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Examination October 2020

B.Sc. T.Y (Sem-V)

2152 Physics Paper- XVI(Electrodynamics)

Time: One Hour **Max. Marks: 50**

Instructions
Solve any 25 questions from Q1 to Q30
Solve any 25 questions from Q31 to Q60

1 'The total outward electric flux through a closed surface is directly proportional to the net charge enclosed by that surface.' This is the statement of ……law.

(A)Coulomb's (B)Faraday's (C)Gauss's (D)Lenz's

2 Which one of the following is Poisson's equation?

(A) $\nabla^2\Psi=0$ (B) $E=-\nabla\Psi$ (C) $\nabla \vec{E}=\rho/\epsilon_0$ (D)None of the above

3 Electric lines of forces for a positive charge are directed in the…….direction.

(A)Outward (B)Inward (C)Both outward and inward (D)No direction

4 $\vec{\nabla}\vec{E}=\frac{\rho}{\epsilon_0}$ is the …..

(A)Stoke's Theorem (B)Gauss's law (C)Greens Theorem (D)Coulomb's Law

5 Which one of the following is not a property of electric field line?

(A)Lines of force start from positive charge and terminate on negative charge. (B)Direction of electric field lines is same for positive and negative charges. (C)The field intensity is proportional to the number of lines passing through unit area held normal to the local field direction. (D)There is repulsion between the lines.

6 Electric field intensity is a ……quantity.

(A)Scalar (B)Algebraic (C)Numerical (D)Vector

7 Gaussian surface of a point charge will be….

(A)Sphere (B)Cylinder (C)Cube (D)Hexagonal

8 The electric field inside a spherical shell of uniform surface charge density is,

(A)Constant (B)Positive (C)Zero (D)Negative

9 The magnitude of electric field 'E' is,

(A) $E=\frac{q1q2}{4\pi\epsilon_0\Gamma^2}$ (B) $E=\frac{F}{q}$ (C) $E=q\epsilon_0$ (D) $E=Fq$

10 For a single rectangular co-ordinate 'x', the solution of Laplace equation is,

(A) $\nabla\Psi=1$ (B) $\nabla\bullet E=q\epsilon_0$ (C) $\Psi(x)=ax=b$ (D)None of the above

11 The electric force experienced by a unit positive charge placed at that point is called as,

(A)Gravitational field (B)Magnetic field (C)Electromagnetic field (D)Electric field

12 "Gaussian pillbox" extending equal distance….

(A)Above the plane (B)Above and Below the plane (C)Below the plane (D)None of the above

13 Henry is the unit of ….

(A)Self inductance (B)Mutual Inductance (C)Both A and B (D)Frequency

14 Whenever an e.m.f. and current is set up by a charge of magnetic flux through a circuit its direction will be such as to oppose the act which caused it. This is known as…

(A)Coulomb's Law (B)Faradays Law (C)Kirchhoff's Law (D)Lenz's law

15 Whenever there is change in the magnetic flux linked with a circular coil, an e.m.f. will be induced in the coil. This is known as…

(A)Coulomb's Law (B)Faradays Law (C)Kirchhoff's Law (D)Lenz's law

16 If the induced emf is $'\epsilon'$, then Faraday's law is….

(A) $\epsilon=\frac{d\phi}{dt}$ (B) $\epsilon=\frac{d^2\phi}{dt^2}$ (C) $\epsilon=\frac{dE}{dt}$ (D) $\epsilon=\nabla\times E$

17 Magnitude of induced emf is proportional to

(A)Rate of change of current (B)Rate of change of voltage (C)Rate of change of magnetic flux linkage (D)Rate of change of resistance.

18 $\nabla\times\vec{H}=\vec{J}+\frac{\partial\vec{D}}{\partial t}$ is the extension of …….

(A)Faraday's law (B)Coulomb's law (C)Gauss Law (D)Ampere's law

19 The equation $\nabla^2 v=0$ is called as,

(A)Green's function (B)Poisson's equation for free space (C)Gauss equation (D)Laplace's equation for free space

20 With boundary conditions Laplace's equation had….

(A)Only one solution. (B)Two solutions (C)Three solutions (D)Four solutions

21 An imaginary surface enclosing the charge is known as….

(A)Laplacian Surface (B)Colombian Surface (C)Gaussian Surface (D)Ampere's surface

22 Lenz's law is a consequence of the law of conservation of …..

(A)Charge (B)Energy (C)Momentum (D)Density

23 A rate of flow of charge per unit time is defined as…

(A)Voltage (B)Power (C)Current (D)Resistance

24 ransformers works on the principle of…

(A)Self inductance (B)Mutual inductance (C)Displacement current (D)Joule's law

25 Electromagnetic waves travels …….

(A)Without medium (B)With medium (C)Both A and B (D)In disturbed path

26 The phenomena of production of induced emf in the same circuit is called…

(A)Self inductance (B)Mutual inductance (C)Eddy current (D)None of the above

27 Electromagnetic waves are …… in nature.

(A)Polarized (B)Longitudinal (C)Both A and B (D)Transverse

28 Energy of electromagnetic waves divided equally into ……field vectors.

(A) $\vec{E}\times\vec{B}$ (B) $\vec{E}\times\vec{D}$ (C) $\vec{B}\times\vec{D}$ (D) $C\times\vec{E}$

29 Which of the following equation shows modified Ampere's law.

(A) ∇ [illegible] $=p$ (B) $\nabla\vec{H}=\vec{J}+\frac{\partial\vec{v}}{\partial t}$ (C) $\nabla\times\vec{H}=\vec{J}+\frac{\partial\vec{D}}{\partial t}$ (D) $\nabla\times\vec{E}=-\frac{\partial\vec{v}}{\partial t}$

30 Which of the following shows differential form of Ampere's circuital law.

(A) $\nabla\times\vec{H}=0$ (B) $\nabla\times\vec{H}=\vec{J}$ (C) $\nabla\times\vec{H}=\frac{\rho}{\epsilon_0}$ (D) $\nabla\times\vec{E}=\rho\epsilon_0$

31 Which of the following shows differential form of Ampere's circuital law. The mutual inductance between two coils P and S is 10 Henry. The current is P change at 2 amp/sec. The induced emf in S is ……. Volts.

(A)2 (B)10 (C)5 (D)20

32 The unit of Poynting vector is……

(A)Watt (B)Watt/s (C)Watt/m2 (D)Watt/m

33 Which of the following circuit oppose the change in circuit current?

(A)Capacitance (B)Inductance (C)Resistance (D)Conductor

34 The property of the coil by which a counter emf is induced in it when the current through the same coil changes, is known as,

(A)Self inductance (B)Mutual inductance (C)Capacitance (D)Resistance

35 The rate of energy flow per unit area or power flow per unit area is……..

(A) $\vec{E}\times\vec{B}$ (B) $\vec{E}\times\vec{D}$ (C) $\vec{E}\times\vec{H}$ (D) $\vec{D}\times\vec{H}$

36 Gauss law can be evaluated by using the following system.

(A)Cartesian (B)Gaussian surface (C)Charge type (D)None of the above

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

(A)Only conductors in air (B)Only dielectrics in air (C)Both the densities can never exists (D)Conductors placed in any dielectric medium.

38 Which parameter is unity in air medium?

(A)Permittivity (B)Permeability (C)Relative permeability (D)Absolute permittivity

39 Gauss law for magnetic fields is given by,

(A)Div(E)=0 (B)Div(B)=0 (C)Div(D)=0 (D)Curl(B)=0

40 Which of the following component exist in electromagnetic wave?

(A)Only E (B)Only H (C)Both E and H (D)None of the above

41 The normal component of magnetic induction $\vec{B}$ is ……..across the boundary.

(A)Continuous (B)Discontinuous (C)Discrete (D)All the above

42 Which of the following is general electromagnetic wave equation for electric field in conducting medium.

(A) $\nabla\times E=\frac{-\partial B}{\partial t}$ (B) $\vec{\nabla}\times\vec{S}+\frac{\partial U}{\partial t}=0$ (C) $\nabla^2\vec{E}=\mu\sigma\frac{\partial\vec{E}}{\partial t}+\mu\in\frac{\partial^2\vec{E}}{\partial t^2}$ (D) $\int E.dl=0$

43 In case of reflection the angle of reflection is equal to the angle of……

(A)Incidence (B)Reflection (C)Refraction (D)Transmission

44 The frequency of the wave remains unchanged by …… or ……..

(A)Reflection or polarization (B)Refraction or dispersion (C)Reflection or refraction (D)Transmission

45 The incident, reflected, refracted waves all lie in the ……..plane but normal to the boundary surface.

(A)Different (B)Same (C)Normal (D)All the above

46 n_1 sin θ_1 = $n_2\sin\theta_2$ represents the …….law of reflection.

(A)Snell's (B)Brewster's (C)Ampere's (D)Newton's

47 Which component of the electric field intensity is always continuous at the boundary?

(A)Tangential (B)Normal (C)Horizontal (D)Vertical

48 For a conservative field which of the following equations holds good?

(A) $\int D.dl=0$ (B) $\int H.dl=0$ (C) $\int B.dl=0$ (D) $\int E.dl=0$

49 Equation $\vec{\nabla}\times\vec{S}+\frac{\partial U}{\partial t}=0$ shows,

(A)Equation of continuity (B)Current density (C)Poynting theorem (D)Stokes theorem

50 Which of the following is not a type of polarization.

(A)Linear Polarization (B)Elliptical Polarization (C)Circular Polarization (D)Triangular Polarization

51 The Gaussian pillbox is the surface with an infinite charge or uniform charge density is used to determine.

(A)Magnetic field (B)Refractive index (C)Electric field (D)Electric current

52 The ratio of amplitudes of electric (E) and magnetic (B) fields is always constant and it is equal to ……. of electromagnetic wave.

(A)Intensity (B)Velocity (C)Frequency (D)Wavelength

53 Electromagnetic waves travels in vacuum with velocity……

(A) $3\times10^{8}m/s$ (B) $3\times10^{10}m/s$ (C) $300\mathrm{m}/s$ (D) $3\,Times10^{8}cm/s$

54 Which one of the following is not a Maxwell's equation.

(A) $\nabla.D=\rho$ (B) $\nabla.B=0$ (C) $\nabla\times E=\frac{-\partial B}{\partial t}$ (D) $\nabla.D=\epsilon_0 E$

55 When variation of electric and magnetic fields are restricted to a single plane then the electromagnetic wave is called as …….

(A)Reflected wave (B)Radiated wave (C)Plane polarized wave (D)None of the above

56 Electromagnetic waves transfer …….. from one region to another.

(A)Charge (B)Current (C)Voltage (D)Energy

57 The tangential component of magnetic intensity H is ……across the surface separating two dielectrics.

(A)Discontinuous (B)Continuous (C)Linear (D)Circular

58 Electromagnetic waves are produced by

(A)Electric current (B)A static charge (C)An accelerated charge (D)Voltage

59 In electromagnetic waves the phase difference between electric field vector E and magnetic field vector $\vec{B}$ is,

(A) $\frac{\pi}{2}$ (B) π (C) $\frac{2\pi}{3}$ (D)Zero

60 Which of the following rays are not electromagnetic waves?

(A)Alpha rays (B)Gamma rays (C)X-rays (D)Thermal rays