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PHYSICS

COMPULSORY QUESTIONS

COLLECTED FROM ALL PREVIOUS YEAR QUESTION PAPERS

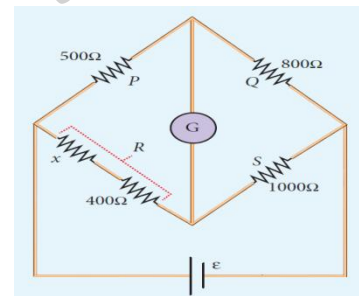## MR. SS PRITHVI

Getting in:

- **It gives me great pride and pleasure in bringing to you, this wonderful booklet.**
- **The compulsory questions are collected from almost all the available previous years' question papers, which will give an idea about to study the topics which will help them to tackle these compulsory questions.**
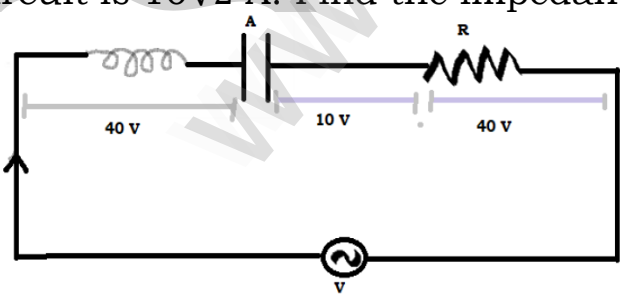
-SS PRITHVI, FOUNDER- PRIT~EDUCATION.

FIRST MID TERM

1	The electric field lines will never intersect. Justify.
2	Two electric bulbs marked 20 W – 220 V and 100 W – 220 V are connected in series to 440 V supply. Which bulb will get fused?
3	A potential difference across 24 ohm resistor is 12 V. what is the current through the resistor? {repeated}
4	A sample of HCl gas is placed in the uniform electric field of magnitude 3 x 10^{-4} NC^{-1}. The dipole moment of each HCl molecule is 3.4 x 10^{-30} cm.calculate the maximum torque experienced by each HCl molecule. {repeated}
5	If the resistance of coil is 3 Ω at 20° C and a = 0.004/ ^{0}C then determine its resistance at 100°C. {repeated}
6	A coil of a tangent galvanometer of diameter 0.24 m has 100 turns. If the horizontal component of Earth's magnetic field is 25 × 10^{-6} T then, calculate the current which gives a deflection of 60^0. {repeated}
7	Why is it safer to sit inside a bus during lightning than In oprn air or under a tree? {Repeated}
8	Determine the number of electrons flowing per second through a conductor, when a current of 32 A flows through it.
9	A parallel plate capacitor has square plates of side 5 cm and separated by a distance of 1 mm. (a) Calculate the capacitance of this capacitor. {repeated}
10	Define drift velocity. Write its unit.
11	The resistance of nichrome wire at 0 degree celsius is 10 ohm. If its temperature coefficient of esistance is 0.004/degree C, Find its resistance at boiling point of water.comment on the result.
12	Resistance of a material at 20°C and 40°C are 45 Ω and 85 Ω respectively. Find its temperature coefficient of resistivity.
13	Derive an expression for energy stored in capacitor.

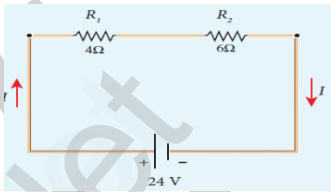| 14	The temperature coefficient of resistance of a wire is 0.00125 per °C. At 20°C, its resistance is 1 Ohm. The resistance of the wire will be 2 ohm at is what ? {asked frm book back 1 mrk question}{repeated}
15	In a meter bridge experiment, the value of resistance in the resistance box connected in the right gap is 10 Ohm. The balancing length is l_1= 55 cm. Find the value of unknown resistance. {repeated}
16	How many 160 ohm resistor in parallel are required to carry out a current of 5A on a 100 V line ?
17	A 3.0 m wire carrying a current of 10A is placed inside a solenoid perpendicular to its axis. The magnetic field inside the solenoid is given to the 0.277 T. what is the magnetic force on the wire ?
18	Calculate the no of electrons in one coulomb of negative charge.
19	Consider a point charge +q placed at the origin and another point charge -2q placed at a distance of 9 m from the charge +q. Determine the point between the two charges at which electric potential is zero. {repeated}
20	What is the value of x when the Wheatstone's network is balanced? P = 500 Ω, Q = 800 Ω, R = x+ 400, S = 1000 Ω {EXAMPLE 2.24}

QUARTERLY

1	A wire of length l carrying a current I along the Y direction is kept in a magnetic field given by $\vec{B} = \dfrac{\beta}{\sqrt{3}}(\hat{i} + \hat{j} + \hat{k})T$. Calculate the magnitude of Lorentz force acting on the wire.{ book back 1 m r k }
2	An object is placed at a certain distance from a convex lens of focal length 20 cm. Find the object distance if the image obtained is magnified 4 times.
3	The angle of minimum deviation for an equilateral prism is 37o. Find the refractive index of the material of the prism.
4	A coil of a tangent galvanometer of diameter 0.24 m has 100 turns. If the horizontal component of Earth's magnetic field is 25×10^{-6} T then, calculate the current which gives a deflection of 60^0.
5	In a meter bridge experiment, the value of resistance in the resistance

	box connected in the right gap is 10 Ohm. The balancing length is l_1= 55 cm. Find the value of unknown resistance. {repeated}
6	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.
7	A parallel plate capacitor filled with mica having εr = 5 is connected to a 10 V battery. The area of each parallel plate is 6 cm2 and separation distance is 6 mm. (a) Find the capacitance and stored charge. (b) After the capacitor is fully charged, the battery is disconnected and the dielectric is removed carefully. Calculate the new values of capacitance, stored energy and charge.
8	The equation for an alternating current is given by i = 77 sin 314t. Find the peak current, frequency, time period and instantaneous value of current at t = 2 ms. {REPEATED}
9	In a Wheatstone's bridge P = 100 Ω, Q = 1000 Ω and R = 40 Ω. If the galvanometer shows zero deflection, determine the value of S.
10	Compute the speed of thr electromagnetic wave in a medium if the amplitude of electric and magnetic fields are 3 x 10^4 NC^{-1} and 2 x 10^{-4} T respectively.
11	Find the heat energy produced in aresistance of 10 OHM when 5 A current flows through it for 5 minutes.
12	Dielectric strength of air is 3 × 106 V m–1. Suppose the radius of a hollow sphere in the Van de Graff generator is R = 0.5 m, calculate the maximum potential difference created by this Van de Graaff generator.
13	An inductor of inductance L, a capacitor of capacitance C and a resistor of R are connected in series to AC source of potential difference V volt as shown in the figure.Potential difference across L,C and R is 40V, 10V and 40V respectively. The amplitude of current flowing through LCR series circuit is 10√2 A. Find the impedance of the circuit.
14	Why are dish antennas curved ?
15	The self-inductance of an air-core solenoid is 4.8 mH. If its core is replaced by iron core, then its self-inductance becomes 1.8 H. Find out the relative permeability of iron.

16	An ideal transformer has 460 and 40,000 turns in the primary and secondary coils respectively. Find the voltage developed per turn of the secondary if the transformer is connected to a 230 V AC mains. The secondary is given to a load of resistance 104 O. Calculate the power delivered to the load.
17	An electron moving perpendicular to a uniform magnetic field 0.500 T undergoes circular motion of radius 2.50 mm. What is the speed of electron?
18	From the given circuit, Find i) Equivalent emf of the combination ii) Equivalent internal resistance iii) Total current iv) Potential difference across external resistance v) Potential difference across each cell
19	A stepdown transformer connected to a man supply of 220V is used to operate 11V.88W lamp. Calculate voltage transformation ratio.
20	A coil of a tangent galvanometer of diameter 0.24 m has 100 turns. If the horizontal component of Earth's magnetic field is 25×10^{-6} T then, calculate the current which gives a deflection of 60^0.
21	A series RLC circuit which resonates at 400 kHz has 80 µH inductor, 2000 pF capacitor and 50 OHM resistor. Calculate (i) Q-factor of the circuit (ii) the new value of capacitance when the value of inductance is doubled and (iii) the new Q-factor.
22	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.
23	Where the object to be placed to form image as 4 times of the object for the convex lens having focal length 20 cm.
24	The magnetic fluse passing through a coil perpendicular to its plane is function of time and is given by $\varphi = (2t^3+4t^2+8t+8)$wb. If the resistance of the cell is 5 ohm, determine the induced current through the coil at a time t=3 second.
25	The relative magnetic permeability of the medium is 2.5 the relative electrical permitivity of the medium is 2.25. Compute the refractive index of the medium.
26	A copper wire of cross-sectional area 0.5 mm2 carries a current of 0.2 A. If the free electron density of copper is 8.4×10^{28} m^{-3} then compute the drift velocity of free electrons. {repeated}
27	Consider a point charge $+q$ placed at the origin and another point charge $-2q$ placed at a distance of 9 m from the charge $+q$. Determine the point between the two charges at which electric potential is zero. {repeated}
28	A cell supplies a current of 0.9 A through a 2 Ω resistor and a current of 0.3 A through a 7 Ω resistor. Calculate the internal resistance of the cell.
29	Pure water has refractive index 1.33. What is the speed of light through

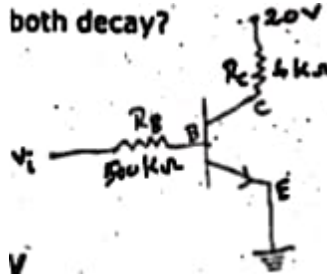|	it?
30	A parallel plate capacitor has square plates of side 5cm and separated by a distance of 1mm. Calculate the capacitance of this capacitor.
31	Light travels from air into a glass slab of thickness 50 cm and refractive index 1.5. What is the time taken by the light to travel through the glass slab?
32	Calculate the equivalent resistance for the circuit which is connected to 24 V battery and also find the potential difference across each resistors in the circuit.
33	In cyclotron the velocity of the revolving ions in the spiral path is gradually increased along with the radius of the path. Give the reason for it.
34	Find the impedance of a series *RLC* circuit if the inductive reactance, capacitive reactance and resistance are 184 Ω, 144 Ω and 30 Ω respectively. Also calculate the phase angle between voltage and current.

2ᴺᴰ MID TERM

1	Calculate the cut off wavelength of x rays accelerating potential 20,000V
2	Calculate the time required for 60 % of a sample of radan undergoes decay. T ½ of radon = 3.8 days.
3	Calculate the distance upto which ray optics is a good approximation for light of wavelength 500 nm falls on an aperture of width 0.5 nm.
4	Calculate the cut off wavelength and cut off frequency of x rays from an x-ray tube of accelerating potential 20,000V.
5	The radius of the 5th orbit of hydrogen atom is 13.25 Å. Calculate the de broglie wavelength of the electron orbitting in the 5th orbit. [repeated]
6	The diffraction grating consists of 400 slits per cm. it is illuminated by a monochromatic light. The second order diffraction maximum is produced at an angle of 30 degree. What is the wavelength of the light used ?
7	A radioactive sample h has a half-life of 10 minutes. Calculate its mean life.
8	The wavelength of light is 450 nm. How much phase it will differ for a path of 3 nm ?
9	Two light sources with amplitude 5 units and 3 units respectively- interface with each other. Calculate the ratio of maximum and minimum

	intensities.
10	How many photons per second emanate from a 50mW laser of 640 nm ?
11	A microscope has an objective an eyepiece of focal length 5cm and 50cm respectively with tube length 30 cm. calculate the magnification (m) at near point.
12	An object is placed in front of a concave mirror of focal length 20 cm. The image formed is three times the size of the object. Calculate two possible distances of the object from the mirror.
13	What is myopia ? what is it's remedy ?
14	A radiation of wavelength 300 nm is incident on a silver surface. Will photoelectrons be observed? [work function of silver = 4.7 eV] [repeated]
15	A proton and a deuteron have the same velocity. What is the ratio of their de-broglie wavelengths ?
16	Give the reason for colourful appearance on the read/writable side of a CD.
17	Calculate the distance upto which ray optics is a good approximation for light of wavelength 500 nm falls on an aperture of width 0.5 mm.
18	A microscope has an objective and eyepiece of focal lengths 5 cm and 50 cm respectively with tube length 30 cm. Find the magnification of the microscope in the (a) near point and (b) normal focusing.
19	Differentiate nuclear fission and nuclear fusion.
20	Calculate the number of nuclei of carbon-14 undecayed after 22,920 years if the initial number of carbon-14 atoms is 10,000. The half-life of carbon-14 is 5730 years.
21	Half lives of two radioactive elements A and B are 20 minutes and 40 minutes respectively. Initially, the samples have equal number of nuclei. Calculate the ratio of decayed numbers of A and B nuclei after 80 minutes.

HALF-YEARLY

1	A spherical stone and a spherical metallic ball of same size and mass are dropped from the same height. Which one, a stone or a metal ball, will reach the Earth's surface first? Justify your answer. Assume that there is no air friction.
2	A dipole is formed by two charges $5 \mu C$ and $-5 \mu C$ at a distance of 8mm. find the electric field at A). a point 25 cm away from center of dipole along its axial line. B). a point 20 cm away from the center of dipole along its

	equatorial line.
3	Calculate the cut off wavelength of x rays accelerating potential 20,000V.
4	What is the focal length of the combination if the lenses of focal lengths – 70 cm and 150 cm are in contact? What is the power of the combination?
5	Give the symbolic representation of alpha decay and beta decay.
6	Obtain an expression for drift velocity.
7	Calculate the energies of the photons of x- rays wavelength 0.1 nm.
8	Two resistors when connected in series and parallel, their equivalent resistances are 15 Ω and 56/15 Ω respectively. Find the values of the resistances.
9	Two materials X and Y are magnetised whose values of intensity of magnetization are 500 Am^{-1} and 2000 Am^{-1} respectively. If the magnetizing field is 1000 Am^{-1}, then which one among the sematerials can be magnetized?
10	UV light of wavelength 1800 A° is incident on a lithium surface whosethreshold wavelength 4965 A°. Calculate the maximumKinetic energy of the electron emitted in eV.
11	Determine the wavelength of light emitted from LED which is made up of GaAsP semiconductor whose forbidden energy gap is 1.875 eV. Mention the colour of the light emitted. (Take h=6.6 X 10^{-34} JS)
12	both decay? In the circuit shown in the figure; the input voltage V_i = 20V, V_{BE} = 0V and V_{CE} = 0V and I_B, I_C and β.
13	The self - inductance of an air core solenoid is 4.8mH. If its core is replaced by iron core, then its self - inductance becomes 1.8H. Find out the relative permeability of iron.

14	Calculate the time required for 60% of a sample of radon undergo decay. Given $T_{1/2}$ of radon = 3.8 days. **[repeated]**
15	If the resistance of a coil is 3Ω at 20°C. Find the resistance at 100°C. (Given $\alpha = 0.004$/°C)
16	A proton and an electron have same de Broglie wavelength. Which of them moves faster and which possesses more kinetic energy?
17	Prove the Boolean identity AC + ABC = AC and give its circuit description.
18	Let the magnetic moment of a bar magnet be $\vec{P}_m$ whose magnetic length is d = 2l and pole strength is q_m. Compute the magnetic moment of the bar magnet when it is cut into two pieces (a) along its length (b) perpendicular to its length.
19	The equation for an alternating current is given by i = 77 sin 314 t. Find the peak current, frequency of current.
20	A monochromatic light of wavelength of 500 nm strikes a grating and produces fourth order maximum at angle of 30°. Find the number of slits per centimetre
21	Compate the current in the wire if a charge of 120C is flouring through a copper wire in 1 minute ?
23	Find the power of the lens whose focal length is 150 cm ? **[repeated]**
24	Resistance of a material at 20°C and 40°C are 45 and 85 respectively. Find its temperature coefficient of resistivity.
25	Find the ratio of the intensities of lights with wavelength 500 nm and 300nm which undergo Rayleigh scattering.
26	

	i) Why does sky appear blue? ii) What is the reason for reddish appearance of sky during sunset and sunrise?
27	The self-inductance of an air-core solenoid is 4.8 mH. If its core is replaced by iron core, then its self- inductance becomes 1.8 H. Find out the relative permeability of iron.

HALF YEARLY – DEC-2023

An electronics hobbyist is building a radio which requires 150 Ω in her circuit. But she has only 220 Ω, 79 Ω and 92 Ω resistors available. How can she connect the available resistors to get the desired value of resistance?

A proton and an electron have same de Broglie wavelength. Which of them moves faster and which possesses more Kinetic energy?

A cell supplies a current of 0.9A through a 22 resistor and a current of 0.3A through a 72 ohm resistor. Calculate the internal resistance of the cell.

Find the impedance of a series RLC circuit if the inductive reactance, capacitance reactance and resistance are 184ohm, 144ohm, and 30 respectively. Also calculate the phase angle between voltage and current. **[repeated]**

The radius of the 5th orbit of hydrogen atom is 13.25 Å. Calculate the de broglie wavelength of the electron orbitting in the 5th orbit. **[repeated]**

Distinguish between step up and step down transformer.

A copper wire of cross-sectional area 0.5 mm2 carries a current of 0.2 A. If the free electron density of copper is 8.4×10^{28} m–3 then compute the drift velocity of free electrons.

A copper wire of 10^{-6} m² area of cross section, carries a current of 2A. Calculate the current density.

Show that the moss of radium $\left(^{226}_{88}Ra\right)$ with an activity of 1 curie is almost a gram.
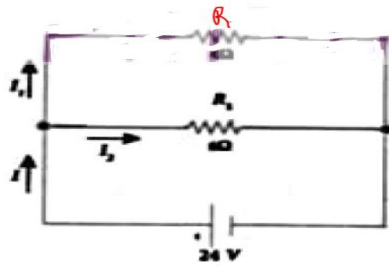
Given $T_{1/2}$ = 1600 years.

If the resistance of coil is 10Ω at 0°C and α = 0.004 / °C then, determine the resistance at 100°C.

$_{92}U^{235}$ nucleus emits 2α particles, 3β particles and 2γ particles. What is the resulting atomic number and mass number?

Calculate the number of nuclei of Carbon-14 undecayed after 22,920 years, if the initial number of Carbon-14 atoms is 10,000. (The half-life of Carbon-14 is 5730 years)

The wavelength of Light is 450 nm. How much phase will differ for a path of 3mm?

The resistance of a wire is 200 ohm. What will be new resistance it it is stretched uniformly 8 times of its original length?

Pure water has refractive index 1.33. what will be the speed of light through it ? **[repeated]**

An object is placed at a certain distance from a convex lens of focal length 20 cm. Find the object distance if the image obtained is magnified 4 times.

An electric power of 2 MW is transmitted to a place through transmission lines of total resistance R=40 Qand voltage V= 100 KV. Calculate the percentage of power loss.

REVISION 1 & 2

1	Consider a point charge +q placed at the origin and another point charge -2q placed at a distance of 9 m from the charge +q. Determine the point between the two charges at which electric potential is zero. {repeated}
2	An electron is accelerated through a potential difference of 81V. What is the de Broglie wavelength associated with it? To which part of electromagnetic spectrum does this wavelength correspond?
3	Calculate the cut-off wavelength and cutoff frequency of x-rays from an x-ray tube of accelerating potential 20,000 V. ?**[repeated]**

4	The resistance of a moving coil galvanometer is made twice its orignal value in order to increase current sensitivity by 50%. Find the percentage change in voltage sensitivity for a parallel plate capacitor.
5	Find the power of the lens whose focal length is 150 cm ? **[repeated]**
6	In a transistor connected in the common base configuration, _=095., *Im AE*=1. Calculate the values of *IC* and *IB*.
7	The radius of the 5th orbit of hydrogen atom is 13.25 Å. Calculate the de broglie wavelength of the electron orbitting in the 5th orbit.[repeated]
8	Calculate the distance upto which ray optics is a good approximation for light of wavelength 500 nm falls on an aperture of width 0.5 mm.[repeated]
9	In a nuclear fission 0.1% mass is converted into energy calculate the energy released by the fission of 1kg mass.
10	The self-inductance of an air core solenoid is 4.8 mH. If its core is replaced by iron core, then self-inductance becomes 1.8H. Find out the relative permeability of iron. **[repeated]**
11	Determine the number of electrons flowing per second through a conductor, when a current of 32A flows through it. **[repeated]**
12	Calculate the electric flux through the rectangle of sides 5 cm and 10 cm kept in the region of a uniform electric field 100 NC−1. The angle θ is 60o. If θ becomes zero, what is the electric flux?
13	An electric power of 2 MW is transmitted to a place through transmission lines of total resistance R = 40 Ω, at two different voltages. One is lower voltage (10 kV) and the other is higher (100 kV).Calculate and compare power losses in these two cases.
14	Find the (i) angular momentum (ii) velocity of the electron revolving in the 5th orbit of hydrogen atom. (h = 6.6 × 10^{-34} Js, m = 9.1 × 10^{-31} kg).
15	The equation for an alternating current is given by i = 77 sin 314t. find the peak current, frequency, time period and instantaneous value of current at t = 2 ms.

16	Write down the properties of electromagnetic waves.
17	Simplify the Boolean identity AC+ABC=AC
18	What is the focal length of the combination if the lenses of focal lengths –70 cm and 150 cm are in contact? What is the power of the combination?
	Define ampere. Light travelling through transparent oil enters into glass of refractive index 1.5. If the refractive index of glass with respect to the oil is 1.25. What is refractive index of the oil.
19	4965A. Determine the maximum ... In Nuclear fission reaction what is the total energy released in 100th step in Kwh. Assume number of nuclei undergo present is 2.5 x 10^{40}
20	Light of frequency 7.21 x 10^{14} Hz is incident on a metal surface. Electrons with maximum speed of 6.0 x 10^{5} m/s are ejected from the surface. What is the threshold frequency for photoemission of electrons?
21	In a transistor connected in the common base configuration α =0.95, I_E = 1 mA.Calculate I_c and I_B.
22	Draw the circuit diagram of half wave rectifier and explain its working.
23	A 500 µH inductor, $\frac{80}{\pi^2}$ pF capacitor and 628 Ω resistor are connected to form a series RLC circuit. Calculate the resonant frequency of this circuit at resonance.
24	Compute the binding energy of ^4_2He nucleus using the following data. Atomic mass of Helium atom MA (He) = 4.00260 u and that of hydrogen atom, mH = 1.00785 u.

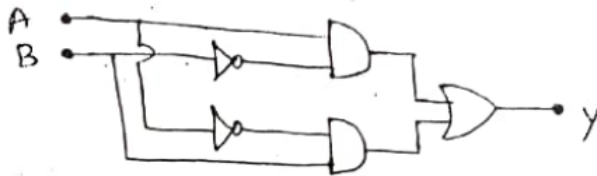| 25	33. A 400mH coil of negligible resistance is connected to an AC circuit in which an effective current of 6mA is flowing . Find out the voltage across the coil if the frequency is 1000Hz.
26	What is the value of x when the Wheatstone's network is balanced? P=500Ω Q=800Ω R=x +400Ω S=1000Ω
27	A monochromatic light is incident on an equilateral prism at an angle 30° and is emergent at an angle of 75°. What is the angle of deviation produced by the prism?
28	Find the heat energy produced in a resistance of 10Ω when 5A current flows through it for 5 minutes.
30	Derive an expression for the debroglie wavelength of electron.
31	A cell supplies a current of 0.9 A through a 2 Ω resistar area a current of 0.3 A through a 7 Ω resistor. calculate the internal resistance of the cell
32	Show that the mass of radium ($^{226}_{88}Ra$)with an activity of 1 curie is almost a gram. Given $T_{1/2} = 1600\ years$
33	In Nuclear fission reaction what is the total energy released in 100th step in Kwh. Assume number of nuclei undergo present is 2.5 x 10^{40}.
34	A parallel plate capacitor has square plates of side 5 cm and separated by a distance of 1mm. Calculate the capacitance of this capacitor. ($\varepsilon_n = 8.85 \times 10^{-12}\ N^{-1}m^{-2}C^2$)
35	Pure water has refractive index 1.33. what is the speed of light through it ?
36	Calculate the equivalent resistance in the following circuit and also find the values of current I, I_1 and I_2 in the given circuit.

37	Calcualte the disinteguation energy when stationary $^{232}_{92}U$ nucleus decays to thorium $^{228}_{90}Th$ with the emission of α-particle. The atomic masses are of $^{232}_{92}U$ = 232.037156U. $^{228}_{90}Th$ = 228.028741U and $^{4}_{2}He$ = 4.002603U
38	In Young's double slit experiment, 62 fringes are seen in visible region for sodium light of wavelength 5893 Å. If violet light of wavelength 4359 Å is used in place of sodium light, then what is the number of fringes seen?
39	How many photons of frequency 10^{14} Hz will make up 19.86 J of energy ?
40	A spherical conductor of radius 10 cm has a charges of 3.2×10^{-7} C distributed uniformly. Find the magnitude of electric field at a point 15 cm from the centre of the sphere.
41	Light frequency $7.21 \times 10^{14} Hz$ is incident on a metal surface. Electrons with maximum speed of 6.0×10^5 m/s are ejected from the surface. What is the threshold frequency for photo emission of electrons?
42	A ray of light strikes a glass plate at an angle 60°. If the reflected and refracted rays are perpendicular to each other, the refractive index of glass?
43	The half life of 210 Bi sample is 5 days. Calculate the decay constant.
44	Calculate the radius of $_{79}Au^{187}$ nucleus.

REVISION-2024

Prove the Boolean expression: AB + ABC = AB

A radiation of wavelength 300nm is incident on a silver surface. Will photoelectrons be observed? [work function of silver=4.7eV]

An ideal transformer has 460 and 40,000 turns in the primary and secondary coils respectively. Find the voltage developed as per turn of the secondary coil if the transformer is connected to a 230v Ac mains.

Find the impedance of a series RLC circuit, if the inductive reactance, capacitive reactance, and resistance are 184 Ω, 144 Ω and 30 Ω respectively. Also calculate the phase angle between voltage and current.

Two light sources of equal amplitudes interfere with each other. Calculate the ratio of maximum and minimum intensities.

A 500 μH inductor, $\frac{80}{\pi^2}$ pF capacitor and a 628 Ω resistor are connected to form a series RLC circuit. Calculate the resonant frequency and Q-factor of this circuit at resonance.

Calculate the number of nuclei of Carbon-14 undecayed after 22, 920 years if the initial number of Carbon-14 is atoms is 10,000. The half-life of Carbon -14 is 5730 years.

In the combination of the below gates, write the Boolean equation for output Y in terms of inputs A and B.

A sample of HCl gas is placed in a uniform electric field of magnitude 3×10^4 NC^{-1}. The dipole moment of each HCl molecule is 3.4×10^{-30} cm. Calculate the maximum torque experienced by each HCl molecule.

To resistors when connected in series and parallel, their equivalent resistances are $15\,\Omega$ and $\frac{56}{15}\,\Omega$ respectively. Find the value of resistances.

$_{92}U^{235}$ emits 2α, 3β and 2γ particles. What is resulting atomic number and mass number?

calculate the number of nuclei of carbon-14 undecayed after 22,920 years if the intial number of carbon-14 atoms is 10,000. The half life of carbon-14 is 5730 years.

Calculate the power of the lens of the spectacles needed to rectify the defect of nearsightedness for a person who could see clearly upto a distance of 1.8m.

Dielectric strength of air is 3×10^6 Vm^{-1}. Suppose the radius of a hollow sphere in the Van de Graff generator is R=0.5m. Calculate the maximum potential difference created by this Van de Graff generator.

The equation for an alternating current is given by i=77 sin 314t. Find the peak current and frequency.

Calculate the time required for 60% of a sample of radon undergo decay. Given $T_{1/2}$ of radon = 3.8 days.

In a transistor connected in the common base configuration, α = 0.95. I_E = 1mA. Calculate the values of I_C and I_B .

Calculate the time required for 60% of a sample of radon undergoes decay. ($T_{1/2}$ of radon = 3.8 days)

Compute the magnitude of the magnetic field of a long, straight wire carrying a current of 1 A at distance of 1m from it. Compare it with Earth's magnetic field.

A transmitting antenna has a height of 40 m and the height of the receiving antenna is 30 m. What is the maximum distance between them for line-of-sight communication? The radius of the earth is 6.4×10^6 m.

The angle of minimum deviation for an equilateral prism is 37°. Find the refractive index of the material of the prism.

Assuming that energy releases by the fission of a single $_{92}U^{235}$ nucleus is 200MeV, Calculate the number of fission per second required to produce 1 Watt power.

Suppose a cyclotron is operated to accelerate protons with magnetic field of strength 1 T. Calculate the frequency in which the electric field between two Dees could be reversed.

In Bohr atom model an electron in hydrogen atom having an energy of – 3.4 electron volt. Find out the angular momentum of an electron.

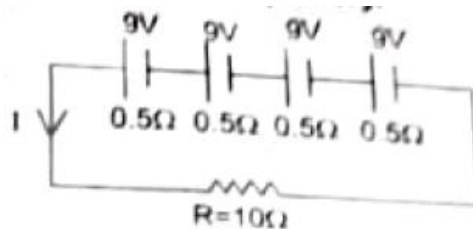|	
	Find the minimum wavelength of X-ray with 1000 kv of x-ray tube.
	Calculate the number of nuclei of Carbon -14 undecayed after 22,920 years. If the initial number of Carbon - 14 atoms is 10,000. The half-life of carbon - 14 is 5730 years.
	Resistance of Nichrome wire at 20°C is 10Ω. The temperature coefficient of resistance is 0.004/c°, calculate the resistance of wire at the boiling point of water.
	Calculate the value of angular momentum and velocity of an electron revolving in the 5th orbit of Hydrogen atom.
	Resistance of a material at 20° C and 40° C are 45 Ω and 85 Ω respectively. Find its temperature coefficient of resistivity.
	Calculate the number of nuclei of carbon-14 undecayed after 22,920 years if the initial number of carbon-14 atoms is 10,000. The half-life of carbon-14 is 5730 years.
	Suppose a cyclotron is operated to accelerate protons with magnetic field of strength 1 T. Calculate the frequency in which the electric field between two Dees could be reversed.
	In bohr atom model an electron in hydrogen atom having an energy of - 3.4 electron volt. Find out the angular momentum of an electron.
	In a transistor connection in common base configuration α = 0.95, I_E = 1 mA. Calculate the value of I_C and I_B.

Two light sources of equal amplitude interfere with each other. Calculate the ratio of maximum and minimum intensities.

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.

Compute the magnitude of the magnetic field of a long, straight wire carrying a current of 1 A at distance of 1m from it. Compare it with Earth's magnetic field.

A transmitting antenna has a height of 40 m and the height of the receiving antenna is 30 m. What is the maximum distance between them for line-of-sight communication? The radius of the earth is 6.4×10^6 m.

Find the heat energy produced in a resistance of 10Ω when 5 A current flows through it for 5 minutes.

The angle of minimum deviation for an equilateral prism is 30°. Find the refractive index of the material of the prism.

The radius of the 3rd orbit of hydrogen atom is 4.761 A°. Calculate the de Broglie wavelength of the electron orbiting in the 3rd orbit.

Find the ratio of the intensities of light with wavelength 500 nm and 300 nm which undergo Rayleigh scattering.

A capacitor of capacitance $10^2/\pi$ μF is connected across a 220V, 50 HZ A.C mains. Calculate the capacitive reactance, RMS value of current and write down the equations of voltage and current.

What is the angle at which a glass plate of refractive index 1.65 is to be kept with respect to the horizontal surface so that an unpolarised light travelling horizontal after reflection from the glass plate is found to be plane polarised?
State de-Broglie hypoth...

Dielectric strength of air is $3 \times 10^6 Vm^{-1}$. Suppose the radius of a hollow sphere in the Van de Greff generator is R=0.5 m, Calculate the maximum potential difference created by this Van de Graff generator.
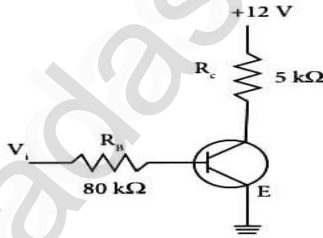
6×3=18

...Qns. 25 is compulsory.

Find the total current flow through the given circuit

9V   9V   9V   9V
0.5Ω 0.5Ω 0.5Ω 0.5Ω

R=10Ω

Distingu...
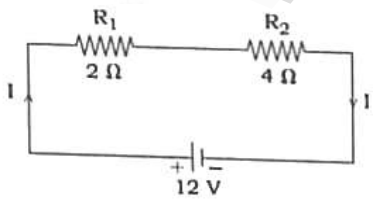Calculate the radius of $_{79}Au^{197}$

Calculate the number of nuclei of carbon-14 undecayed after 22,920 years if the initial number of carbon-14 atoms is 10,000. (The half- life of carbon -14 is 5730 years)
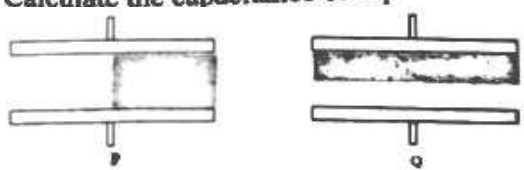
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1	Calculate the magnetic field inside a solenoid whan the number of turns is halved and length of the solenoid and the area remain the same.
2	In the circuit shown in the figure, the input voltage V_i = +5 V, V_{BE} = + 0.8 V and V_{CE} = +0.12 V. Find the values of $I_B I_C$ and β. +12 V R_c 5 kΩ V_i R_B 80 kΩ E
3	In a magnetic field of 0.05T, area of a coil changes from 101 cm² to 100 cm² without changing the resistance which is 2Ω. What is the amount of charge that flow during this period?
4	Charges of $+\dfrac{10}{3} \times 10^{-9}$ C are placed at each of the four corners of a square of side 8 cm. Find the potential at the intersection of the diagonals.
5	A spherical stone and a spherical metallic ball of same size and mass are dropped from the same height. Which one, a stone or a metal ball, will reach the earth's surface first? Justify your answer. Assume that there is no air friction.

6	A dipole is formed by two charges of 5 µC and –5 µC at a distance of 8 mm. Find the electric field at a) a point 25 cm away from center of dipole along its axial line b) a point 20 cm away from center of dipole along its equatorial line
7	Two materials X and Y are magnetised whose intensity of magnetisation are 500 Am^{-1} and 2000 Am^{-1} respectively. The magnetising field is 1000 Am^{-1}. What is the ratio between the susceptibilities of the two material ?
8	Modulation helps to reduce the antenna size in wireless communication – explain.
9	If an electric field of magnitude 570 NC^{-1} is applied in the copper wire, find the acceleration experienced by the electron.
10	What is total internal reflection? Give the condition for the total internal reflection takes place.
11	Dielectric strength of air is 4×10^6 Vm^{-1}. Suppose the radius of a hollow sphere in the Van de Graff generator is R=0.4 m, calculate the maximum potential difference created by this Van de Graff generator.
12	92U235 nucleus emits 2α particles, 3β particles and 2γ particles. What is the resulting atomic number and mass number ?
13	Find the impedance of a series RLC circuit, if the inductive reactance, capacitive reactance and resistance are 184 Ω, 144 Ω and 30 Ω respectively. Also calculate the phase angle between voltage and current.
14	Calculate the equivalent resistance for the circuit which is connected to 12 V battery and also find the potential difference across 2 Ω and 4 Ω resistors in the circuit. R$_1$ 2 Ω R$_2$ 4 Ω 12 V
15	

	Light travels from air into a glass slab of thickness 50 cm and refractive index 1.5. What is the speed of light in the glass slab and what is the time taken by the light to travel through the glass slab ?
16	If the resistance of coil is 3 Ω at 208C and α=0.004/8C then, determine its resistance at 100 degree C.
17	Calculate the amount of energy released in joules when 1 kg of 235 U 92 undergoes fission reaction.
18	The radius of the 5th orbit of hydrogen atom is 13.25 A. Calculate the de broglie wavelength of the electron orbiting in the 5th orbit. **[repeated]**
19	A coil of a tangent galvanometer of diameter 0.24m has 100 turns. If the horizontal component of Earth's Magnetic field is $25 \times 10 ^ 6$ T then, calculate the current which gives a deflection of 60°.
20	A wire of resistance 10 Ω is stretched uniformly to thrice its original length. Calculate the resistance of the stretched wire.
21	Four point charges +q, +q, −q and −q are to be arranged respectively at the four corners of a square PQRS of side r. Find the work needed to assemble this arrangement.
22	When an inductor is connected to a 230 V d.c. source, a current of 2 A passes through it. When the same inductor is connected to a 230 V, 50 Hz a.c. source, the amount of current decreases (i.e, 1 A). Why?
23	Calculate the magnetic field at the centre of a square loop which carries a current of 1.5 A, length of each loop is 50 cm.
24	A circular coil of radius 5 cm and 50 turns carries a current of 3 ampere. Find the magnetic dipole moment of the coil.
25	

	A proton and an electron have same de Broglie wavelength. Which of them moves faster and which possesses more kinetic energy?
26	What should be the velocity of the electron so that its momentum equals that of 4000 Å wavelength photon
27	Capacitors P and Q have identical cross sectional areas A and separation d. The space between the capacitors is filled with a dielectric of dielectric constant ε_r as shown in the figure. Calculate the capacitance of capacitors P and Q.
28	What is skip distance & skip zone in sky wave propagation ?
29	The light of wavelength 590nm, 596nm are used in turn to study the diffraction taking place at a single slit of aperture 2×10^{-4}m. The distance between the slit and the screen is 1.5m. Calculate the separation between the positions of first maximum of the diffraction pattern obtained in the two cases.
30	Draw the circuit diagrams of transistor in CB and CC modes.
31	What are the advantages and disadvantages of FM ?

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