 8 respectively is

- a) 96
- b) 12
- c) 8
- d) 48

5. The power in a wave given that H component is 0.82 units in air.

- a) 126.74
- b) 621.47
- c) 216.47
- d) 745.62

55. Find the power of a wave given that the RMS value of E and H are 6 and 4.5 respectively.

- a) 24
- b) 27
- c) 29
- d) 32

56. The work done in the power transmission with E and H given by 50 and 65 respectively. The velocity of propagation is 20m/s.

- a) 162.5
- b) 621.5
- c) 562.1
- d) 261.5

57. The Poynting vector is the power component that is calculated by the

- a) Product of E and H
- b) Ratio of E and H
- c) Dot product of E and H
- d) Cross product of E and H
