SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

Subject with Code : EMF(**19EE0207**) **Course & Branch**: B.Tech - EEE
Year & Sem: II-B.Tech & II-Sem **Regulation:** R19

UNIT-I
INTRODUCTION TO VECTOR CALCULUS

1. a) Convert point P (1,3,5) from cartesian to cylindrical and spherical co-ordinates system. 5 M
   b) Given the two points A (X=2, Y=3, Z=-1) and B= (r=4, θ=25 and ϕ=120°). Find the spherical co-ordinates of A and cartesian co-ordinates of B 5 M
2. Point P and Q are located at (0,2,4) and (-3,1,5) calculated: 1. The Position vector P , 2. The distance vector from P and Q, 3. The distance between P and Q and 4. A vector parallel to PQ with magnitude of 10. 10 M
3. Express vector B in cartesian and cylindrical systems. Given B= $10/r\ a_r + r\cos\theta\ a_\theta + a_\phi$. Find the B at (-3,4,0) and (5,π/2, -2) 10 M
4. a) Transform the vector field W=$10\ a_x - 8\ a_y + 6\ a_z$ to cylindrical co-ordinate system at point P (10 ,-8, 6) 5 M
   b) Express B= $r^2\ a_r + \sin\theta\ a_\phi$ in the cartesian co-ordinates. Hence obtain B at P (1,2,3) 5 M
5. If B= $y\ a_x + (x+z)\ a_y$ and a point Q is located at (-2,6,3) express.1 The Point Q in cylindrical and spherical co-ordinates and 2) B in spherical coordinates. 10 M
6. a) Given point P (-2,6,3) and A=$y\ a_x + (x+z)\ a_y$. Express A in Cylindrical coordinates. 5 M
   b) Transform the vector A= 3i-2j-4K at P (x=2, y=3, Z=3) to cylindrical coordinates 5 M
7. a) Given the two coplanar vectors A= $3\ a_x + 4\ a_y - 5\ a_z$ and B= $-6a_x + 2\ a_y + 4\ a_z$. Obtain the unit vector normal to the plane containing the vector A and B 5 M
   b) The Three fields are given by A=$2a_x - a_z$, B= $2\ a_x - a_y + 2a_z$, C= $2a_x - 3a_y + a_z$. Find the scalar and vector triple product. 5 M
8. Determine the divergence of these vector fields:
   i).P=$x^{-2}yz\ a_x + xz\ a_z$, ii) Q= $r\sin\phi\ a_r + r^2\ z\ a_\phi + z\cos\phi\ a_z$ and iii) T= $(1/r^2)\cos\theta\ a_r + r\sin\theta\cos\phi\ a_\theta + \text{Cos}\theta\ a_\phi$ 10 M
9. Find the gradient of the following scalar fields
   i) V= $e^{-z}\sin 2x\cosh y$, ii) U= $r^2\ z\cos\phi$ and iii) W= $10r\sin^2\theta\cos\phi$ 10 M
10. Determine the curl of the vector fields:
    i).P=$x^2yz\ a_x + xz\ a_z$, ii) Q= $r\sin\phi\ a_r + r^2\ z\ a_\phi + z\cos\phi\ a_z$ and iii) T= $(1/r^2)\cos\theta\ a_r + r\sin\theta\cos\phi\ a_\theta + \text{Cos}\theta\ a_\phi$ 10 M

UNIT –II
STATIC ELECTRIC FIELD

1. (a) State and explain Coulomb's law indicating clearly the units of quantities in the equation of force? 5M
   (b) State and prove Gauss's law and write limitations of Gauss's law? 5M
2. Three concentrated charges of 0.25 μC are located at the vertices of an equilateral triangle of 10 cm side . Find the magnitude and direction of the force on one charge due to other two charges. 10 M
3. a) Determine the Electric filed intensity at P(-0.2, 0, -2.3) m due to a point charge of 5 nc at Q (0.2,0.1, -2.5) m in air. 5 M
   b) An infinitely long uniform line charge is located at y=3, Z=5. If ρ_L = 30 n C/m, find the filed intensity E at i) origin , ii) P(0,6,1) and iii) P (5,6,1) 5 M
4. Line charge density ρ_L= 24 n C/m is located in free space on the line y=1 and Z=2 m
   a) Find E at the point P(6,-1,3) , b) What point charge Q_a should be located at A (-3,4,1) to make y component of total E zero at point P? 10 M
5. a) Find E at (0,0,2) m due to charged circular disc in x-y plane with ρ_S=20 n C/m^2 and radius 1m. 5M
   b) A circular disc of 10 cm radius is charged uniformly with total charge of 100μc . Find E at a point 20cm on its axis. 5 M
6. The Electric flux density is given as D= (r/4) a_r n C/m^2 in free space. Calculate:
   The Electric field intensity at r=0.25 m , The total charge within a sphere of r=0.25 m 10 M
7. Given that A= 30 e^{-r} a_r-2 z a_z in the cylindrical co-ordinates. Evaluate both sides of the divergence theorem for the volume enclosed by r=2, z=0 and Z=5 10 M
8. a)An electric potential is given by V=(60 sinθ /r^2) v . Find V and E at P(3,60°,25°) 5 M
   b) In free space V= x^2y(z+3) . Find E at (3, 4, -6) and The charge within the cube 0<x,y,z<1. 5 M
9. a) The potential field in free space is given by V=(50/r) , a<r< b (spherical) show that ρ_v=0 for a<r<b and find the energy stored in the region a<r<b 5 M
   b) Two pint charges 1.5nC at (0,0,0.1) and -1.5nC at (0,0,-0.1) are in free space . Treat the two charges as a dipole at the origin and find the potential at p(0.3,0,0.4) 5 M
10. a) What is the relation between electric flux density and electric field intensity? 2M
    b) Define dipole moment? 2M
    c) Define an electric dipole? 2M
    d) State vector form of coulombs law? 2M
    e) Derive Maxwell second equation? 2M

UNIT –III

CONDUCTORS, DIELECTRICS AND CAPACITANCE

1. (a) Derive the continuity equation. What is its physical significance? 5M
   (b) Derive the point form of ohms law? 5M
2. Explain the boundary conditions of two perfect dielectrics materials? 10M
3. Explain the boundary conditions between conductor and free space? 10M
4. a) In cylindrical coordinates $J=10\ e^{-100r}\ a_\phi$ A/m^2. Find the current crossing through the region $0.01<r<0.02$ m and $0<z<1$ m and intersection of this region with the ϕ = constant plane 5 M
   b) An aluminum conductor is 2000 ft long and has a circular cross section with a diameter of 20 mm. If there is a DC voltage of 1.2 V between the ends . Find a) The current density b) The current , C power dissipated form the l=knowledge of circuit theory. Assume $\sigma=3.82 *10^7$ mho/m for aluminum . 5 M
5. a) Find the magnitude of D and P for a dielectric material in which E=0.15 mV/m and $\chi=4.25$ 5 M
   b) Find the polarization in dielectric material with $\varepsilon_r=2.8$ if $D=3*10^{-7}$ C/m^2 5 M
6. Explain the phenomenon of polarization when a dielectric slab is subjected to an electric field? 10M
7. a) Derive the expression for parallel plate capacitor and capacitance of a co-axial cable? 6 M
   c) A parallel plate capacitor has an area of 0.8 m^2 separation of 0.1 mm with a dielectric for which ε_r = 1000 and a field of 10^6 V/m. Calculate C and V 4 M
8. Find V at P (2,1,3) for the field of two coaxial conducting cones, with V=50 V at $\theta=30$ and V=20 V at $\theta=50$. 10 M
9. Two parallel conducting disc are separated by distance 5 mm at z=0 and z=5 mm . If V=0 and V=100 v at z=5 mm, find the charge densities on the disc. 10 M
10. a)Determine whether or not the following potential fields satisfy the Laplace's equation
    i) $V=x^2-y^2+z^2$ ii) $V= r\cos\phi +z$ and 5 M
    b) Derive Laplace's and Poisson's Equation 5 M

UNIT –IV

STATIC MAGNETIC FIELDS

1. Using Biot-savart's law. Find $\vec{H}$ and $\vec{B}$ due conductor of finite length? 10M
2. a) Explain maxwell's second equation? 5M
   b) State and explain ampere's circuital law? 5M
3. Evaluate both sides of the stokes theorem for the filed H=6xy a_x -3y^2 a_y A/m and the rectangular path around the region 2<x<5, -1<y<1 , Z=0 . Let the positive direction of ds be a_z. 10 M
4. a) Find the flux passing the portion of the plane $\phi=\pi/4$ defined by 0.01<r<0.05 m and 0<z<2 m. A current filament of 2.5 A is along the z axis in the a_z direction in free space. 5 M
   b) In cylindrical coordinates B= (2.0/r) a_ϕ tesla. Determine the magnetic flux ϕ crossing the plane surface defined by 0.5<r<2.5 m and 0<z<2m. 5 M
5. In cylindrical co-ordinates A=50 r^2 a_z wb/m is a vector magnetic potential in a certain region of free space. Find H, B, J and using J find the total current I crossing the surface 0<r<1 , 0<ϕ<2π and Z=0. 10 M
6. a) A Point charge of Q=-1.2 C has a velocity V=(5 a_x +2 a_y -3a_z)m/s. Find the magnitude of the force exerted on the charge if i) E= -18 a_x +5 a_y -10 a_z V/m and ii) B=-4 a_x +4 a_y +3 a_z T 3 M
   b) A magnetic field B= 3.5*10^{-2} a_z exerts a force on a 0.3 m long conductor along x axis. IF a current of 5 A flows in -a_x direction, determine what force must be applied to hold conductor in position. 3 M
   c) Determine the force per meter length between two long parallel wires A and B separated by distance 5 cm in air and carrying currents of 40 A in the same direction. 4 M
7. A rectangular loop in Z=0 plane has corners at (0,0,0), (1,0,0),(1,2,0) and (0,2,0). The loop carries a current of 5 A in a_x direction. Find the total force and torque on the loop produced by the magnetic field B=2 a_x+2a_y-4a_z wb/m^2. 10 M
8. Derive the expression for self-inductance of solenoid, toroid and coaxial cable 10M
9. a) Calculate the inductance of a solenoid of 200 turns wound tightly on a cylindrical tube of 6 cm diameter. The length of the tube is 60 cm and the solenoid is in air. 5 M
   b) Find inductance per unit length of a co-axial cable if radius of inner and outer conductors are 1 mm and 3 mm respectively. Assume relative permeability unity. 5 M
10. a) Calculate the inductance of a 10 m length of coaxial cable filled with a material for which μ_r = 80 and radii inner and outer conductors are 1 mm and 4 mm respectively. 5 M
    b) A straight long wire is situated parallel to one side of a square coil. Each side of the coil has a length of 10 cm. The distance between straight wire and the center of the coil is 20 cm. Find the mutual inductance of the system . 5 M

UNIT –V

TIME VARYING FIELDS AND MAXWELL'S EQUATIONS

1. Write Maxwell's equation in good conductors for time varying fields and static fields both in differential and integral form? 10M
2. Explain faradays law of electromagnetic induction and there from derive maxwell's equation in differential and integral form? 10M
3. Derive the equation of Continuity for time varying fields? 10M
4. Derive an expression for motional and transformer induced emf? 10M
5. What is displacement current? Explain physical significance of displacement current? 10M
6. Derive expressions for integral and point forms of poynting Theorem? 10M
7. Explain faradays law of electromagnetic induction and derive the expression for induced e.m.f? 10M
8. a) Define skin depth? 2M
   b) Define displacement current? 2M
   c) State Faraday's law of electromagnetic induction? 2M
   d) Write Maxwell equations in time varying fields? 2M
   e) Define pointing vector? 2M
9. A Parallel plate capacitor with plate area of 5 cm^2 and plate separation of 3mm has a Voltage of 50 sin 10^3 t volts applied to its plates. Calculate the displacement current Assuming $\varepsilon=2\varepsilon_0$ 10 M
10. An area of 0.65 m^2 in the plane Z=0 encloses a filamentary conductor. Find the induced voltage if B= 0.05 cos 10^3 t (a_y+a_z)/$\sqrt{2}$ tesla. 10 M

Prepared by**: J.GOWRISHANKAR AND N.SRAVANTHI**

SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (OBJECTIVE)

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Year & Sem: II-B.Tech & II-Sem **Regulation:** R18

UNIT-I
INTRODUCTION TO VECTOR CALCULUS

1. In three dimensional coordinate systems, coordinates are
   A)perpendicular to each other B) parallel to each other
   C) same direction for each other D)opposite direction for each other

2. Three dimensional coordinate system is one in which coordinates intersect each other at
   A) negative points B) zero points C)positive points D) absolute points

3. Rectangular coordinate system is also known as
   A) Space coordinate system B) Polar coordinate system
   C) Cartesian coordinate system D)Planar coordinate system

4. The range of azimuthal angle φ in the spherical polar coordinates is
   A) $[0,2\pi]$ B) $[0,\pi]$ C) $[0,\pi/2]$ D) $[-\pi, +\pi]$

5. The equation to a surface in spherical coordinates is given by $\theta=\pi/3$. The surface is a.
   A) sector of a circle
   B) A cone making an angle of $\pi/3$ with the z-axis
   C) A vertical plane making an angle of $\pi/3$ with the z-axis
   D) A vertical plane making an angle of $\pi/3$ with the x-axis

6. The equation to a surface in spherical coordinates is given by $\varphi=\pi/3$. The surface is a.
   A) sector of a circle
   B) A cone making an angle of $\pi/3$ with the z-axis
   C) A vertical plane making an angle of $\pi/3$ with the z-axis
   D) A vertical plane making an angle of $\pi/3$ with the x-axis

7. Expressed in spherical coordinates, the equation $x^2+y^2+z^2= 4z$ becomes
   A) $4\cos\boldsymbol{\theta}\sin\Phi$ B) $4\sin\boldsymbol{\theta}\cos\Phi$ C) $4\cos\boldsymbol{\theta}$ D) $4\sin\boldsymbol{\theta}$

8.The cylindrical coordinate system is also referred to as
   A) Cartesian system B) Circular system C) Spherical system D) Space system

9. Transform the point (-2,6,3) into cylindrical coordinates.
   A) (6.325,-71.57,3) B) (6.325,71.57,3) C) (6.325,73.57,3) D) (6.325,-73.57,3)

10. A charge located at point p $(5,30^0,2)$ is said to be in which coordinate system?
   A) Cartesian system B) Cylindrical system C) Spherical system D) Space system

11. Transform the spherical system B = (10/r)i + (10cos θ)j + k into cylindrical form at (5, π/2, -2)
A) 2.467i + j + 1.167k B) 2.467i – j + 1.167k
C) 2.467i – j – 1.167k D) 2.467i + j – 1.167k

12. Convert the given rectangular coordinates A(2,3,1) into corresponding cylindrical coordinates
A) (3.21,56.31,1) B) (3.21,57.31,0) C) (3.61,57.31,0) D) (3.61,56.31,1)

13. Convert the point (3,4,5) from Cartesian to spherical coordinates
A) $(7.07,45^0,53^0)$ B) $(0.707,45^0,53^0)$ C) $(7.07,54^0,63^0)$ D) $(0.707,54^0,63^0)$

14. Find the spherical coordinates of A(2,3,-1)
A) $(3.74, 105.5^0, 56.13^0)$ B) $(3.74, 105.5^0, 56.31^0)$
C) $(3.74, 106.5^0, 56.13^0)$ D) $(3.74, 106.5^0, 56.31^0)$

15. Find the Cartesian coordinates of $B(4,25^0,120^0)$
A) (0.845, 1.462, 3.625) B) (-0.845, 1.462, 3.625)
C) (-8.45, 2.462, 6.325) D) (8.45, 2.462, 6.325)

16. Given B= (10/r)i+(rcos θ) j+k in spherical coordinates. Find Cartesian points at (-3,4,0)
A) -2i + j B) 2i + k C) i + 2j D) –i – 2k

17. The scalar factor of spherical coordinates is
A) 1, r, r sin θ B) 1, r, r C) r, r, 1 D) r, 1, r

18. Transform the vector (4,-2,-4) at (1,2,3) into spherical coordinates.
A) 3.197i – 2.393j + 4.472k B) -3.197i + 2.393j – 4.472k
C) 3.197i + 2.393j + 4.472k D) -3.197i – 2.393j – 4.472k

19. Cylindrical systems have the following scalar values respectively
A) 1, ρ ,1 B) 1, 1, 1 C) 0,1,0 D) 1,0,0T

20. he volume of a parallelepiped in Cartesian is
A) dV = dx dy dz B) dV = dx dy C) dV = dy dz D) dV = dx dz

21. Transform the vector A = 3i – 2j – 4k at P(2,3,3) to cylindrical coordinates
A) -3.6j – 4k B) -3.6j + 4k C) 3.6j – 4k D) 3.6j + 4k

22. Which of the following criteria is used to choose a coordinate system?
A) Distance B) Intensity C) Magnitude d) Geometry

23. Vector transformation followed by coordinate point substitution and vice-versa, both given the same result. Choose the best answer.
A) Possible, when the vector is constant B) Possible, when the vector is variable
C) Possible in all cases D) Not possible

24. The polar form of Cartesian coordinates is
A) Circular coordinates B) Spherical coordinates
C) Cartesian coordinates D) Space coordinates

25. The cross product of the vectors 3i + 4j – 5k and –i + j – 2k is,
A) 3i – 11j + 7k B) -3i + 11j + 7k C) -3i – 11j – 7k D) -3i + 11j – 7k

26. Which of the following are not vector functions in Electromagnetics?
A) Gradient B) Divergence
C) Curl D) There is no non- vector functions in Electromagnetics

27. The work done of vectors force F and distance d, separated by angle θ can be calculated using,
A) Cross product B) Dot product C) Addition of two vectors D) Cannot be calculated

28. Find whether the vectors are parallel, (-2,1,-1) and (0,3,1)
A) Parallel B) Collinearly parallel C) Not parallel D) Data insufficient

29. When two vectors are perpendicular, their
A) Dot product is zero B) Cross product is zero
C) Both are zero D) Both are not necessarily zero

30. Find the gradient of $t = x^2y + e^z$ at the point p(1,5,-2)
A) i + 10j + 0.135k B) 10i + j + 0.135k C) i + 0.135j + 10k D) 10i + 0.135j + k

31. Curl of gradient of a vector is
A) Unity B) Zero C) Null vector D) Depends on the constants of the vector

32. Find the gradient of the function given by, $x^2 + y^2 + z^2$ at (1,1,1)
A) i + j + k B) 2i + 2j + 2k c) 2xi + 2yj + 2zk D) 4xi + 2yj + 4zk

33. Find the gradient of the function sin x + cos y.
A) cos x i – sin y j B) cos x i + sin y j C) sin x i – cos y j D) sin x i + cos y j

34. Compute the divergence of the vector xi + yj + zk.
A) 0 B) 1 C) 2 D) 3

35. Find the divergence of the vector yi + zj + xk.
A) -1 B) 0 C) 1 D) 3

36. Given $D = e^{-x}\sin y\, i - e^{-x}\cos y\, j$ Find divergence of D.
A) 3 B) 2 C) 1 D) 0

37. Find the divergence of the vector $F = xe^{-x} i + y j - xz k$
A) $(1 - x)(1 + e^{-x})$ B) $(x - 1)(1 + e^{-x})$ C) $(1 - x)(1 - e)$ D) $(x - 1)(1 - e)$

38. Determine the divergence of $F = 30 i + 2xy j + 5xz^2 k$ at (1,1,-0.2) and state the nature of\ the field.
A) 1, solenoidal B) 0, solenoidal C) 1, divergent D) 0, divergent

39. Find whether the vector is solenoidal, E = yz i + xz j + xy k
A) Yes, solenoidal B) No, non-solenoidal
C)) Solenoidal with negative divergence D) Variable divergence

40. Identify the nature of the field, if the divergence is zero and curl is also zero.
A) Solenoidal, irrotational B) Divergent, rotational
C) Solenoidal, irrotational D) Divergent, rotational

41. The curl of a curl of a vector gives a
A) Scalar B) Vector C) Zero value D) Non zero value

42. Find the curl of A = (y cos ax)i + (y + e^x)k
A) 2i – ex j – cos ax k B) i – ex j – cos ax k
C) 2i – ex j + cos ax k D) i – ex j + cos ax k

43. Find the curl of the vector A = yz i + 4xy j + y k
A) xi + j + (4y – z)k B) xi + yj + (z – 4y)k
C) i + j + (4y – z)k D) i + yj + (4y – z)k

UNIT –II
STATIC ELECTRIC FIELD

1. A Quantity which gives only direction is called [ ]
A) Vector B) Scalar C) Unit Vector D) None

2. The charge of an electron is [ ]
A) 1.60219×10^{-19} C B)-1.60219×10^{19} C C)-1.60219×10^{-19} C D) 1.60219×10^{19} C

3. The two equal and opposite point charges are separated by a very small distance is known as [ ]
A) Dipole moment B) Potential gradient C) Dipole D) None

4. Find the Laplacian of the Potential function $V=x^2+y^2+z^2$ [ ]
A) $2V/m^2$ B) $6\ V/m^2$ C)$4\ V/m^2$ D)$8\ V/m^2$

5. The _ is defined as the tangential force times the radial distance at which it acts [ ]
A) Power B) Energy C) Torque D) Magnetic flux density

6. Steady magnetic fields are governed by _____ law. [ ]
A) Biot–Savart's B)Ampere's Circuital C)Both (A) and (B) D)None of these

7. Four fundamental equations of electromagnetics are grouped under [ ]
A) Fleming's laws B) faraday's laws C) lorentz equations D) maxwell's equation

8. According to poisson's equation, if V is the potential function, then [ ]
A) $\nabla^2 V=-\rho/\varepsilon$ B) $\nabla^2 V=-\rho/E$ C) $\nabla^2 V=0$ D)none of these

9. According to Gauss law ψ= [ ]
A) Q_{end} B) $\int_S D.\,dS$ C) $\int_V \rho_V\,dV$ D) ALL

10. Which of the following is a vector quantity? [ ]
A) Electrical potential B) Electrical field intensity
C) Electrical charge D) none of the above

11. An infinite number of charge each equal to q are placed along the x-axis at x=1,x=2,x=3 and so on .
The potential at x=0 due to this set of charges will be [ ]
A) q B) 3 q/2 C) 2 q D) $4\,q/4$

12. An infinite number of charges, each equal to 1 q are placed at n=1, 3, 9, 27, 81. . . The electronic potential at n= 0 will be [ ]

A) q B) 3/2 q C) 2 q D) 5 $q/2$

13. A tiny particle carrying a charge of 0.2 coulomb is accelerated through a P.D of 1000 V. The K.E. acquired by the particle will be [ ]

A) 100 J B) 200 J C) 300 J D) 400 J

14. Given V=2x^2 y-12z, V at (0, 0 ,6) is…….. [ ]

A) -72V B) 62V C) 70 V D) 0 V

15. The unit of electric field intensity is [ ]

A) A/m B) V/m C) V/m D) A/sec

16. The total flux out of a closed surface is equal to the net charge with in the surface. This statement an expression of a [ ]

A) gauss law B)divergence theorem C)faraday's law D)Maxwell's equations

17. In homonogenous linear, isotropic and stationary media, for a plane electromagnetic wave [ ]

A) $\nabla \cdot D = \rho$ B) $\nabla . D = \rho$ C) $\nabla * D = \rho$ D) none

18. It is given that electric flux density (D) in acertain region is expressed by D= $(1/r)a_r$ in spherical co-ordinates. The charge density (u) in this region is given by [ ]

A) l/r B) l/r^2 C) $-l/r^2$ D) r^2

19. The electric field intensity (E) and electric potential (V) are interrelated by [ ]

A) E= -Divergence of V B) E= Divergence of V C) E=-gradient of V D) none of these

20. For an infinite line charge [ ]

A) $E= \rho_S /2\varepsilon$ B) $E= \rho_S /2 \pi \varepsilon$ C) $E= \rho_S /4 \pi \varepsilon$ D) None

21. Potential at R due to a point charge Q is V = [ ]

A) $V=Q/4\pi \varepsilon R$ B) $V=Q/4\pi \varepsilon R^2$ C) $V=QR/4\pi \varepsilon$ D) None

22. Point charges 30nc,-20nc and 10nc are located at (-1, 0, 2), (0, 0, 0) and (1, 5,-1) respectively. The total flux leaving a cube of side 6 m centered at the origins is [ ]

A) 20nc B)-2nc C) 10nc D) -10nc

23. Inside a hollow spherical conductor [ ]

A) Electrical field is zero B) Electrical field is constant

C) Electrical field changes with the magnitude of charge given to the conductor

D) None of the above

24. A sphere of one meter radius can attain a maximum potential of [ ]

A) 1000 V B) 2 KV C) 30 KV D) 3 million volts

25. Surface integral of electric field intensity is [ ]

A) Electrical charge B) differential of volume flux

C) Net flux emanating from surface D) none of these

26. A plane z=10 m carries charge 20 nc/m^2.Electric field intensity at the origin is [ ]

A) -15 a_z V/m B) -36 π a_z V/m C) -72 pia_z V/m D) -360 π a_z V/m

27. Point charges Q_1=1 nC and Q_2 =2 Nc are at a distance apart. Which of the following statements are correct? [ ]

A) The force on Q_1 is repulsive B) the force on Q_2 is the same in magnitude as that-on Q_1

C) As the distance between them decreases, the force on Q_1 increases linearly

D) All the above

28. Find the Laplacian of the Potential function $V=2x^2+y^2+z^2$ [ ]

A) 2V/m2 B) 6 V/m2 C) 4 V/m2 D) 8 V/m2

29. The unit of electric flux is [ ]

A) Coulomb B) Coulomb/m^2 C) Weber D) Newton/ Coulomb

30. Coulomb's law States that [ ]

A) $F=Q1Q2/4\pi \varepsilon R^2$ B) $F=Q1/4\pi \varepsilon R$ C) $F=Q2/4\pi R$ D) None

31. The electric flux density D is related to E as [ ]

A) D=E B) εD=E C) D=εE D) None

32. The electric displacement current density is measured in [ ]

A) coulombs/meter B) coulombs /meter ^{2} C) volts/m D) amp/m^2

33. Conductivity is measured in [ ]

A) ohm-m B) ohms/m C)mho-m D) mhos/m

34. The relation between electric polarization and susceptibility indicates that electric Polarizations is [ ]

A) Independent of susceptibility B) inversely proportional to susceptibility

C) Proportional to square root of susceptibility D) proportional to susceptibility

35. The divergence theorem applies to a [ ]

A) Static field only B) time varying field only C) both A & B D) magnetic fields only

36. Find the Laplacian of the Potential function $V=x^2+y^2-z$ [ ]

A) 2V/m2 B) 6 V/m2 C) 4 V/m2 D) 8 V/m2

37. The electric flux density (D) and the electric field intensity (E) interrelated by [ ]

A) D=εE B) D=E/ε C) D=εE² D) D=μE

38. First Maxwell's equation is [ ]

A) ρ_V=V.D B) ρ_V=V.E C) both A & B D) None

39. Laplaces equation V^2 V= [ ]

A) - ρ_v /ε B) ρ_v C) 1 D) 0

40. The unit of field intensity is [ ]

A) Coulomb B) Coulomb/m^2 C) Weber D) Newton/ Coulomb

UNIT –III

CONDUCTORS, DIELECTRICS AND CAPACITANCE

1. The conductivity of a material usually depends on [ ]

A) Temperature B) Frequency C) Temperature and Frequency D) Length

2. The electric field inside the conductor is [ ]

A) Maximum B) Zero C) both a and b D) infinity

3. Convection current occurs when current flows through an insulating medium such as [ ]

A) Liquid B) Copper C) Resistor D) Air

4. Charges in dielectric material are called [ ]

A) Bound charges B) free charges C) polar charges D) none

5. The expression for Electric displacement in Dielectrics, D= [ ]

A) $€_0$ E –P B) $€_0$ E +P C) P - $€_0$ E D) both b & c

6. The phenomena of polarization happens in [ ]

A) Dielectrics B) conductors C) insulators D) none

7. Point form of ohm's law is [ ]

A) E=σJ B) J=σE C) E=σ/J D) E=J

8. For steady current, the continuity equation [ ]

A) $\nabla \cdot \bar{J} = 0$ B) $\nabla \cdot \bar{J} = 1$ C) $\nabla \times \bar{J} = 0$ D) none

9. On the two sides of the boundary, the tangential components of **E** are [ ]

A) Same B) Discontinuous C) Zero D) Infinity

10. A dielectric material is Isotropic if € does not change with [ ]

A) Point to point B) E C) V D) Direction

11. The law of refraction is [ ]

A) $\frac{Tan\,\theta 1}{Tan\,\theta 2} = \frac{\epsilon r1}{\epsilon r2}$ B) $\frac{Tan\,\theta 2}{Tan\,\theta 1} = \frac{\epsilon r1}{\epsilon r2}$ C) $\frac{Tan\,\theta 1}{Tan\,\theta 2} = \frac{\epsilon r2}{\epsilon r1}$ D) $\frac{Tan\,\theta 2}{Tan\,\theta 1} = \frac{\epsilon ro}{\epsilon r1}$

12. The energy density W_m can write [ ]

A) W=1/2 D.E B) W=1/2∈E^2 C) W=D^2/2∈ D) All

13. Which is not an example of convection current [ ]

A) A moving charged belt B) Electronic movement in vacuum tube

C) an electron beam in a television tube C) Electric current flowing in a copper wire

14. Unit of permittivity [ ]

A) F/m B) m/F C) F.m D) F/m^2

15. Dielectric strength is the _____value of electric field at which dielectric breakdown occurs[ ]

A) Maximum B) Minimum C) Zero D) Infinity

16. If no free charges exist at interface then [ ]

A) $D_{1n}-D_{2n}= \rho_s$ B) $D_{1n}-D_{2n}= 0$ C) $D_{1n}-D_{2n}= \infty$ D) None

17. A material is said to be a conductor if [ ]

A) □/ω□<<1 B) □/ω□>>1 C) □/ω□=1 D)□/ω□=0

18. If a dielectric material of ε_r =4 is kept in an electric field $\mathbf{E}=3\mathbf{a}_x+2\mathbf{a}_y+\mathbf{a}_z$, V/m, find electric susceptibility. [ ]

A) 1 B) 2 C) 3 D)4

19. When an electric field **E** is applied, the force on an electron with charge –e is [ ]

A) **F=-eE** B)**F=eE** C)**F=-e/E** D)**F=e/E**

20. _____is current at a given point trough a unit normal area at that point. [ ]

A) Current density B) Flux density C) Both D) Electric field

21. At boundary condition of two dielectrics $D_n1=$ [ ]

A) D_{n2}/ε B) D_{n2} C) εD_{n2} D) none

22. At boundary condition of two dielectrics $E_t1=$ [ ]

A) E_{t2}/ε B) E_{t2} C) εE_{t2} D) None

23. The flux passing through a $2m^2$ area that is normal to the xx-axis at x=4.5m for $D=10x\ \bar{a}_x$ is [ ]

A) 60 C B) 30 C C) 90 C D) 120 C

24. Dipole moment of two equal & opposite charges separated with equal distance d is [ ]

A) p=Q/d B) p=d/Q C) p=Qd D) None

25. In a capacitor, the conduction current and displacement currents are -------- [ ]

A) Equal B) Zero C) not Equal D) depends on area of capacitor plate

26. The displacement current density is given by [ ]

A) $J_D= \frac{\partial D}{\partial t}$ B) $J_D= -\frac{\partial D}{\partial t}$ C) $J_D= -\frac{\partial B}{\partial t}$ D) $J_D= \frac{\partial B}{\partial t}$

27. Polarization of dielectric materials results in [ ]

A) Production of eddy currents B) Creation of dielectric dipoles

C) Release of protons D) absorption of electrons

28. The unit of Polarization is the same as that of [ ]

A) Electric field density (D) B) electric intensity (E) C) charge D) dielectric flux

29. The Polarization of dielectric material is given by [ ]

A) $P=\varepsilon_r E$ B) $P= (\varepsilon_r-1)E$ C) $P= (\varepsilon_r-1)E\varepsilon_o$ D) $P= (\varepsilon_r-1)\varepsilon_o$

30. The capacitance of an insulated conducting sphere of radius R in vacuum is [ ]

A) $2\pi\varepsilon_0 R$ B) $4\pi\varepsilon_0 R$ C) $4\pi\varepsilon_0 R^2$ D) $4\pi\varepsilon_0/R$

31. The conductivity of an ideal conductor is [ ]

A) Zero B) infinite C) 100C D) 50nF

32. The continuity equation of the current is based on [ ]

A) Conservation of charge B) Conservation of momentum

C) Conservation of motion D) Conservation of velocity

33. Capacitance is measured in _____ [ ]

A) Coulomb/ amp B) amp/Coulomb C) Coulomb/ volt D) volt/ Coulomb

34. The maximum value of applied electric field at which the dielectric break down occurs is called [ ]

A) dielectric field B) dielectric intensity C) dielectric strength D) none

35. Dielectrics can store the energy due to [ ]

A) magnetization B) Polarization C) density D) electrons

36. The conductivity of ideal conductor is [ ]

A) Zero B) infinite C) +250C D) +100C

37. Current density is _____ [ ]

A) Scalar quantity B) vector quantity C) both D) none

38. In Dielectrics displacement current is under the influence of [ ]

A) Magnetic field B) magnetic field intensity C) electric field D) electric field intensity

39. The phenomena of polarization happen in [ ]

A) Dielectrics B) conductors C) insulators D) none

40. Energy stored in capacitor is____ [ ]

A) ½ cv^2 B) ½ Lv^2 C) ½ cI^2 D) ½ LI^2

UNIT –IV

STATIC MAGNETIC FIELDS

1. In steady magnetic field $\nabla \times \vec{H}$ = ---------- [ ]

A) Zero B) $\vec{J}$ C) $-\frac{\partial B}{\partial t}$ D) $\frac{\partial D}{\partial t}$

2. The line integral of magnetic field intensity $\vec{H}$ around a closed path is exactly equal to the direct current enclosed by that path is given by ---------- law [ ]

A) Gauss B) Faraday's C) Biot-savart D) Amperes

3. The magnetic force F_m on a moving charge is given by---------- [ ]

A) F =QE B) F= V×B `C) F= Q V×B D) F=0

4. The Lorentz force equation is given by---------- [ ]

A) F =QE B) F= Q (E+V×B) C) F= Q V×B D) none

5. The Maxwell equation in time variant field is given by---------- [ ]

A) $\nabla \times \vec{H} = \vec{j}$ B) $\nabla \times \vec{H} = \vec{j} + \frac{\partial D}{\partial t}$ C) $\nabla \times \vec{H} = \vec{j} + \frac{\partial E}{\partial t}$ D) $\nabla \times \vec{H} = 0$

6. The faraday's law in differential form is given by [ ]

A) $\nabla \times \vec{E} = \vec{j}$ B) $\nabla \times \vec{E} = \frac{\partial D}{\partial t}$ C) $\nabla \times \vec{E} = -\frac{\partial B}{\partial t}$ D) $\nabla \times \vec{E} = \frac{\partial B}{\partial t}$

7. In general magnetic field intensity is directly proportional to [ ]

A) Voltage B) current C) distance D) None

8. In general magnetic field intensity is inversely proportional to [ ]

A) Voltage B) current C) distance D) None

9. A conductor 6m long lies along Z direction with a current of 2A in a direction. Find the force experienced by the conductor if $\vec{B}$ = 0.08 a_x Tesla. [ ]

A) 0.9 a_y B) 0.96 a_y C) 0.96 a_z D) 0.96 a_x

10. The magnetic field intensity at the centre of a long solenoid is---------- [ ]

A) H= $N\frac{I^2}{l}$ B) $\frac{NI}{l}$ C) $\frac{NI}{l^2}$ D) $\frac{N^2I}{l}$

11. The total magnetic flux coming out of closed surface is---------- [ ]

A) infinite B) finite C) zero D)None

12. The MFI due to an infinitely long straight conductor carrying a current I is----- [ ]

A) H= $\frac{I}{2\pi d}$ B) H = $\frac{I}{2d}$ C) H = $\frac{I}{d}$ D) 2dl

13. The line integral of H about any closed path is exactly equal to the ------- enclosed by that path [ ]

A) field B) potential C)current D)None

14. The MFI at the centre of the square current carrying wire is [ ]

A) H= $\frac{I}{a}$ B) H = $\frac{\sqrt{2}I}{a}$ C) H = $\frac{2I}{\pi a}$ D) $\frac{\sqrt{2}I}{\pi a}$

15. The expression for biot-savarts law in integral form is [ ]

A) H= $\int \frac{I.\overrightarrow{dl} \times \vec{r}}{4\pi r^2}$ B) H= $\int \frac{I.\overrightarrow{dl} \times \vec{r}}{4\pi r^3}$ C) H=$\int \frac{I.\overrightarrow{dl} \times \vec{r}}{4\pi r}$ D) $\int \frac{I.\overrightarrow{dl} \times \vec{r}}{4r^2}$

16. The Amperes circuital law in integral form is [ ]

A) $\oint \vec{H}.\overrightarrow{dl}$ = I B) $\oint \vec{H}.\overrightarrow{dl}$ = J C) $\oint \vec{H}.\overrightarrow{dl}$ = 0 D) none

17. Point form of Ampere's circuital law is [ ]

A) $\nabla \times \vec{H} = \vec{j}$ B) $\nabla \times \vec{H} = 0$ C) $\nabla \times \vec{B} = \vec{j}$ D) $\nabla \times \vec{H} = 0$

18. The charges is motion produce a---------- [ ]

A) Electric field B) magnetic field C) electro static fields D) None

19. If the particle is at rest in magnetic fields, then it will experience---------- [ ]

A) Forces B) no forces C) can't say D) none

20. The force on a straight conductor in a magnetic field is given by /F/= [ ]

A) BILsinΘ B) $\vec{F} = I\vec{l} \times \vec{B}$ C) A or B D) none

21. The surface integral of B over a closed surface S in a magnetic field must be [ ]

A) BSCOSΘ B) BS SINΘ C) Zero D) none

22. A differential current loop is carrying current I have a magnetic dipole moment m= [ ]

A) $\frac{I}{A}$ B) IA C) $I^2 A$ D) None

23. Magnetic field intensity interms of magnetic flux density is given as---------- [ ]

A) $\vec{H} = \mu \vec{B}$ B) $\vec{H} = \frac{\vec{B}}{\mu}$ C) $\vec{H} = \frac{\vec{B}}{\varepsilon\mu}$ D) $\vec{H} = \frac{\vec{B}}{\varepsilon}$

24. The concept of displacement current was a major contribution attributed to [ ]

A) Faraday B) Lenz C) Lorentz D) Maxwell

25. Magnetic fields can exert force on [ ]

A) Moving charges only B) Staionary charges only C) A and B D) None

26. Ampere's law state that the force $\vec{F}$ between two parallel wire carrying current I_1 and I_2 is equal to [ ]

A) $\frac{\mu_0 I_1 I_2}{2\pi d}$ B) $\frac{\mu_0 I_1 I_2}{2\pi d} l$ C) $\frac{\mu_0 I_1 I_2}{2d}$ D) $\frac{\mu_0 I_1 I_2}{2\pi dl}$

27. When a charged particle having charge Q travels with velocity V in magnetic field $\vec{B}$, it will experience a force F_m is given by [ ]

A) $\vec{F_m}$= Q ($\vec{V} \times \vec{B}$) B)QVB sinΘ C) A or B D) none

28. The expression for Torque on a current loop placed in a magnetic field is T = [ ]

A) mB sinΘ B)$\vec{m} \times \vec{B}$ C)A or B D) none

29. The unit of magnetic field intensity $\vec{H}$ is ---------- [ ]

A) weber B) $\frac{AT}{m}$ C)Tesla D)no units

30. The Curl operator used in ----------fields [ ]

A) Electrostatic B) Magneto static C) both A and B D) none

31. The torque on a magnetic dipole is ($\vec{F} = force\ and\ \vec{R} = moment\ of\ arm$) [ ]

A)$\vec{T} = \vec{R} \times \vec{F}$ B) $\vec{T} = \vec{F} \times \vec{R}$ C)$\vec{T} = \vec{R}.\vec{F}$ D) $\vec{T} = \vec{F}$

32. The MFI at the centre of the circular loop is [ ]

A) H = $\frac{I}{2a}$ B) H = $\frac{I}{a}$ C) L = $\frac{\sqrt{3}}{2a}$ I D) L = $\frac{5I}{2a}$

33. Ampere's law state that the force $\vec{F}$ between two parallel wire carrying current I_1 and I_2 is equal to [ ]

A) $\frac{\mu_0 I_1 I_2}{2\pi d}$ B) $\frac{\mu_0 I_1 I_2}{2\pi d} l$ C) $\frac{\mu_0 I_1 I_2}{2d}$ D) $\frac{\mu_0 I_1 I_2}{2\pi dl}$

34. When a charged particle having charge Q travels with velocity V in magnetic field $\vec{B}$, it will experience a force F_m is given by [ ]

A) $\vec{F_m}$= Q ($\vec{V} \times \vec{B}$) B) QVB sinΘ C) A or B D) none

35. The line integral of magnetic field intensity $\vec{H}$ around a closed path is exactly equal to the direct current

enclosed by that path is given by ---------- law [ ]

A) Gauss B) Faraday's C) Biot savart D) Amperes

36. In the expression $\vec{B} = \times \vec{A}$, is $\vec{A}$ is called ---------- [ ]

A) Area of the field B) vector magnetic potential C) scalar magnetic potentials D) None

37. The expression for biot-savarts law in integral form is [ ]

A) H= $\int \frac{I.\overline{dl} \times \vec{r}}{4\pi r^2}$ B) H= $\int \frac{I.\overline{dl} \times \vec{r}}{4\pi r^3}$ C) H=$\int \frac{I.\overline{dl} \times \vec{r}}{4\pi r}$ D) $\int \frac{I.\overline{dl} \times \vec{r}}{4r^2}$

38. The faraday's law in integral form is given by [ ]

A) $emf = -\int_s \frac{\partial B}{\partial t}.ds$ B) $emf = \int_s \frac{\partial B}{\partial t}.ds$ C) $emf = -\int_s \frac{\partial D}{\partial t}.ds$ D) none

39. The force of ---------- is experienced between two parallel conductors carrying current in opposite direction. [ ]

A) Attraction B) Repulsion C) Zero D) None

40. The force of ---------- is experienced between two parallel conductors carrying current in same direction. [ ]

A) Attraction B) Repulsion C) Zero D) None

UNIT –V

TIME VARYING FIELDS AND MAXWELL'S EQUATIONS

1. The inductance of a solenoid is given by [ ]

A) L = $\frac{N\mu A}{l}$ B) L = $\frac{N\mu}{l}$ C) L = $\frac{N^2\mu A}{l}$ D) L = $\frac{N^2\mu A}{2\pi R}$

2. The inductance of a Torroid is given by [ ]

A) L = $\frac{N\mu A}{l}$ B) L = $\frac{N\mu}{l}$ C) L = $\frac{N^2\mu A}{l}$ D) L = $\frac{N^2\mu A}{2\pi R}$

3. The divergence of magnetic flux density $\nabla.\vec{B}$ is ---------- [ ]

A) $\nabla.\vec{B} = \rho_v$ B) $\nabla.\vec{B} = -\rho_v$ C) $\nabla.\vec{B} = 0$ D) none

4. What is the energy density in free space on account of field intensity H= 1000A/m? [ ]

A) 0.2 J/m^3 B) 0.628 J/m^3 C) 0.735 J/m^3 D) 0

5. The scalar magnetic potentials satisfy the ---------- equation [ ]

A) Poisson B) Laplace C) Both A &B D) None

6. The vector magnetic potentials satisfy the ---------- equation [ ]

A) Poisson B) Laplace C) Both A &B D) None

7. What is the value of permeability constant μ_0 in free space [ ]

A) 8.54×10^{-12} H/m B) $4\pi\times10^{-12}$ H/m C) $4\pi\times10^{-7}$ H/m D) 0

8. The numan's formulae for finding the mutual inductance is given by [ ]

A) M=$\frac{\mu}{4\pi}\iint_{c1c2}\frac{dl_1.dl_2}{r}$ B) M=$\frac{\mu}{4\pi}\iint_{c1c2}\frac{dl_1}{r}$ C) M=$\frac{\mu I}{4\pi}\iint_{c1c2}\frac{dl_1.dl_2}{r}$ D) none

9. If the two coils L_1 and L_2 are connected in series aiding the total inductance is [ ]

A) L_1+L_2 B) L_1+L_2-2M C) L_1+L_2+2M D) $M = \frac{L1L2}{L1+L2}$

10. If the two coils L_1 and L_2 are connected in series opposing the total inductance is [ ]

A) L_1+L_2 B) L_1+L_2-2M C) L_1+L_2+2M D) $M = \frac{L1L2}{L1+L2}$

11. If the two coils L_1 and L_2 are connected in parallel aiding the total inductance is [ ]

A) L_1+L_2 B) L_1+L_2-2M C) $M = \frac{L1L2-M^2}{L1+L2+2M}$ D) $M = \frac{L1L2-M^2}{L1+L2-2M}$

12. If the two coils L_1 and L_2 are connected in parallel opposing the total inductance is [ ]

A) L_1+L_2 B) L_1+L_2-2M C) $M = \frac{L1L2-M^2}{L1+L2+2M}$ D) $M = \frac{L1L2-M^2}{L1+L2-2M}$

13. The energy density in magnetic field is given by [ ]

A) $\frac{1}{2}\mu H^2$ B) $\frac{1}{2}\mu B^2$ C) $\frac{1}{2}\mu H$ D) none

14. The energy stored in magnetic field is given by [ ]

A) $\frac{1}{2}LI$ B) $\frac{1}{2}LI^2$ C) $\frac{1}{2}I^2$ D) none

15. The coefficient of coupling K between two coil is [ ]

A) K =M$\sqrt{L_1L_2}$ B)K= $\frac{M}{\sqrt{L_1L_2}}$ C)K= $\sqrt{\frac{M}{L_1L_2}}$ D)None

16. In free space relative permeability μ_r=---------- [ ]

A) 0 B) 1 C) infinite D) None

17. What is the unit of Energy density? [ ]

A) Joules B)Weber C)Joules /m^3 D)Weber/m^3

18. in magnetic fields $\nabla.\vec{B}$ is ---------- [ ]

A)$\nabla.\vec{B} = \frac{\rho_v}{\varepsilon}$ B)$\nabla.\vec{B} = -\rho_v$ C) $\nabla.\vec{B} = 0$ D) none

19. The transformer induction equation is given by [ ]

A) emf =$-\oint_s \frac{\partial \acute{B}}{\partial t}$ B) emf = $\oint_s \frac{\partial \acute{B}}{\partial t}$ C) emf =$-\oint_s \frac{\partial \acute{D}}{\partial t}$ D) emf = $\oint_s \frac{\partial \acute{D}}{\partial t}$

20. The emf induced in a coil is directly proportional to [ ]

A) flux B) rate of change of flux C) current D) none

21. Find the coefficient of coupling K between two coil, where $L_1=L_2=M=1H$ [ ]

A) K =1 B) K= 0.5 C) K=2 D) None

22. The inductance of a Torroidal ring is given by [ ]

A) L = $\frac{N\mu A}{l}$ B) L = $\frac{N\mu}{l}$ C) L = $\frac{N^2\mu A}{l}$ D) L = $\frac{N^2\mu A}{2\pi R}$

23. The curl of magnetic field intensity is [ ]

A)$\nabla \times \vec{H} = \vec{j}$ B) $\nabla \times \vec{H} = 0$ C) $\nabla \times \vec{B} = \vec{j}$ D)$\nabla \times \vec{H} = 0$

24. The unit of scalar magnetic potential is [ ]

A) Ampere B) Volt C) Amp/m D) Volt/m

25. Vector magnetic potential exists in regions where **J** is [ ]

A) Absent B) Present C) not related to **J** D) None

26. Vector magnetic potential has applications in [ ]

A) Antennas B) transmission lines C) Microwave ovens D) All

27. Magnetic scalar potential is defined in the region [ ]

A) **J**=0 B)**J**>0 C) **J**<0 D)**E**=0

28. The relation between magnetic flux density **B**and vector magnetic potential **A** is [ ]

A) $\bar{B}=\nabla.\bar{A}$ B) $\bar{A}=\nabla.\bar{B}$ C) $\bar{B}=\bar{A}X\nabla$ D) $\bar{B}=\nabla X\bar{A}$

29. If R is the mean radius of toroid with N number of turns and A is the area of cross-section of a toroid then Inductance of toroid is [ ]

A) $L=\frac{\mu NA}{2\pi r}$ B) $L=\frac{\mu NR}{2\pi A}$ C) $L=\frac{\mu N^2 A}{2\pi r}$ D) None

30. If M is the mutual inductance between two magnetically coupled circuits having self-inductances L_1 and L_2 and K is the coefficient of coupling between them then [ ]

A) M = K $\sqrt{L_1L_2}$ B) K = M $\sqrt{L_1L_2}$ C) M = K L_1L_2 D) None

31. The magnetic field in a solenoid is [ ]

A) H=N/I B) H=n/I C) H=NA/I D) H=I/N

32. A toroid has air core and has a cross-sectional area of $10mm^2$. It has 1000 turns and its mean radius is 10 mm. Find its inductance. [ ]

A) 0.02mH B) 0.002mH C) 0.02H D) 0.02mH

33. Energy density in a magnetic field [ ]

A) $W_H=0.5\mu H^2$ B) $W_H=1/2\ \mu H^2$ C) $W_H=1/2$ B.H D) All

34. Inductance has equivalent use in magnetics as _____has in electrostatics, including storage of energy. [ ]

A) Electric filed B) Electric Flux density C) Potential D) Capacitance

35. Self-inductance is defined as the rate of total magnetic flux linkage to the_____ through the coil. [ ]

A) Current B) energy C) Power D) flux

36. The mutual inductance between two coupled circuit has the property that [ ]

A) $L_{12}>L_{21}$ B) $L_{12}<L_{21}$ C) $L_{12}=L_{21}$ D) $L_{12}\leq L_{21}$

37. If a current of 1.0 amp flowing in an inductor , L=2 henry, the energy stored in an inductance [ ]

A) 2 J B) 1J C) 2J/m D) 0.5J

38. If μ=1.0 μH/m for a medium, H=2.0 A/m, the energy stored in the field is [ ]

A) 0.5 J/m^3 B) 1μJ/m^3 C) 2μJ/m^3 D) 1J/m^3

39. The force produced by B=2wb/m^2on a current element of 2 A-m is [ ]

A) 4 N B) 1 N C) 2 N D) 0.5 N

40. $M_{12}=\frac{N1\ \emptyset 12}{I2}$ is _____ inductance between two coils [ ]

A) Self B) Mutual C) Series D) Parallel

41. Current passing through the capacitor is called [ ]

A) Conduction current B) Convection current C) Displacement current D) All

42. Electromagnetic fields produced by [ ]

A) Stationary charges B) Steady current C) time-varying currents D) All

43. Except in electrostatics, voltage and potential difference are usually [ ]

A) not equivalent. B) equivalent C) zero D) infinity

44. When a conducting loop is moving in a static B field, an emf is induced in the loop. Such an emf is called as [ ]

A) Motional emf B) flux cutting emf C)Static emf D) a & b

1. In case of time varying fields Gauss law is [ ]

A) Curl H=J+ ∂D/∂t B) Div D= ρ_v C) Div .B = 0 D) Curl E =-∂ B/∂

2. Formula for displacement current [ ]

A) $\partial\mathbf{D}/\partial t$ B) $\mathbf{J}=J+\partial\mathbf{D}/\partial t$ C)$\mathbf{J}=\sigma\mathbf{E}$ D) $\mathbf{J}=\partial\mathbf{B}/\partial t$

3. Who is the founder of electromagnetic theory [ ]

A) Faraday B)Lenz C)Lorentz D)Maxwell

4. A time-harmonic field is one that varies_____with time. [ ]

A) Periodically B) sinusoidally C) non-periodically D)a & b

5. A loop is rotating about the y-axis in a magnetic field B = Ba sin wt$\mathbf{a}_x$Wb/m^2. The voltage induced in the loop is due to [ ]

A) Rotional emf B) Transformer emf

C) A combination of motional and transformer emf D) none of the above

6. The Maxwell's equation $\nabla.\mathbf{B}=0$ is due to [ ]

A) $\mathbf{B}=\mu\mathbf{H}$ B) $B=\mu/H$ C) non-existence of mono pole D) none of these

7. Applications of electromagnetic waves [ ]

A) satellite B) television C)Radars D) All

8. For a uniform plane wave in the x-direction has [ ]

A) $E_x=0$ B) $H_x=0$ C) $E_x=0$ and $H_x=0$ D) $E_z=0$

9. **E.H** of a uniform plane wave is [ ]

A) EH B) 0 C) ηE^2 D) ηH^2

10. The direction of propagation of EM wave is obtained from [ ]

A) **E×H** B) **E.H** C) **E** D) **H**

11. Velocity of the wave in an idle conductor is [ ]

A) Zero B) very large C) moderate D) small

12. Velocity of EM wave in free space is [ ]

A) Independent of frequency (f) B) increase with increase in f

C) Decrease with increase in f D) Zero

13. Pointing vector **P**= [ ]

a) **E×H** B) **E.H** C) ½ **E×H** D) **(E×H)**^{2}

14. Depth of penetration δ= [ ]

A) $1/\beta$ B) $1/\alpha$ C) $1/\gamma$ D) $1/\sigma$

15. In pointing vector **E×H** represents [ ]

A) Electric field per unit area B) magnetic field per unit area

C) power flow per unit area D) All

16. Velocity of EM wave in good dielectric is [ ]

A) $v=\omega/\beta$ B) $v=\omega/\alpha$ C) $v=\omega/\delta$ D) $v=\alpha/\beta$

21. Reciprocal of attenuation constant is called [ ]

A) Skin depth B) pointing vector C) drift current D) displacement current

22. A wave propagating in the +z direction and the wave is called_____ [ ]

A) Forward travelling wave B) backward travelling wave C) wavelength D) none

23. The emf induced in coil is given by [ ]

A) $e=-N\frac{d\emptyset}{dt}$ B) $e=-N\frac{dI}{dt}$ C) $e=-L\frac{dI}{dt}$ D)A and C

24. A wave propagating in the -z direction and the wave is called_____ [ ]

A) Forward travelling wave B) backward travelling wave C) wavelength D) none

25. Skin resistance (Ω/m^2) is defined ____ part of intrinsic impedance for good conductor [ ]

A) Real part B) imaginary part C) zero D) none

26. The field intensity in a conductor rapidly decreases are known as [ ]

A) Skin depth B) skin effect C) pointing field D) wave field

27. Skin depth is also known as [ ]

A) Wave depth B) pointing depth C) penetration depth D) drift current

28. In dielectric medium the displacement current is_____ compared to conduction current [ ]

A) greater B) equal C) lesser D) none

29. The e.m.f is induced in a stationary closed path due to the time varying field is called [ ]

A) Statically induced e.m.f B) dynamically induced e.m.f

C) Motional e.m.f D) none

30. The e.m.f is induced in a stationary closed path due to the static varying field is called [ ]

A) Statically induced e.m.f B) dynamically induced e.m.f

C) Transformer e.m.f D) none

31. Skin Depth δ= [ ]

A) α B) 1/α C)1/β D) β

32. For a time varying fields ∇ X H= _____ [ ]

A) $J+\frac{\partial \vec{B}}{\partial t}$ B) $J+\frac{\partial \vec{D}}{\partial t}$ C) $J+\frac{\partial \vec{E}}{\partial t}$ D) $I+\frac{\partial \vec{D}}{\partial t}$

33. Poynting vector _____ [ ]

A) AXB B) AXE C) EXH D) BXH

34. The induced voltage opposes the flux producing in it is called _____Law [ ]

A) Lenz's B) Faraday's C) Ampere's D) Gauss

35. Time varying fields are due to _____Charges [ ]

A) Static B) Accelerated C) Decelerated D) Uniform

36. Time varying fields are due to _____Charges Lenz's [ ]

A) Static B) Accelerated C) Decelerated D) Uniform

37. The induced voltage opposes the flux producing in it is called _____Law [ ]

A) Lenz's B) Faraday's C) Ampere's D) Gauss

38. The induced emf, V_{emf} in any closed circuit is equal to time rate of change of the magnetic flux linkages by the circuit is called _____Law [ ]

A) Gauss's B) Ampere's C) Lenz's D) Faraday's

39. If a moving loop is kept in a static B field, the emf induced is _____. [ ]

A) Rotational B) Motional C) Both D) None of these

40. The ratio of transmitted electric field to incident electric field is called_____ [ ]

A) Transmission B) Reflection C) Both D) None

Prepared by**: J.GOWRISHANKAR AND N.SRAVANTHI**