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12th Standard

Physics

Total Marks: 452

Multiple Choice Question 144 x 1 = 144

Q1.The dimension of $\frac{1}{\mu_0 \varepsilon_0}$ is _____.

(a) $[LT^{-1}]$ (b) $[L^2T^{-2}]$ (c) $[L^{-1}T]$ (d) $[L^{-2}T^2]$

Q2.If the amplitude of the magnetic field is 3 x 10^{-6} T, then amplitude of the electric field for a electromagnetic waves is _____.

(a) 100 V m^{-1} (b) 300 V m^{-1} (c) 600 V m^{-1} (d) 900 V m^{-1}

Q3.Which of the following electromagnetic radiations is used for viewing objects through fog

(a) microwave (b) gamma rays (c) X- rays (d) infrared

Q4.Which of the following is false for electromagnetic waves

(a) transverse (b) non-mechanical waves (c) longitudinal

(d) produced by accelerating charges

Q5.Consider an oscillator which has a charged particle oscillating about its mean position with a frequency of 300 MHz. The wavelength of electromagnetic waves produced by this oscillator is _____.

(a) 1 m (b) 10 m (c) 100 m (d) 1000 m

Q6.The electric and the magnetic fields, associated with an electromagnetic wave, propagating along negative X axis can be represented by _____.

(a) $\vec{E} = E_0\hat{i}$ and $\vec{B} = B_0\hat{k}$ (b) $\vec{E} = E_0\hat{k}$ and $\vec{B} = B_0\hat{j}$

(c) $\vec{E} = E_0\hat{i}$ and $\vec{B} = B_0\hat{j}$ (d) $\vec{E} = E_0\hat{j}$ and $\vec{B} = B_0\hat{i}$

Q7.In an electromagnetic wave traveling in free space the rms value of the electric field is 3 V m^{-1}. The peak value of the magnetic field is _____.

(a) 1.414 x 10^{-8} T (b) 1.0 x 10^{-8} T (c) 2.828 x 10^{-8} T

(d) 2.0 x 10^{-8} T

Q8.During the propagation of electromagnetic waves in a medium _____.

(a) electric energy density is double of the magnetic energy density

(b) electric energy density is half of the magnetic energy density

(c) electric energy density is equal to the magnetic energy density

(d) both electric and magnetic energy densities are zero

Q9.If the magnetic monopole exists, then which of the Maxwell's equation to be modified?

(a) $\oint \vec{E}.d\vec{A} = \frac{Q_{enclosed}}{\in_0}$ (b) $\oint \vec{B}.d\vec{A} = 0$ (c) $\oint \vec{B}.d\vec{l} = \mu_0 i_c + \mu_0 \in_0 \frac{d}{dt} \oint_s \vec{E}.d\vec{A}$

(d) $\oint \vec{E}.d\vec{l} = -\frac{d}{dt}\Phi_B$

Q10.A radiation of energy E falls normally on a perfectly reflecting surface. Th e momentum transferred to the surface _____.

(a) $\frac{E}{c}$ (b) $2\frac{E}{c}$ (c) Ec (d) $\frac{E}{c^2}$

Q11.Which of the following is an electromagnetic wave?

(a) α - rays (b) β - rays (c) γ - rays (d) all of them

Q12.Which one of them is used to produce a propagating electromagnetic wave?

(a) an accelerating charge

(b) a charge moving at constant velocity (c) a stationary charge

(d) an uncharged particle

Q13.If $E = E_o \sin[10^6 \text{ x } -\omega t]$ be the electric field of a plane electromagnetic wave, the value of ω is_____.

(a) $0.3 \text{ x } 10^{-14}$ rad s^{-1} (b) $3 \text{ x } 10^{-14}$ rad s^{-1} (c) $0.3 \text{ x } 10^{14}$ rad s^{-1}

(d) $3 \text{ x } 10^{14}$ rad s^{-1}

Q14.Which of the following is NOT true for electromagnetic waves?

(a) it transport energy (b) it transport momentum

(c) it transport angular momentum

(d) in vacuum, it travels with different speeds which depend on their frequency

Q15.The electric and magnetic fields of an electromagnetic wave are _____.

(a) in phase and perpendicular to each other

(b) out of phase and not perpendicular to each other

(c) in phase and not perpendicular to each other

(d) out of phase and perpendicular to each other

Q16.Who produced the electromagnetic waves first?

(a) J.C.Bose (b) Marconi (c) Maxwell (d) Hertz

Q17.Speed of electromagnetic wave is the same for all _____.

(a) wavelength (b) media (c) intensities (d) frequencies

Q18.Electromagnetic waves are produced by _____.

(a) static charge (b) moving charge (c) an accelerating charge

(d) chargeless particles

Q19.Which of the following electromagnetic waves has the highest frequency?

(a) radio waves (b) micro waves (c) X- rays (d) ϒ-rays

Q20.Which of the following E.M waves has the longest wavelength?

(a) Radio waves (b) IR (c) X-rays (d) visible

Q21.The electric and magnetic field of an EM wave are _____.

(a) in phase and perpendicular to each other

(b) in phase and parallel to each other

(c) in opposite phase and perpendicular to each other

(d) in opposite phase and parallel to each other

Q22.The EM waves do not transport _____.

(a) energy (b) charge (c) momentum (d) information

Q23.Which EM waves are used in medicine to destroy cancer cells?

(a) radio waves (b) IR (c) ϒ rays (d) UV rays

Q24.Which of the following is a special aspect of EM wave?

(a) can be deflected by electric field

(b) can be deflected by magnetic filed

(c) can be deflected by both electric & magnetic filed

(d) none of these

Q25.The existence of E.M. waves was confirmed experimentally by _____.

(a) Hertz (b) Maxwell (c) Huygens (d) Planck

Q26.If the velocity of light in a medium is 2.25×10^8 ms^{-1} then the refractive index of the medium will be _____.

(a) 1.5 (b) 0.5 (c) 1.33 (d) 1.73

Q27.A magnetic field is produced by _____.

(a) a changing electric field (b) a moving charge (c) both of them

(d) none of them

Q28.Accelerated charges would produce _____.

(a) sound waves (b) ϒ-rays (c) magnetic waves

(d) electromagnetic waves

Q29. Electromagnetic waves are discovered by _____.

(a) Hertz (b) Maxwell (c) Lenz (d) Huygens

Q30. The wavelength range of ultra violet radiation is _____.

(a) $6x10^{-10}$ to $4x10^{-7}$m (b) $4x10^{-7}$ to $7x10^{-7}$m

(c) $6x10^{-10}$ to $4x10^{-10}$m (d) $7x10^{-7}$ to $4x10^{-9}$m

Q31. The phase difference between electric and magnetic field vectors in the electromagnetic waves?

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{2}$ (c) π (d) zero

Q32. The phase and orientation of the magnetic vector associated with electromagnetic oscillations differ respectively from those of the corresponding electric vectors by _____.

(a) zero, zero (b) $\frac{\pi}{2}, \frac{\pi}{2}$ (c) 0, $\frac{\pi}{2}$ (d) 0, $\frac{\pi}{2}$

Q33. Speed of electromagnetic waves through vacuum is equal to _____.

(a) $\sqrt{\mu_0 \varepsilon_0}$ (b) $\frac{1}{\sqrt{\mu_0 \varepsilon_0}}$ (c) $\frac{\sqrt{\mu_0}}{\varepsilon_0}$ (d) $\sqrt{\frac{\varepsilon_0}{\mu_0}}$

Q34. Dimensions of $\frac{1}{\mu_0 \varepsilon_0}$ is _____.

(a) $\frac{L^2}{T^2}$ (b) $\frac{T^2}{L^2}$ (c) $\frac{T}{L}$ (d) $\frac{L}{T}$

Q35. The unit of $\mu_o \varepsilon_o$ is _____.

(a) m S^{-1} (b) m^2 S^{-2} (c) m^{-1} s (d) m^{-2} S^{-2}

Q36. An electromagnetic wave has 5 joules of electric energy. The magnetic energy is _____.

(a) zero (b) 5 J (c) 10 J (d) 2.5 J

Q37. The energy of electromagnetic waves is due to which energy of the oscillating charge?

(a) mechanical (b) potential (c) kinetic (d) electrostatic

Q38. The wavelength of electromagnetic wave produced by Hertz experiment was _____.

(a) 6mm (b) 60m (c) 6000 mm (d) 60 cm

Q39. The velocity of light in vacuum can be changed by changing _____.

(a) frequency (b) amplitude (c) wave length (d) none of these

Q40.In vacuum speed of light depends upon _____.

(a) colour (b) wavelength (c) frequency (d) none of the above

Q41.The velocity of light is maximum in _____.

(a) Diamond (b) Water (c) Vacuum (d) Glass

Q42.If V_g, V_x, V_m are speeds of gamma rays, X rays and microwaves respectively in vacuum, then _____.

(a) V_g x m (b) $V_g > V_k > V_m$ (c) $V_g > V_x < V_m$ (d) $V_g = V_x = V_m$

Q43.Short wave bands are upto frequencies _____.

(a) 54 KHz (b) 5.4 MHz (c) 54 MHz (d) 54 GHz

Q44.Television waves range from _____.

(a) 54 MHz to 89 MHz (b) 54 MHz to 890 MHz

(c) 54 MHz to 89 MHz (d) 54 MHz to 80 MHz

Q45.Cellular phones use radio frequencies in _____.

(a) AM band (b) UHF band (c) FM band (d) upto 54 MHz

Q46.Which of the following can be used to take photograph over long distance of _____.

(a) White light (b) U- V radiation (c) I-R radiation (d) Microwaves

Q47.Which one of the following is not an electromagnetic waves?

(a) Gamma rays (b) X-rays (c) Beta rays (d) Microwaves

Q48.Which one of the following groups of electromagnetic waves is in order of increasing frequency?

(a) Microwaves U-V rays, X-rays

(b) Radio waves, visible light and 1-R rays

(c) gamma rays U-V rays radio waves

(d) gamma rays, U-V rays radio waves

Q49.The correct definition of spectrum is _____.

(a) band of colours (b) band of white light (c) band of frequencies

(d) band of amplitudes

Q50.The spectra used for making dyes is _____.

(a) line spectra (b) continuous absorption spectra

(c) fraunhofer spectra (d) band absorption spectra

Q51.A red flower seen in the light of mercury vapour lamp through a green filter will appear _____.

(a) black (b) red (c) violet (d) white

Q52.The central core of the sun is called _____.

(a) chromosphere (b) stratosphere (c) photosphere
(d) thermo sphere

Q53.Which of the following is used to study crystal structure?

(a) microwave (b) infrared rays (c) ultraviolet rays (d) X-rays

Q54.Electric filament lamp gives rise to _____spectrum.

(a) line (b) band (c) continuous (d) absorption

Q55.Which of the following gives rise to continuous emission spectrum?

(a) electric filament lamp (b) sodium vapour lamp
(c) gases in the discharge tube (d) calcium salt in Bunsen flame

Q56.Absorption spectrum is the characteristic of the_____

(a) emitting substance (b) absorbing substance
(c) reflecting substance (d) penetrating substance

Q57.A pure red glass plate when placed in the path of the light absorbs everything except_____.

(a) yellow (b) black (c) green (d) red

Q58.The sun's outer layer is called _____.

(a) chromosphere (b) exosphere (c) Photosphere (d) stratosphere

Q59.Band spectra are obtained from _____.

(a) atoms (b) molecules (c) solids (d) semisolids

Q60.Calcium or Barium salts in bunsen flame, CO_2, N_2 molecule, NH_3 gas in a discharge tube gives_____.

(a) line emission spectra (b) continuous emission spectra
(c) line absorption spectra (d) band spectra

Q61.The value of $\frac{1}{\sqrt{\mu_0 \varepsilon_0}}$ _____

(a) 3 x 10^{-8} m/s (b) 2.25 x 10^8 m/s (c) 3 x 10^8 m/s
(d) 2.25 x 10^8 m/s

Q62.In Hertz experiment, the formula for the frequency is _____

(a) $\frac{1}{2\pi\sqrt{\frac{L}{C}}}$ (b) $\frac{\sqrt{LC}}{2\pi}$ (c) $\frac{1}{2\pi\sqrt{LC}}$ (d) $\frac{2\pi}{\sqrt{LC}}$

Q63.The waves used in physiotherapy is _____.

(a) I-R rays (b) U-V rays (c) μ - waves (d) ɣ-rays

Q64.The rays used in weather forecasting is _____.

(a) I-R rays (b) U-V rays (c) X - rays (d) μ-Waves

Q65.Electromagnetic waves are _____ waves.

(a) longitudinal (b) Transverse (c) mechanical (d) sound

Q66.Angle between the electric and magnetic component of EM wave is _____.

(a) 0 (b) π/4 (c) π/2 (d) π

Q67._____discovered electromagnetic induction.

(a) Faraday (b) Maxwell (c) Ampere (d) Hertz

Q68.Electromagnetic waves propagate through space in_____.

(a) ether (b) vacuum (c) oxygen (d) carbon-dioxide

Q69.In E.M. waves, the variations in electric and magnetic fields are at an angle of_____.

(a) 0° (b) 60° (c) 90° (d) 270°

Q70.Electromagnetic waves are _____ in nature.

(a) parallel (b) transverse (c) longitudinal (d) Uni-directional

Q71.In an electromagnetic wave, the electric and magnetic fields are at an angle _____ to the direction of propagation.

(a) 270° (b) 90° (c) 180° (d) 67°

Q72.The speed of electromagnetic waves in free space is _____ m/s

(a) 3×10^{-18} (b) 6.2×10^{5} (c) 3×10^{8} (d) 5×10^{2}

Q73.The relation between velocity of light, permeability and permittivity of free space in_____.

(a) $C^2 = \frac{1}{\mu_0 \varepsilon_0}$ (b) $C = \frac{1}{\mu_0 \varepsilon_0}$ (c) $\mu_0 = \varepsilon_0 c$ (d) $\varepsilon_0 = \mu_0 c$

Q74.The electromagnetic waves are _____ by electric and magnetic fields.

(a) neutral (b) positive (c) negative (d) time-dependent

Q75.The electromagnetic waves are _____ by electric and magnetic fields

(a) deflected (b) not deflected (c) oscillated (d) scanned

Q76.The frequency of electromagnetic radiation Hertz produced was _____ Hz.

(a) 10^8 (b) $5x10^7$ (c) $3x10^8$ (d) $6x10^5$

Q77.ɣ-rays are produced by _____.

(a) radio active nuclei (b) high energy electrons
(c) incandescent solids (d) electronic devices

Q78.The wavelength range of x-rays is _____ (m).

(a) 10^{-4} to 10^{-2} (b) 10^{-14} to 10^{-9} (c) 10^{-10} to 3 X 10^{-8}
(d) 10^{-3} to 10^{-5}

Q79.The frequency range of UV rays is_____ Hz

(a) 3 x 10^{18} to 10^{16} (b) 5 x 10^{5} to 8 x 10^{9} (c) 5 x 10^{17} to 8 x 10^{14}
(d) 5 x 10^{14} to 8 x10^{10}

Q80.Vacuum tubes produces _____

(a) Visible light (b) RF waves (c) UV rays (d) Microwaves

Q81.The wavelength range of microwave is _____m

(a) 10^{-8} to 0.35 (b) 10^{-3} to 0.3 (c) 10^{-8} to 10^{-6} (d) 10^{-3} to 10^{-1}

Q82.Radio frequency waves are produced by _____.

(a) radioactive nuclei (b) radioactive nuclear reactions
(c) accelerated charges (d) radio - carbon

Q83.The frequency range of radio-waves is _____.

(a) 3 x 10^{7} to 3 x 10^{14} Hz (b) 3 x 10^{17} to 3 x 10^{14}Hz
(c) 3 x 10^{7} to 3 x 10^{4} Hz (d) 3 x 10^{17} to 3 x 10^{4} Hz

Q84.Cellular phones use radio-waves in _____ band

(a) long wave (b) ultra high frequency (c) short frequency
(d) medium frequency

Q85.Microwaves are used in _____ communication system.

(a) radio (b) TV (c) radar (d) sonar

Q86.Microwaves ovens are the domestic application of _____ wave.

(a) UV (b) visible (c) radio (d) micro

Q87._____ lamps are used in physiotherapy.

(a) IR (b) UV (c) visible (d) ɣ-rays

Q88._____ are used in weather forecasting.

(a) IR photographs (b) Microwaves (c) Radiowaves
(d) Visible light

Q89._____ absorption spectrum are used to study molecular structure.

(a) UV rays (b) IR (c) X-rays (d) ϒ-rays

Q90._____ radiations are used to study atomic structure.
(a) UV (b) IR (c) X-rays (d) Gamma

Q91._____ are used to study crystal structure in solids.
(a) UV rays (b) IR rays (c) X-rays (d) Gamma rays

Q92._____ radiations are used in destroying bacteria.
(a) UV (b) IR (c) X-ray (d) Gamma rays

Q93._____ radiations are used to sterilize surgical instruments.
(a) X-ray (b) UV (c) IR (d) Gamma

Q94._____ are used in forensic labs.
(a) X-ray (b) UV (c) Gamma (d) Visible

Q95._____ are used as a diagnostic tool in medicine.
(a) visible light (b) UV rays (c) X-rays (d) Gamma rays

Q96.Gamma rays are used in the treatment of _____
(a) cancer (b) Polio (c) AIDS (d) Tuberculosis

Q97.Forged documents are detected through _____.
(a) X-rays (b) UV-rays (c) IR-rays (d) microwaves

Q98.We can make long distance photographs using _____.
(a) radio waves (b) visible light (c) X-rays (d) IR rays

Q99.Every source has its own characteristic _____ spectrum.
(a) white (b) emission (c) scattering (d) absorption

Q100._____ emission spectrum is used to identify the gas used.
(a) Continuous (b) Line (c) Band (d) Solid

Q101.Continuous spectrum depends only on the _____ of the source.
(a) characteristic (b) temperature (c) density (d) volume

Q102.Carbon are produces _____ spectrum.
(a) characteristic (b) line (c) band (d) continuous

Q103.The absorption spectra are characteristic of the _____.
(a) source (b) absorbing substance
(c) time of travel from source to screen

(d) spectrometer used to study the spectrum

Q104.A pure green glass plate when, placed in the path of white light, absorbs_____.

(a) everything (b) everything except green (c) nothing

(d) only red

Q105.If white light is passed through iodine vapour, _____ are obtained.

(a) continuous absorption spectra

(b) continuous emission spectra (c) band absorption spectra

(d) emission spectra

Q106._____ spectra are used for making dyes

(a) continuous emission (b) band emission (c) band absorption

(d) line spectra

Q107.The dark lines in the solar spectrum are called _____ lines.

(a) Fresnel (b) Newton (c) Compton (d) Fraunhofer

Q108.The spectrum obtained from the photosphere of the sun is of _____ type.

(a) band spectra (b) line spectra

(c) continuous emission spectra (d) non-linear spectra

Q109.In an electromagnetic wave power is transmitted _____.

(a) along electric field (b) along magnetic field

(c) in a direction perpendicular to both the fields

(d) in a direction parallel to both the fields

Q110.The wavelength that can be use to observe the growth of cops on earth from the satellite is _____.

(a) 10^{-8} m (b) 10^{-14} m (c) 10^{-3} m (d) 10^{-12} m

Q111._____ waves have longest wavelength.

(a) UV (b) IR (c) Micro (d) Radio

Q112.The refractive index of a medium is _____.

(a) $\frac{1}{\mu_o \varepsilon_o}$ (b) $\sqrt{\frac{\mu\varepsilon}{\mu_o \varepsilon_o}}$ (c) $\sqrt{\frac{\mu_o \varepsilon_o}{\mu\varepsilon}}$ (d) $\frac{1}{\sqrt{\mu_o \varepsilon_o}}$

Q113.The dimensions of $\frac{1}{\mu\varepsilon}$ is _____.

(a) $[L^{-2}\ T^{-2}]$ (b) $[LT^{-1}]$ (c) $[L^2\ T^2]$ (d) $[L^2\ T^{-2}]$

Q114.In an electromagnetic wave the phase difference between electric field and magnetic field is

(a) $\frac{\pi}{4}$ (b) zero (c) $\frac{\pi}{2}$ (d) $d\pi$

Q115.Who proposed electromagnetic theory?

(a) Planck (b) Huygen (c) Newton (d) Maxwell

Q116.Velocity of electromagnetic wave through vacuum is _____.

(a) $\frac{1}{\sqrt{\mu\varepsilon}}$ (b) $\sqrt{\frac{\mu_0}{\varepsilon_0}}$ (c) $\sqrt{\frac{\varepsilon_o}{\mu_o}}$ (d) $\frac{1}{\sqrt{\mu_o\varepsilon_o}}$

Q117.Experimental verification of electromagnetic waves was done by _____.

(a) Huygen (b) Maxwell (c) Hertz (d) James Clerk

Q118.The idea by Displacement current was given by _____.

(a) Gauss (b) Ampere (c) Maxwell (d) Faraday

Q119.The ratio of speed of gamma rays to that of ultraviolet rays _____.

(a) 2 (b) $\sqrt{2}$ (c) 0.1 (d) 1

Q120.The physical properties of electromagnetic curves are not determined by _____.

(a) material (b) wavelength (c) frequency

(d) method of excitation

Q121.Infrared rays, radio waves, and gamma rays are classified as _____.

(a) electric waves (b) magnetic waves (c) light waves

(d) electromagnetic waves

Q122.The range of wavelength for microwaves is _____.

(a) 30 m - 10^{-6} m (b) 0.03 - 10^{-3} m (c) 0.3 m - 10^{-3} m

(d) 3 m - 10^{-6} m

Q123._____ rays are used to analyse structure of atoms.

(a) IR (b) gamma (c) X-rays (d) UV

Q124.To study about nuclear structure _____ rays are used.

(a) UV (b) IR (c) gamma (d) visible

Q125.Atomic spectrum is _____ spectrum.

(a) emission band (b) emission line (c) pure line

(d) absorption line

Q126.The radiations used in physiotherapy are _____rays.

(a) visible (b) IR (c) UV (d) Micro wave

Q127.Which spectrum is produced by an incandescent solid at high temperature?

(a) A pure spectrum (b) A continuous spectrum

(c) A line spectrum (d) An absorption spectrum

Q128._____ spectrum is produced by a gas molecular state.

(a) pure (b) band (c) continuous (d) line

Q129.The line spectrum is obtained from _____.

(a) solids (b) carbon arc lamp (c) liquids

(d) sodium vapour lamp

Q130.The line spectra is formed from _____.

(a) molecules in gaseous state (b) atoms in gases state

(c) atoms liquid state (d) molecules liquid state

Q131.A discharge takes place in a tube containing carbondioxide or ammonia emits, _____ specturm.

(a) continuous (b) band (c) line (d) absorption

Q132.The average energy density of a microwave is _____.

(a) $\frac{B}{\mu_o}$ (b) $\frac{B^2}{\mu_n}$ (c) $\frac{B^2}{\varepsilon_o}$ (d) $\frac{B}{\varepsilon}$

Q133.The momentum delivered to the surface by an electromagnetic wave is _____.

(a) $\frac{U}{c}$ (b) $\frac{U}{2c}$ (c) $\frac{2U}{c}$ (d) Uc

Q134.Name the EM waves used for studying molecular structure and also in forensic investigations:

(a) UV rays (b) Gamma rays (c) X-rays (d) IR rays

Q135.The unit of permittivity is _____.

(a) $C^2\ N^{-1}\ m^{-2}$ (b) $N\ m^2\ C^{-2}$ (c) $H\ m^{-1}$ (d) $N\ C^{-2}\ m^{-2}$

Q136.Maxwell's modified form of Ampere's circuital law is _____.

(a) $\oint \vec{B} \cdot \vec{ds} = 0$ (b) $\oint \vec{B} \cdot \vec{dl} = \mu_0 I$ (c) $\oint \vec{B} \cdot \vec{dl} = \mu_0 I + \frac{1}{\varepsilon_0}\frac{dq}{dt}$

(d) $\oint_l \vec{B} \cdot \vec{dl} = \mu_0 i_c + \mu_0 \varepsilon_0 \frac{d\phi_E}{dt}$

Q137. An e.m. wave is propagating in a medium with a velocity $\vec{v} = v\hat{i}$. The instantaneous oscillating electric field of this e.m. wave is along + y-axis, then the direction of oscillating magnetic field of the e.m. wave will be along _____.

(a) –y direction (b) –x direction (c) +z direction (d) –z direction

Q138. Fraunhofer lines are an example of _____ spectrum.

(a) line emission (b) line absorption (c) band emission

(d) band absorption

Q139. Match List-I with List-II

List-I (Electromagnetic waves)	List-II (Wavelength)
(a) AM radio waves	(i) 10^{-10} m
(b) Microwaves	(ii) 10^{2} m
(c) Infrared radiations	(iii) 10^{-2} m
(d) X-rays	(iv) 10^{-4} m

Choose the correct answer from the options given below

(a) (a) - (iv), (b) - (iii), (c) - (ii), (d) - (i)

(b) (a) - (iii), (b) - (ii), (c) - (i), (d) - (iv)

(c) (a) - (iii), (b) - (iv), (c) - (ii), (d) - (i)

(d) (a) - (ii), (b) - (iii), (c) - (iv), (d) - (i)

Q140. When light propagates through a material medium of relative permittivity ε_r and relative permeability μ_r, the velocity of light, v is given by (c-velocity of light in vacuum)

(a) v = c (b) $V = \sqrt{\frac{\mu_r}{\varepsilon_r}}$ (c) $V = \sqrt{\frac{\varepsilon_r}{\mu_r}}$ (d) $v = \frac{c}{\sqrt{\varepsilon_r \mu_r}}$

Q141. Charging current for a capacitor is 0.2 A, find the displacement current.

(a) zero (b) 0.2 A (c) 0.4 A (d) 0.1 A

Q142. Electromagnetic waves are

(a) Mechanical waves only (b) Longitudinal waves only

(c) Both mechanical and longitudinal

(d) Transverse but non - mechanical

Q143. The dimension of $\frac{1}{\mu\varepsilon}$ is

(a) $[L^{-2}T^{-2}]$ (b) $[LT^{-1}]$ (c) $[L^{2}T^{2}]$ (d) $[L^{2}T^{-2}]$

Q144. The average energy density of electromagnetic wave is

(a) $\frac{1}{2}\epsilon_0 E$ (b) $\frac{1}{2}\epsilon_0 E^2$ (c) $\frac{1}{4}\epsilon_0 E^2$ (d) $\frac{1}{4}\epsilon_0 E$

Q145. The relative magnetic permeability of the medium is 2.5 and the relative electrical permittivity of the medium is 2.25. Compute the refractive index of the medium.

Q146. Compute the speed of the electromagnetic wave in a medium if the amplitude of electric and magnetic fields are 3×10^4 N C^{-1} and 2×10^{-4} T, respectively.

Q147. What is displacement current?

Q148. What are electromagnetic waves?

Q149. Write down the integral form of modified Ampere's circuital law.

Q150. Explain the concept of intensity of electromagnetic waves.

Q151. What is meant by Fraunhofer lines?

Q152. Consider a parallel plate capacitor whose plates are closely spaced. Let R be the radius of the plates and the current in the wire connected to the plates is 5 A, calculate the displacement current through the surface passing between the plates by directly calculating the rate of change of flux of electric field through the surface.

Q153. A transmitter consists of LC circuit with an inductance of 1 μH and a capacitance of 1 μF. What is the wavelength of the electromagnetic waves it emits?

Q154. Write the uses of Radio waves.

Q155. Write the uses of Micro waves.

Q156. (i) How is the speed of Electromagnetic waves in vacuum determined by the electric and magnetic fields? and
(ii) Do Electromagnetic waves carry energy and momentum?

Q157. (i) In which situation is there a displacement current but no conduction current?
(ii) Find the displacement current across the plate of the capacitor whose charging current is 0.25 A.

Q158. Arrange the Electromagnetic waves in order of
(i) increasing frequency
(ii) decreasing wavelength.

Q159. Why are Infrared radiation referred to as heatwaves? Name the radiations, which are next to these radiation having
(i) shorter λ
(ii) longer λ.

Q160. Which part of the Electromagnetic spetrum spectrum is used in operating a RADAR and why?

Q161. Which part of Electromagnetic is absorbed from sunlight by ozone layer?
(i) Write its source and
(ii) mention its uses.

Q162. Draw a diagram depicting oscillating electric and magnetic field of an electromagnetic wave.

Q163. What is the orgin of displacement currtent?

Q164. Write notes on Gauss' law in magnetism.

Q165. Give two uses each of
(i) IR radiation,
(ii) Microwaves and
(iii) UV radiation.

Q166. Write notes on Ampere-Maxwell law.

Q167. Why are e.m. waves non-mechanical?

Q168. What is the ratio velocities of the microwaves and radio waves?

Q169. How are electromagnetic waves classified?

Q170. What is an emission spectrum?

Q171. What is meant by absorption spectrum?

Q172. What is gravitational waves? How are they produced?

Q173. What are the types of spectrum?

Q174. Consider a parallel plate capacitor which is connected to an 230 V RMS value and 50 Hz frequency. If the separation distance between the plates of the capacitor and area of the plates are 1 mm and 20 cm^2 respectively. Calculate the displacement current at t = 1 s.

Q175. A magnetron in a microwave oven emits electromagnetic waves (em waves) with frequency f = 2450 MHz. What magnetic field strength is required for electrons to move in circular paths with this frequency?

Q176. A pulse of light of duration 10^{-6} s is absorbed completely by a small object initially at rest. If the power of the pulse is 60×10^{-3} W. Calculate the final momentum of the object.

Q177. Let an electromagnetic wave propagate along the x-direction, the magnetic field oscillates at a frequency of 10^{10} Hz and has an amplitude of 10^{-5} T, acting along the y-direction. Then, compute the wavelength of the wave. Also write down the expression for electric field in this case.

Q178. If the relative permeability and relative permittivity of a medium are 1.0 and 2.25 respectively, find the speed of the electromagnetic wave in this medium.

Q179. Write short notes on
(a) microwaves
(b) X - rays
(c) Radio waves
(d) Visible spectrum

Q180. Discuss briefly the experiment conducted by Hertz to produce and detect electromagnetic spectrum.

Q181. Write an expression for the momentum of Electromagnetic wave.

Q182. Write the uses of Infrared radiation

Q183. Write the frequency source of production and uses of Ultraviolet radiation.

Q184. Write the production of gamma rays and mention its properties and uses.

Q185. The charge on a parallel plate capacitor varies as $q = q_o \cos 2\pi\gamma t$. The plates are very large and close together. (area - A.

separation - d) find the displacement current through the capacitor?

Q186. A variable frequency ac source is connected to capacitor. How will the displacement current change with decrease in frequency.

Q187. How does Ampere - Maxwell law expalain the flux of current trough a capacitor when it is being charged by a battery? write the expression for the displacement current in terms of the rate of change of electric flux.

Q188. Write the generalized expression for Ampere's circuital law in terms of I_c & I_d. Mention the situation when there is
(i) only conduction current &no displacement current (I_d).
(ii) only I_d & no I_c.

Q189. Identify the Electromagnetic waves whose wavelength vary as
(a) 10^{-12} m to 10^{-8} m
(b) 10^{-4} m and write their uses.

Q190. Name the parts of Electromagnetic spectrum which is
(i) used to destroy becteria.
(ii) produced by where is a sudden deceleration of high speed electrons.
(iii) used in food industry.

Q191. Identify the following Electromagnetic radiations
(a) 10^{9} Hz
(b) 10^{11} Hz. Give one application of each.

Q192. Discuss the Hertz experiment.

Q193. What are Fraunhofer lines? How are they useful in the identification of elements present in the Sun?

Q194. Explain the concept of intensity of electromagnetic waves.

Q195. Explain Faraday's law of electromagnetic induction.

Q196. Obtain an expression for energy density.

Q197. Write short note on Poynting vector.

Q198. If μ_E is the average energy density of the electric field $\vec{E}$ associated with an electromagnetic Wave, then calculate the

average energy density of the magnetic field μ_B.

Q199. In an electromagnetic wave in free space, the root mean square value of the electric field is 6V/m, then calculate the peak value of magnetic field.

Q200. An electric charge is oscillating with a frequency of 100 Hz. Calculate the wavelength of electromagnetic wave generated by it.

Q201. Hydrogen atom emits a radius wave having wavelength of 21 km. Calculate the. energy of the emitted wave by it.

Q202. The frequency of a ratio station is in the range from 7.5 MHz to 12 MHz band. Calculate the corresponding wavelength band.

Q203. A medium has electric constant 2.25 and relative permeability 4. Calculate the velocity of an electromagnetic wave in the medium.

Q204. If the oscillating electric field is a plane electromagnetic wave is given by E_2 = 1800 sin (200 πx + 3 x 10^{10}t) V/ m^2 . Then find the expression for the oscillating magnetic field.

Q205. If the energy of an electromagnetic wave is of the order of 15 ke V, determine the wave that emits this spectrum.

Q206. The electric field associated with an electromagnetic wave is $E = -\hat{i}40\cos\left(kz - 6\times10^{8}t\right)$ where E is in V/m Z in meter and t in sec. Calculate the value of wave factor k.

Q207. Height with an energy flux of 18W/cm^2 falls on a surface of area 20 cm^2. Calculate the average force exerted on the surface during a span of 30 minutes.

Q208. Explain band absorbtion spectrum?

Q209. what is spectrum?

Q210. Write down the properties of electromagnetic waves. (ANY SIX)

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5 Marks 24 x 5 = 120

Q211. Write down Maxwell equations in integral form.

Q212. Explain the Maxwell's modification of Ampere's circuital law.

Q213. Write down the properties of electromagnetic waves.

Q214. Discuss the source of electromagnetic waves.

Q215. Explain the types of emission spectrum.

Q216. Explain the types of absorption spectrum.

Q217. Show how to generalize Ampere's circuital law to include the term due to displacement current?

Q218. A parallel plate capacitor is charged by an external ac source straight the displacement current inside the capacitor is the same as the current charging the capacitor.

Q219. In an Electromagnetic wave propagating along the X - direction, the magnetic field oscillates at a frequency. 5×10^8 Hz and has an amplitude of 10^{-7} tesla, acting along the Y-direction.
(i) What is the wavelength of the wave?
(ii) Write the expression representing the corresponding oscillating electric field.

Q220. The oscillating magnetic field in a plane Electromagnetic wave is given by
$B = (8 \times 10^{-6}) \sin (2 \times 10^{11} t + 300 \pi x)$ T
(i) Calculate the λ of Electromagnetic wave.
(ii) Find the amplitude of electric field.

Q221. In a plane Electromagnetic wave, the electric field oscillates sinusoidally at a frequency of 1.5×10^{10}Hz with & an amplitude of 36 Vm^{-1}.
(i) What is the wavelength of a wave?
(ii) What the amplitude of the oscillating magnetic field?
(iii) Straight the average energy density of the electric field $\left(\vec{E}\right)$, is equal to average energy density of the magnetic field $\left(\vec{B}\right)$

Q222. The magnetic field amplitude of an Electromagnetic wave is 1.6×10^{-7} T. If the frequency is 30 MHz. determine electric field, any velocity K and λ.

Q223. In an electric circuit, there is a capacitor of reactance 100 Ω connected across the source of 220 V, find the displacement current.

Q224. In which way you can establish an instantaneous displacement current of 1.0 A in the space between the parallel plates of 1μf capacitor?

Q225. An electromagnetic wave is traveling in vacuum with a speed 3×10^8 m/s. find its velocity in a medium having relative electric and magnetic permeability 2 and 1 respectively.

Q226. A plane Electromagnetic wave travels in vacuum along z - direction. What can you say about the directions of electric and magnetic field vectors? If the frequency of the wave is 30 MHz. What is its wavelength?

Q227. About 5 % of the power of a 100 W light bulb is connected to visible radiation. What is the average intensity of visible radiation at the distance of 1m from the bulb?

Q228. Use the formula $E = h\gamma$ (for energy of a quantum of radiation photon) and obtain the photon energy in units of ev for different parts of the Electromagnetic spectrum. In what ways are the different scales of photon energies that you obtain related to the sources of Electromagnetic radiation?

Q229. Explain the importance of Maxwell's correction.

Q230. Explain the method of generation of magnetic field by changing electric field.

Q231. Explain briefly. a) Ultra violet radiation b) Infra red radiation c) Gamma rays.

Q232. write down the properties of EM waves.

Q233. Explain in detail the emission spectra and absorption spectra.

Q234. Write down Maxwell equations in integral form. (EXPLAIN ANY 3 EQUATION)

Match the following 8 x 1 = 8

Q235. Radio waves

Q236. Micro waves

Q237. I - R Radiation

Q238.U- V Radiation

Q239.Continuous Emission spectra

Q240.Band Emission spectra of H, gas

Q241.Line Absorption spectra

Q242.Fraunhofer Lines

Assertion and reason 1 x 2 = 2

Q243.**Assertion:** Electromagnetic waves carries not only energy and momentum but also angular momentum.
Reason: Electromagnetic waves cannot be polarized.
Codes:
(a) Assertion and Reason are correct and Reason is the correct explanation of Assertion.
(b) Assertion and Reason are true but Reason is the false explanation of the Assertion.
(c) Assertion is true but Reason is false.
(d) Assertion is false but Reason is true.

Odd one out 2 x 2 = 4

Q244.(a) Radio waves
(b) Microwaves
(c) Visible Light waves
(d) Ultrasonic waves

Q245.(a) Interference
(b) Polarisation
(c) Diffraction
(d) Photoelectric effect

Find out the wrong pair 1 x 2 = 2

Q246.a. Ampere - maxwell's law $\oint \vec{B}.\vec{dl}$

b. Faraday's law $\oint \vec{E}.\vec{dl}$

c. Gauss's law $\oint \vec{E}.\vec{dA}$

d. Ohm's law $\oint \vec{B}.\vec{dA}$
Which one is incorrect pair?

Choose the correct pair 1 x 1 = 1

Q247.a. Gamma rays - Structure of Crystals
b. X - ways - Structure of Nucleus
c. U - V rays - Structure of Atoms
d. Microwaves - Radar communication
Which one is correct pair?

Choose the Correct or Incorrect Statement 2 x 1 = 2

Q248.(I) : Electromagnetic wave is a mechanical wave.
(II) : The energy crossing per unit area per unit time and perpendicular to the direction of propagation of electromagnetic wave is called intensity.
Which one is correct?
(a) I only
(b) II only
(c) both are correct
(d) None

Q249.(I) : $\mu = \sqrt{\frac{\mu_r}{\varepsilon_r}}$ Where μ → refractive index of the medium, μ_r→relative permeability of the medium, ε_r → relative permittivity of the medium.
(II) : By Ampere's circuital law. $\oint_{s_i} \vec{B}.\vec{dl} = \mu_0 I_c$ Which one is incorrect?
(a) I only
(b) II only
(c) both are correct
(d) None
