## MARCH 2019

 The magnitude of electric intensity at a distance 'r' from the centre of an electric dipole along its axial line is E. The distance of the point from the centre of the electric dipole along its equatorial line at which the electric intensity has same value E is :

(a) 
$$\frac{r}{\sqrt{2}}$$
 (b)  $\frac{r}{(3)^{\frac{1}{3}}}$  (c)  $r(2)^{\frac{1}{3}}$  (d)  $\frac{r}{(2)^{\frac{1}{3}}}$ 

- A beam of protons and α-particle are successively accelerated in a cyclotron. The ratio of the normal magnetic field to be applied to the cyclotron so that protons and α-particles have the same period of rotation is :
  - (a) 1:4 (b) 4:1 (c) 1:2 (d) 2:1
- 3. Two sample of radioactive substances have the same quantity.  $\frac{1}{16}$  th portion of A and  $\frac{1}{256}$  th portion of B remain un-decayed after 8 hours. The ratio of half-life

periods of A and B is :

- (a) 1:4 (b) 4:1 (c) 1:2 (d) 2:1
- 4. The threshold frequency of a photo-sensitive surface is 5x10<sup>14</sup> Hz. Then which of the following can produce photoelectric emission from the same surface?
  - (a) Ruby-Laser light (b) He-Ne Laser light
  - (c) Xenon flash light d) Both (a) and (b)
- 5. Which of the following devices does not allow d.c. to pass through?
  - (a) resistor (b) capacitor
  - (c) inductor (d) all the above
- 6. The distance of closest approach of  $\alpha$ -particle reaching a nucleus with momentum 'p' is r<sub>0</sub>. When the  $\alpha$ -particle travels towards the same nucleus with momentum  $\frac{p}{2}$ , the distance of closest approach will be :
  - (a)  $4r_0$  (b)  $\frac{r_0}{4}$  (c)  $2r_0$  (d)  $\frac{r_0}{2}$
- 7. If  $\beta$  is the bandwidth, in Young's double slit experiment, the distance between the first dark band and sixth bright band is:
  - (a)  $5\frac{1}{2}\beta$  (b)  $6\beta$  (C) 11  $\beta$  (d)  $5\beta$

				2						
12 Std. PHYSICS, PREVIOUS YEAR GOVERNMENT EXAM ONE MARK QUESTION WITH ANSWER RAJENDRAN M, M.Sc., B.Ed., C.C.A., PG. TEACHER IN PHYSICS SRMMHSS, KAVERIYAMPOONDI, TIRUVANNAMALAI – 606 603										
8.	According to the laws of Boolean algebra, the expression (A+AB) is equal to:									
	(a)	В	(b)	Ā	(c)	Α		(d)	AB	
9.	Point	charges 1 µC	and 6	μC are placed	l in air	at a certa	ain c	listanc	e apart. The	è
	magni	tude of the for	ce on 1	L μC by 6 μC is	$F_1$ . The	e magnitu	ide o	f the f	orce on 6 μC	)
	by 1 μ	C $F_2$ . Then $F_1$ :	$F_2$ is :							
	(a)	1:1	(b)	36:1	(C)	1:6	(d)	6:1		
10.	High f	requency wave	es follov	v:					X	
	(a)	ionospheric p	(b)	the curvature of the earth						
	(C)	the ground wa	(d)	the line of sight direction						
11.	When	a hydrogen at	tom abs	sorbs an energ	gy of 10	0.2 eV, th	e ch	ange i	n its angulai	r
	mome	ntum is:								
	(a)	4.14 x 10 <sup>-15</sup>	Js		(b)	0.525 x	10-3	<sup>4</sup> Js		
	(c)	<b>1.05 x 10</b> <sup>-34</sup>	Js		(d)	2.1 x 10	-34 <b>J</b> s	6		
12.	Avalar	nche breakdow	ın is pri	marily depend	ent on	the pheno	men	on of :		
	(a)	doping	(b)	recombin	natio	n				
	(c)	collision		ALC AND ALC AN	(d)	ionizatio	n			
13.	The al	ternating curre	ent in a	circuit is giver	by the	equation				
	$i = 10 \sin\left(100\pi t + \frac{\pi}{6}\right)$ . The current attains its first maximum at t is :									
	(a)	$\frac{1}{600}$ S	(b)	$\frac{1}{50}$ S	(C)	$\frac{1}{100}$ S		(d)	$\frac{1}{300}$ <b>S</b>	
14.	An ele	ctric bulb is m	narked	220 V, 100W.	When	it is conn	ecte	d acros	ss 110 V, its	3
	power is:									
	(a)	200 W	(b)	173.2 W	(C)	50 W		(d)	25 W	
15.	Phosp	hor-bronze wi	re is u	sed for suspe	ension	in a mov	/ing	coil ga	alvanometer	,
	becau	se it has:								
	(a)	large couple	per unit	twist	(b)	small co	uple	per ur	nit twist	

(c) high conductivity (d) high resistivity

## MARCH 2020

1.	The fre	The frequency range of 30 MHz to 400 GHz is used for :										
	(a)	Satellite com	munica	tion	(b)	Ground wave propagation						
	(C)	Space wave	propag	ation	(d)	Sky wave pro	pagatio	on				
2.	In an oscillating LC circuit, the maximum charge on the capacitor is Q. The charge											
	on the capacitor when the energy is stored equally between the electric and											
	magne	etic field is :						X				
	(a)	Q	(b)	$\frac{Q}{2}$	(c)	$\frac{Q}{\sqrt{3}}$	(d)	$\frac{Q}{\sqrt{2}}$				
3.	Type o	f material whi	ch emit	s white light in	LED :		AA					
	(a)	GalnN	(b)	SiC	(c)	AlGaP	(d)	GaAsP				
4.	The fo	rce experienc	ed by	a particle hav	ving ma	iss m and cha	arge q	accelerated				
	through a potential difference V when it is kept under perpendicular magnetic field											
	$\overrightarrow{B}$ is											
	(a)	$\sqrt{\frac{2q^3BV}{m}}$	(b)	$\sqrt{\frac{q^3B^2V}{2m}}$	(c)	$\sqrt{\frac{2q^3BV}{m^3}}$	(d)	$\sqrt{\frac{2q^3B^2V}{m}}$				
5.	Chargi	ng current for	a capa	citor is 0.2 A, f	ind the	displacement	curren	t.				
	(a)	zero	(b)	0.2 A	(C)	0.4 A	(d)	0.1 A				
6.	In Boh	In Bohr Atom Model when the principal quantum number (n) increases the velocity										
	of elec	tron:										
	(a)	increases and	d then o	decreases	(b)	increases						
	(c)	decreases		•	(d)	remains cons	stant					
7.	In the given diagram a point charge +q is placed at the origin O. Work done in taking											
	another point charge – Q from point A to point B is:											
	(a)	$\frac{qQ}{4\pi\epsilon_0 a^2} \left(\!\frac{a}{\sqrt{2}}\!\right)$			(b)	zero <sup>(0, a)</sup>						
	(C)	$\left[\frac{-\mathrm{q}\mathrm{Q}}{4\pi\varepsilon_0}\frac{1}{a^2}\right]\sqrt{2}$	а		(d)	$\left[\frac{\mathrm{qQ}}{4\pi\varepsilon_0}\frac{1}{a^2}\right]\sqrt{2}$	a +	q B(a,0) x				
8.	The nucleus is approximately spherical in shape. Then the surface area of nucleus											
	having	mass numbe	r A varie	es as								
	(a)	$A^{\frac{5}{3}}$	(b)	$A^{\frac{2}{3}}$	(C)	$A^{\frac{4}{3}}$	(d)	$A^{\frac{1}{3}}$				



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#### 12 Std. PHYSICS, PREVIOUS YEAR GOVERNMENT EXAM ONE MARK QUESTION WITH ANSWER RAJENDRAN M, M.Sc., B.Ed., C.C.A., PG. TEACHER IN PHYSICS SRMMHSS, KAVERIYAMPOONDI, TIRUVANNAMALAI – 606 603

## SEPTEMBER 2020

1. Two identical conducting balls having positive charges  $q_1$  and  $q_2$  are separated by a centre to centre distance r. If they are made to touch each other and then separated to the same distance, the force between them will be : (a) less than before (b) same as before (C) more than before (d) zero 2. In an ac circuit voltage and current are given by V = 50 sin 50t Volt and  $i = 100 \sin (50t) + \frac{\pi}{2}$  A. The power dissipated in the circuit will be: (d) 500 W 2.5 kW (b) 1.25 kW (a) (C) 5 kW 3. The nucleus is approximately spherical in shape. Then the volume of nucleus having mass number A varies as : A<sup>1/3</sup>  $A^{4/3}$  $A^{5/3}$ (C) (d) (a) Α (b) The wavelength  $\lambda_e$  of an electron and  $\lambda_p$  of a photon of same energy E are related 4. by (b)  $\lambda_{\rm p} \propto \sqrt{\lambda_{\rm e}}$  (c) )  $\lambda_{\rm p} \propto \frac{1}{\sqrt{\lambda_{\rm e}}}$  (d)  $\lambda_{\rm p} \propto \lambda_{\rm e}^2$ (a)  $\lambda_{\rm p} \propto \lambda_{\rm e}$ 5. The resistance of a uniform wire of length *l* and cross-sectional area A, is R. The resistance of wire of the same material having length 2l and cross-sectional area 2A is : (c)  $\frac{R}{2}$ R (b) 2R (d) (a) 6. Two polaroid's  $P_1$  and  $P_2$  are placed with their optic axes perpendicular to each other. If an un-polarized light of intensity Io is incident on the first polaroid P1 then the intensity of transmitted light through the second polaroid P2 will be :  $\frac{I_0}{4}$  $\frac{I_0}{8}$ (b) (d) (C) (a) 0 7. A parallel plate capacitor stores a charge Q at a voltage V. Suppose the area of the parallel plate capacitor and the distance between the plates are each doubled then which is the quantity that will change? (a) capacitance (b) Charge (C) Voltage (d) **Energy density** 

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### 12 Std. PHYSICS, PREVIOUS YEAR GOVERNMENT EXAM ONE MARK QUESTION WITH ANSWER RAJENDRAN M, M.Sc., B.Ed., C.C.A., PG. TEACHER IN PHYSICS SRMMHSS, KAVERIYAMPOONDI, TIRUVANNAMALAI – 606 603

8. The value of Bohr magneton  $\mu_B$  is : 9.27x10<sup>-24</sup> Am (a) (b) 9.27x10<sup>24</sup> Am<sup>-1</sup> 9.27x10<sup>24</sup> Am<sup>-2</sup> 9.27x10-24 Am2 (C) (d) 9. The variation of frequency of carrier wave with respect to the amplitude of the modulating signal is called : (a) amplitude modulation (b) phase modulation (C) frequency modulation (d) pulse width modulation 10. A system consists of N<sub>0</sub> nucleus at t = 0. The number of nuclei remaining after half of half-life (that is, at time t =  $\frac{1}{2}T_{1/2}$ )  $\frac{N_0}{\sqrt{2}}$ (C) (a) (b) (d) Q When the current changes from 2 A to - 2 A in 0.05 s, an emf of 8 V is induced in 11. a coil. The coefficient of self-induction of the coil is: 0.2 H (b) 0.4 H 0.8 H (d) 0.1 H (a) (C) 12. The average energy density of an electromagnetic wave is:  $\frac{1}{2} \mathcal{E}_0 \mathbf{E}$  $\frac{1}{2} \mathcal{E}_0 \mathbf{E}^2$ (c)  $\frac{1}{2} E_0 E^2$  $\frac{1}{2} \varepsilon_0 E$ (a) (b) (d) 13. The threshold wavelength for a metal surface whose photoelectric work function is 3.313 eV is : **37350** Å 4125 Å 6000 Å (d) 2062.5 Å (b) (C) (a) 14. The dopant to be added with a pure Germanium Crystal to form n type semiconductor is: ( Boron \_ (b) **Phosphorus** (c) Aluminium (d) Indium (a) 15. If a beam of un-polarized light is incident on a reflecting glass surface at an angle of 57.5°, then the angle between the reflected and refracted beam will be : 600 **90**<sup>0</sup> 45<sup>0</sup> (b) (d) 300 (a) (C)

point charge

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#### 12 Std. PHYSICS, PREVIOUS YEAR GOVERNMENT EXAM ONE MARK QUESTION WITH ANSWER RAJENDRAN M, M.Sc., B.Ed., C.C.A., PG. TEACHER IN PHYSICS SRMMHSS, KAVERIYAMPOONDI, TIRUVANNAMALAI – 606 603

## SEPTEMBER 2021

1. In an oscillating LC circuit, the maximum charge on the capacitor is Q. the charge on the capacitor when the energy is stored equally between the electric and magnetic field is:

(a) 
$$\frac{Q}{\sqrt{2}}$$
 (b)  $\frac{Q}{2}$  (c) Q (d)  $\frac{Q}{\sqrt{3}}$ 

- 2. In a Young's double slit experiment, the slit separation is doubled. To maintain the same fringe spacing on the screen, the screen-to-slit distance D must be changed to :
  - (a)  $\sqrt{2}$  D (b) 2D (c)  $\frac{D}{\sqrt{2}}$  (d)  $\frac{D}{2}$

3. Which charge configuration produces a uniform electric field?

- (a) Uniformly charged infinite plate (b)
- (c) Uniformly charged spherical shell
- (d) Uniformly charged infinite line
- 4. The ratio of magnetic length and geometrical length is :
  - (a) 0.833 (b) 0.633 (c) 0.933 (d) 0.733
- 5. The internal resistance of a 2.1 V cell which gives a current of 0.2A through a resistance of 10  $\Omega$  is :
  - (a)  $0.8 \Omega$  (b)  $0.2 \Omega$  (c)  $1.0 \Omega$  (d)  $0.5 \Omega$
- If the nuclear radius of <sup>27</sup>Al is 3.6 fermi, the approximate nuclear radius of <sup>64</sup>Cu in fermi is:
  - (a) 4.8 (b) 2.4 (c) 3.6 (d) 1.2
- 7. If the velocity and wavelength of light in air is  $V_a$  and  $\lambda_a$  and that in water is  $V_w$  and  $\lambda_w$  then the refractive index of water is,
  - (a)  $\frac{\lambda_w}{\lambda_a}$  (b)  $\frac{V_w}{V_a}$  (c)  $\frac{V_a\lambda_a}{V_w\lambda_w}$  (d)  $\frac{V_a}{V_w}$
- 8. The unit of electric flux is :
- (a)  $Nm^{-1}C^2$  (b)  $Nm^{-2}C^{-1}$  (c)  $Nm^2C^{-1}$  (d)  $N^2mC^{-1}$ 9. For a healthy eye, the distance of the near point is \_\_\_\_\_
  - (a) 30 cm (b) 20 cm (c) 35 cm (d) 25 cm

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#### 12 Std. PHYSICS, PREVIOUS YEAR GOVERNMENT EXAM ONE MARK QUESTION WITH ANSWER RAJENDRAN M, M.Sc., B.Ed., C.C.A., PG. TEACHER IN PHYSICS SRMMHSS, KAVERIYAMPOONDI, TIRUVANNAMALAI – 606 603

- 10. The blueprint for making ultra-durable synthetic material is mimicked from:
  - (a) Parrot fist (b) Lotus leaf
  - (c) Peacock feather (d) Morpho butterfly
- 11. Emission of electrons by the absorption of heat energy is called \_\_\_\_\_
  - (a) Thermionic (b) Photoelectric
  - (c) Secondary (d) Filed
- 12. The Zener diode is primarily used as :
  - (a) Oscillator (b) Rectifier
  - (c) Voltage regulator (d) Amplifier
- 13. Which of the following is false for electromagnetic waves?
  - (a) longitudinal (b) transverse
  - (c) produced by accelerating charges (d) non-mechanical waves
- 14. The force experienced by a particle having mass m and charge q accelerated through a potential difference V when it is kept under perpendicular magnetic field  $\vec{B}$ .

(a) 
$$\sqrt{\frac{2q^{3}B^{2}V}{m}}$$
 (b)  $\sqrt{\frac{2q^{3}BV}{m}}$  (c)  $\sqrt{\frac{2q^{3}BV}{m^{3}}}$  (d)  $\sqrt{\frac{q^{3}B^{2}V}{2m}}$ 

- 15. In a transformer, the number of turns in the primary and the secondary are 410 and 1230 respectively. If the current in primary is 6 A, then that in the secondary coil is :
  - (a) 12 A (b) 2 A (c) 1 A (d) 18 A

# MAY 2022

1.	Which one of the following is the natural nanomaterial?									
	(a)	Grain of sand	d		(b)	Peacock fea	ther			
	(c)	Skin of the w	hale		(d)	Peacock bea	k			
2.	In an	electron microscope, the electrons are accelerated by a voltage of 14kV. If								
the voltage is charged to 224 kV, the de-Broglie wavelength associate							ted with the			
	electr	ectrons would:								
	(a)	decrease by	4 time	5	(b)	increase by 2	2 times	75		
	(c)	increase by 4	4 times		(d)	decrease by	2 times			
3.	The v	ariation of fr	equenc	y of carrier w	ave wi	th respect to	the in	stantaneous		
	ampli	tude of the mo	odulatin	g signal is call	ed:					
	(a)	Phase modu	lation		(b)	Amplitude m	odulatio	on		
	(C)	Pulse width r	nodulat	ion	(d)	Frequency m	nodulat	ion		
4.	Q fact	or is equal to		·						
	(a)	$\frac{\omega_{\rm r} L}{{\rm R}}$			(b)	$\frac{1}{R}\sqrt{\frac{L}{C}}$				
		X		28		κ γ C				
	(C)	R			(d)	All the above	•			
5.	The m	e metallic spheres of radii 1 cm and 3 cm are given charges of – $1 \times 10^{-2}$ C and								
	5 x 10	)-2 C respective	ely. If th	ese are connec	cted by	a conducting w	/ire, the	final charge		
	on the	e bigger spher	e is:							
	(a)	1 x 10 <sup>-2</sup> C	)(p)	3 x 10 <sup>-2</sup> C	(c)	2 x 10 <sup>-2</sup> C	(d)	4 x 10 <sup>-2</sup> C		
6.	Which	nich of the following is an electromagnetic wave?								
	(a)	β – rays			(b)	γ – rays				
	(c)	α - rays			(d)	All of the abo	ve			
7.	An air	bubble in gla	ss slab	of refractive ir	ndex 1.5	5 (near normal	l incide	nce) is 5 cm		
	deep	when viewed f	rom one	e surface and 3	3 cm de	ep when viewe	d from	the opposite		
	face.	The thickness	of the s	lab is:						
	(a)	<b>12 cm</b>	(b)	8 cm	(c)	16 cm	(d)	10 cm		
8.	In Ind	ia electricity is	s supplie	ed for domesti	c use a	t 220 V. It is s	upplied	l at 110 V in		
	USA. I	f the resistand	ce of a 6	60 W bulb for ι	use in Ir	ndia is R, the re	esistan	ce of a 60 W		
	bulb f	or use in USA	will be:							
	(a)	R/4	(b)	R	(C)	R/2	(d)	2R		

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#### 12 Std. PHYSICS, PREVIOUS YEAR GOVERNMENT EXAM ONE MARK QUESTION WITH ANSWER RAJENDRAN M, M.Sc., B.Ed., C.C.A., PG. TEACHER IN PHYSICS SRMMHSS, KAVERIYAMPOONDI, TIRUVANNAMALAI – 606 603

9. A wire of length / carries a current I along the Y direction and magnetic field is given by  $\vec{B} = \frac{\beta}{\sqrt{2}} (\hat{\imath} + \hat{\jmath} + \hat{k}) T$ . The magnitude of Lorentz force acting on the wire is (b)  $\sqrt{\frac{2}{\sqrt{3}}}\beta l l$  (c)  $\sqrt{\frac{1}{\sqrt{2}}}\beta l l$  $\sqrt{\frac{1}{\sqrt{3}}}\beta ll$ (d)  $\sqrt{2}\beta l$ (a) 10. Emission of electrons by the absorption of heat energy is called \_ emission. Thermionic (b) Photo electric (a) (C) Secondary (d) Filed 11. If a current of 7.5 A is maintained in a wire for 45 seconds then the charge flowing through the wire is: 365.5 C (C) 3 C (a) 6 C (b) (d) 337.5 C 12. The charge of cathode ray is: (C) not defined (a) neutral (b) positive (d) negative A step-down transformer reduces the supply voltage from 220 V to 11 V and 13. increases the current from 6 A to 100 A. Then its efficiency is : (c) 0.9 0.12 1.2 (d) (a) (b) 0.83 The electric potential between a proton and an electron is given by V = V<sub>0</sub> In  $\left(\frac{r}{r_0}\right)$ , 14. where ro is a constant. Assume that Bohr atom model is applicable to potential, then variation of radius of nth orbit rn with the principal quantum number n is  $r_n \propto \frac{1}{n^2}$ (b)  $r_n \propto \frac{1}{n}$  (c)  $r_n \propto n^2$ (d) (a)  $r_n \propto n$ 15. Transverse nature of light is shown in : (b) interference (c) polarization (d) diffraction (a) scattering

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## 12 Std. PHYSICS, PREVIOUS YEAR GOVERNMENT EXAM ONE MARK QUESTION WITH ANSWER RAJENDRAN M, M.Sc., B.Ed., C.C.A., PG. TEACHER IN PHYSICS SRMMHSS, KAVERIYAMPOONDI, TIRUVANNAMALAI – 606 603

### JULY 2022

1. The ratio between the radius of first three orbits of hydrogen atom is: (a) 1:2:3 (b) 1:2:2 (C) 1:4:9 (d) 1:3:5 2. Two coherent monochromatic light beams of intensities I and 41 are superposed. The maximum and minimum possible intensities in the resulting beam are: (a) 5I and I (b) 5I and 3I (C) 91 and I (d) 9I and 3I 3. A wire connected to a power supply of 230 V has power dissipation P<sub>1</sub>. Suppose the wire is cut into two equal pieces and connected parallel to the same power supply.P<sub>2</sub> In this case power dissipation is P<sub>2</sub> The ratio  $\frac{P_2}{P_2}$  is : (b) 2 1 4 (a) (C) 3 (d) 4. Stars twinkle due to: (a) Reflection (b) Total internal reflection (d) Polarisation (C) Refraction 5. The instantaneous values of alternating current and voltage in a circuit are  $i = \frac{1}{\sqrt{2}} \sin(100\pi t)$  A and  $v = \frac{1}{\sqrt{2}} \sin\left(100\pi t + \frac{\pi}{3}\right)$  V. The average power in watts consumed in the circuit is: (b)  $\frac{\sqrt{3}}{4}$  (c)  $\frac{1}{2}$  $\frac{1}{4}$  $\frac{1}{8}$ (a) (d) 6. If the mean wavelength of light from Sun is taken as 550 nm and its mean power as 3.8x 10<sup>26</sup> W then, the average number of photons received by the human eye per second from Sunlight is of the order of: (a) **10**<sup>45</sup> (b) 1042 (C) 1054 (d) 1051 7. An electric dipole is placed at an alignment angle of 30° with an electric field of 2x 10<sup>5</sup> NC<sup>-1</sup>, It experiences a torgue equal to 8 Nm. The charge on the dipole if the dipole length is 1 cm is 4 mC (a) (b) 8 mC 5 mC (d) 7 mC (C) 8. Fraunhofer lines are an example of spectrum. line emission line absorption (a) (b) (C) band emission (d) band absorption The mass of a  ${}_{3}^{7}$ Li nucleus is 0.042 u less than the sum of the masses of all its 3 9. nucleons. The average binding energy per nucleon  $\frac{7}{3}$ Li nucleus is nearly 23 MeV (a) 46 MeV (b) 5.6 MeV (C) 3.9 MeV (d)

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12 **12 Std. PHYSICS, PREVIOUS YEAR GOVERNMENT EXAM ONE MARK QUESTION WITH ANSWER** RAJENDRAN M, M.Sc., B.Ed., C.C.A., PG. TEACHER IN PHYSICS SRMMHSS, KAVERIYAMPOONDI, TIRUVANNAMALAI - 606 603 10. The temperature co-efficient of resistance of a wire is 0.00125 per °C. At 20 °C, its resistance is 1  $\Omega$ . The resistance of the wire will be 2  $\Omega$  at (a) 800°C (b) 700°C (C) 850°C (d) 820°C 11. The particle size of ZnO material is 30 nm. Based on the dimension it is classified as: (a) Bulk material (b) **Nanomaterial** Soft material (d) (C) Magnetic material 12. The value of L, C and R of an AC circuit are 1 H, 9 F and 3  $\Omega$  respectively. The quality factor for this circuit is: 1 3 1 1 (b) 9 (a) (C) (d) 9 A circular coil of radius 5 cm and 50 turns carries a current of 3 ampere. 13. The magnetic dipole moment of the coil is nearly 0.5 Am<sup>2</sup> 1.0 Am<sup>2</sup> (b) 1.2 Am<sup>2</sup> (d) 0.8 Am<sup>2</sup> (a) (C) 14. Two radiations with photon energies 0.9 eV and 3.3 eV respectively are falling on a metallic surface successively. If the work function of the metal is 0.6 eV, then the ratio of maximum speeds of emitted electrons in the two cases will be 1:4 1:1 19 (a) (b) 1:3 (C) (d) 15. If a positive half-wave rectified voltage is fed to a load resistor, for which part of a cycle of the input signal there will be current flow through the load? 0°-90° 90°-180° 0°-180° 0°-360° (a) (b) (C) (d)

## MARCH 2023

- 1. The alloys used for muscle wires in Robots are : (a) Gold silver alloys (b) Shape memory alloys (C) Two dimensional alloys (d) Gold copper alloys 2. If the magnitude of the magnetic field is  $3 \times 10^{-6}$  T, then magnitude of the electric field for a electromagnetic waves is 600 Vm<sup>-1</sup> (b) 100 Vm<sup>-1</sup> (C) 900 Vm<sup>-1</sup> 300 Vm<sup>-1</sup> (a) (d) 3. There is a current of 1.0 A in the circuit shown below. What is the resistance of P? 3Ω ww 10V-2.5 0 3.5 Ω 1.5Ω P 4.5 Ω (a) (b) (C) (d) 2.5 Ω 4. An example of Diamagnetic material is ..... (c) Aluminium (a) Nickel (b) Water (d) Iron 5. The flux linked with a coil at any instant t is given by  $\Phi_B = 15t^2 - 50t + 250$ . The induced emf at t = 3 s is : - 40 V (b) - 190 V (C) 40 V (d) - 10 V (a) 6. An electromagnetic wave is propagating in a medium with a velocity  $\vec{v} = v\vec{\iota}$ . The instantaneous oscillating electric field of this e.m. wave is along +Y-axis, then the direction of oscillating magnetic field of the electromagnetic wave will be along: +Z direction Y direction (a) (b) (C) -Z direction (d) -X direction 7. A parallel plate capacitor stores a charge Q at a voltage V. Suppose the area of the parallel plate capacitor and the distance between the plates are each doubled then which is the quantity that will change? Voltage (b) Capacitance (a)
  - (c) Energy density (d) Charge

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### 12 Std. PHYSICS, PREVIOUS YEAR GOVERNMENT EXAM ONE MARK QUESTION WITH ANSWER RAJENDRAN M, M.Sc., B.Ed., C.C.A., PG. TEACHER IN PHYSICS SRMMHSS, KAVERIYAMPOONDI, TIRUVANNAMALAI – 606 603

- 8. In a Young's double slit experiment, the slit separation is doubled. To maintain the same fringe spacing on the screen, the screen-to-slit distance D must be changed to :
  - (a)  $\sqrt{2}$  D (b) 2D (c)  $\frac{D}{\sqrt{2}}$  (d)  $\frac{D}{2}$
- 9. What is value of Forbidden energy gap for silicon at room temperature?
  - (a) 0.3 eV (b) 0.7 eV (c) 0.9 eV (d) **1.1 eV**
- 10. Two polaroids are kept with their transmission axes inclined at 300. Unpolarised light of intensity I falls on the first polaroid. Intensity of light emerging from the second polaroid:
  - (a)  $\frac{1}{8}$  | (b)  $\frac{1}{4}$  | (c)  $\frac{3}{8}$  | (d)  $\frac{3}{4}$  |
- 11. For light incident from air on a slab of refractive index 2, the maximum possible angle of refraction is :
  - (a)  $60^{\circ}$  (b)  $30^{\circ}$  (c)  $90^{\circ}$  (d)  $45^{\circ}$
- 12. A carbon resistor of  $(47 \pm 4.7)$  k  $\Omega$  to be marked with rings of different colours for its identification. The colour code sequence will be :
  - (a) Yellow Violet Orange Silver (b) Yellow Green Violet Gold
  - (c) Green Orange Violet Gold (d) Violet Yellow Orange Silver
- 13. In an hydrogen atom, the electron revolving in the second orbit, has angular momentum:
  - (a)  $\frac{4h}{\pi}$  (b) h (c)  $\frac{2h}{\pi}$  (d)  $\frac{h}{\pi}$
- 14. The Zener diode is primarily used as :
  - (a) Oscillator (b) Rectifier
  - (c) Voltage regulator (d) Amplifier
- 15. The wavelength  $\lambda_e$  of an electron and  $\lambda_p$  of a photon of same energy E are related by
  - (a)  $\lambda_p \propto \frac{1}{\sqrt{\lambda_e}}$  (b)  $\lambda_p \propto \lambda_e$  (c)  $\lambda_p \propto \lambda_e^2$  (d)  $\lambda_p \propto \sqrt{\lambda_e}$

#### JUNE 2023

1.	The speed of light in an isotropic medium depends on ,											
	(a)	its density				(b)	its wavelength					
	(C)	the nature of propagation										
	(d)	d) the motion of the source w.r.t. medium										
2.	A circu	A circular coil of radius 5 cm and 50 turns carries a current of 3 ampere.										
	The magnetic dipole moment of the coil is nearly:											
	(a)	1.0 Am <sup>2</sup>	(b)	<b>1.2 A</b> m <sup>2</sup>	(C)	0.5 An	ו <sup>2</sup>	(d)	0.8 Am <sup>2</sup>			
3.	Two w	ires of A and B	8 with ci	rcular cross se	ection a	re made	e up of	the sa	me material			
	with equal lengths. Suppose $R_A$ = 3 $R_B$ , then what is the ratio of radius of wire A to											
	that of	B?				•	AN.					
	(a)	3	(b)	$\sqrt{3}$	(c)	$\frac{1}{\sqrt{3}}$	5	(d)	$\frac{1}{3}$			
4.	Which of the following electromagnetic radiation is used for viewing objects through											
	fog?											
	(a)	Microwave	(b)	Gamma rays	(C)	X- rays		(d)	Infrared			
5.	Emissi	on of electron	s by the	absorption of	heat e	nergy is	called.		emission.			
	(a)	photoelectric	(b)	field	(C)	thermi	onic	(d)	secondary			
6.	In a se	series RL circuit, the resistance and inductive reactance are the same. Then										
	the ph	ase difference	betwee	en the voltage	and cu	rrent in <sup>.</sup>	the cire	cuit is				
	(a)	$\frac{\pi}{4}$	(b)	$\frac{\pi}{6}$	(C)	$\frac{\pi}{2}$		(d)	zero			
7.	If the nuclear radius of $Al^{27}$ is 3.6 fermi, the approximate nuclear radius of $Cu^{64}$ is											
	(a)	2.4	(b)	1.2	(c)	4.8		(d	)3.6			
8.	The barrier potential of a silicon diode is approximately,											
	(a)	0.7 V	(b)	0.3V	(C)	2.0 V		(d)	2.2V			
9.	An electric dipole is placed at an alignment angle of 30o with an electric field of											
	$2 \times 10^5$ NC <sup>-1</sup> . It experiences a torque equal to 8 N m. The charge on the dipole if the											
	dipole length is 1 cm is											
	(a)	4 mC	(b)	8 mC	(C)	5 mC		(d)	7 mC			
10.	For light incident from air on a slab of refractive index 2, the maximum possible											
	angle of refraction is,											
	(a)	<b>30</b> º	(b)	45°	(C)	60°		(d)	90°			

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11. Light transmitted by Nicol prism is, (a) partially polarised (b) un polarised (C) plane polarised (d) elliptically polarised 12. The vertical component of Earth's magnetic field at a place is equal to the horizontal component. What is the value of angle of dip at this place? (a) 30° (b) **45**° (C) 60° (d) 90° 13. The materials used in Robotics are (a) Aluminium and silver (b) Silver and gold Copper and gold (d) Steel and aluminium (C) 14. The threshold wavelength for a metal surface whose photoelectric work function is 3.313 eV is 4125Å (b) 3750Å 6000Å 20625.Å (a) (C) (d) 15. The principle based on which a solar cell operates is Diffusion (a) (b) Recombination (C) **Photovoltaic action** (d) Carrier flow

## MARCH 2019

- 1. Define electric dipole moment. Give its unit.
- 2. State Ohm's Law.
- 3. Define Peltier Coefficient. (Old Syllabus) : Peltier Effect : New Syllabus
- 4. State De-Morgan's theorems.
- 5. Write the uses of infra-red rays.
- 6. What are the characteristics of laser?
- 7. The de-Broglie wavelength of a neutron of kinetic energy K is  $\lambda$ . When its kinetic energy is 4 K, what is the de-Broglie wavelength of the neutron?
- 8. Define curie.
- 9. The number of turns in the primary of an ideal transformer is 400 and that in the secondary is 2000. If the output power from the secondary at 1000 V is kW then calculate the voltage and current in the primary coil.

# MARCH 2020

- 1. What do you mean by doping?
- 2. What are the uses of X-rays?
- 3. 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 coil if the transformer is connected to a 230 V AC main.
- 4. Distinguish between Fresnel and Fraunhofer types of diffraction.
- 5. What is corona discharge?
- 6. What is skip area?
- 7. What are the properties of neutrino?
- 8. Two materials X and Y are magnetized whose intensity of magnetization are 500 Am<sup>-1</sup> and 2000 Am<sup>-1</sup> respectively. The magnetizing field is 1000 Am<sup>-1</sup>. What is the ratio between the susceptibilities of the two material?
- 9. Why electron is preferred over X-ray in microscope?

# SEPTEMBER 2020

- 1. Define skip distance.
- 2. Calculate the cut-off wavelength and cut-off frequency of X-rays from an X-ray tube of accelerating potential 20,000 V.
- 3 State Lenz's law.
- 4. Potential in a given region is given as a function of distance x,  $V=5(x^2+x)$  Volt. Find the electric field when x = 1 cm.
- 5. What is Photovoltaic cell?
- 6. What are paraxial rays and marginal rays?
- 7. What are the constituent particles of Neutron and Proton?
- 8. What are the uses of X-rays?
- 9. If an electric field of magnitude 570 NC<sup>-1</sup>. Is applied in the copper wire, find the acceleration experienced by the electron.

# SEPTEMBER 2021

- 1. Mention the ways of producing induced emf.
- 2. Find the Polarizing angle for glass of refractive index 1.5
- 3. What is Peltier effect?
- 4. Define "Electrostatic Potential".
- 5. How will you define threshold frequency?
- 6. State Ampere's Circuital Law.
- 7. Why does sky appear blue?
- 8. Give two uses of IR radiation.
- 9. Dielectric strength of air is  $4x10^{6}$  Vm<sup>-1</sup>. Suppose the radius of a hollow sphere in the Van de Graaff generator is R = 0.4 m, calculate the maximum potential difference created by this Van de Graaff generator.

# <u>MAY 2022</u>

- 1. What is corona discharge?
- 2. How will you increase the current sensitivity of a galvanometer?
- 3. Define work function of a metal. Mention its unit.
- 4. Calculate the radius of  $^{197}_{79}$  Au nucleus.
- 5. State Fleming's right hand rule.
- 6. What do you mean by Doping?
- 7. What is displacement current?
- 8. Define electrical resistivity.
- 9. The angle of minimum deviation for the equilateral prism is 40°. Find the refractive index of the material of the prism.

## JULY 2022

- 1. Mention the ways of producing induced emf.
- 2. Define stopping potential.
- 3. Give two uses of UV radiation.
- 4. Pure water has refractive index 1.33. What is the speed of light through it ?
- 5. Define ampere in terms of force.
- 6. What is rectification?
- 7. State Gauss law.
- 8. Define atomic mass unit.
- 9. Calculate the equivalent resistance for the circuit which is connected to 12 V battery and also find the potential difference across 2  $\Omega$  and 4  $\Omega$  resistors in the circuit.



# MARCH 2023

- 1. Define 'electric field'.
- 2. How will you define Q-factor?
- 3. State Ampere's Circuital Law.
- 4. Explain the reason for the glittering of diamond.
- 5. The ratio of intensities of two waves in an interference pattern is 36 : 1. What is the ratio of the amplitudes of the two interfering waves?
- 6. Define work function of a metal. Give its unit.
- 7. What is meant by activity or decay rate? Give its unit.
- 8. Draw the circuit diagram of a full wave rectifier.
- 9. If the resistance of coil is  $3\Omega$  at  $20^{\circ}$  C and  $\alpha = 0.004/{^{\circ}}$ C, then , determine its resistance at  $100^{\circ}$ C.

## JUNE 2023

- 1. What is photoelectric effect?
- 2. State Fleming's left hand rule.
- 3. Find the polarising angle for glass of refractive index 1.5
- 4. State Lenz's law.
- 5. What is the reason for reddish appearance of sky during sunset and sunrise?
- 6. Define capacitance.
- 7. Distinguish between intrinsic and extrinsic semiconductor.
- 8. Determine the number of electrons flowing per second through a conductor, when a current of 32 A flows through it?
- 9. The radius of the 5<sup>th</sup> orbit of hydrogen atom is 13.25 Å . Calculate the de Broglie wavelength of the electron orbiting in the 5<sup>th</sup> orbit.

## MARCH 2019

- 1. Write the properties of electric lines of forces.
- 2.



The heat developed across 6  $\Omega$  resistor per second is 50 J. Calculate the heat developed per second across 2  $\Omega$  resistor in the given electric circuit.

- 3. Write the special features of Magnetic Lorentz force.
- 4. Obtain an expression for the energy associated with an inductor.
- 5. Explain frequency modulation.
- 6. State and obtain Bragg's Law (Old Syllabus)
- 7. Explain length contraction. (Old Syllabus)
- 8. Half lives of two radioactive elements are 12 hrs and 16 hrs respectively. If at any instant, the ratio of the amounts of radioactive substance is 2 : 1 , then after 2 days, What will be the ratio of the un-decayed portions?
- 9. In Young's double slit experiment two coherent sources of intensity ratio of 64:1, produce interference fringes. Calculate the ratio of maximum and minimum intensities.

# **MARCH 2020**

- 1. Explain the conversion of galvanometer into voltmeter.
- The resistance of a nichrome wire at 0° C is 10Ω. If its temperature coefficient of resistance is 0.004/°C, find its resistance at boiling point of water. Comment on the result.
- 3. What are the important inferences from the average binding energy curve?
- 4. In the circuit shown in the figure, the input voltage V<sub>i</sub> is 20 V, V<sub>BE</sub> = 0 V and V<sub>CE</sub> = 0 V. What are the values of I<sub>B</sub>, I<sub>C</sub>,  $\beta$ ?



- 5. Derive the expression for equivalent capacitance, when capacitors are connected in parallel.
- 6. What are the advantages and disadvantages of AC over DC?
- 7. Tow light sources of equal amplitudes interfere with each other. Calculate the ratio of maximum and minimum intensities.
- 8. Derive an expression for de-Broglie wavelength of electrons.
- 9. Modulation helps to reduce the antenna size in wireless communication Explain.

# **SEPTEMBER 2020**

- 1. 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 number of A and B nuclei after 80 minutes.
- 2. State Kirchhoff's Current and Voltage laws.
- 3. An 500  $\mu$ H,  $\frac{80}{\pi^2}$  pF capacitor and a 628  $\Omega$  resistor are connected to form a series RLC circuit. Calculate the resonant frequency and Q-factor of this circuit at
- 4. Obtain Gauss's law of electrostatics from Coulomb's inverse square law.
- 5. Compare the properties of dia, para and ferromagnetic materials.
- 6. Fibre optic communication is gaining popularity among various transmission media. Justify.
- 7. What are the characteristics of photons?
- 8. Write the output (Y) Boolean expression for the following circuit with inputs A, B and C.



9. What is total internal reflection? Give the condition for the total internal reflection takes place.

## SEPTEMBER 2021

- 1. State Kirchhoff's current and voltage rule.
- 2. What are critical angle and total internal reflection?
- 3. List out the characteristics of Photons.
- 4. Obtain the expression for energy stored in the parallel plate capacitor.
- 5. Mention the differences between interference and diffraction.
- 6. The repulsive force between two magnetic poles in air is 9x10<sup>-3</sup> N. If the two poles are equal in strength and are separated by a distance of 10 cm, calculate the pole strength of each pole.
- 7. Draw the circuit diagram of a full wave rectifier and draw its input and output waveforms.
- 8. Mention the various energy losses in a transformer.
- 9.  $_{92}U^{235}$  nucleus emits  $2\alpha$  particles,  $3\beta$  particles and  $2\gamma$  particles. What is the resulting atomic number and mass number?

# MAY 2022

- 1. Derive the relation between f and R for a spherical mirror.
- 2. Obtain a relation between current and drift velocity.
- 3. List out the laws of photo electric effect.
- 4. Draw the circuit diagram of NPN transistor in Common Emitter Configuration.
- 5. Give the uses of Polaroids.
- 6. Derive the expression for resultant capacitance, when capacitors are connected in series.
- 7. Find the :
  - (i) Angular momentum
  - (ii) Velocity of the electron revolving in the 5<sup>th</sup> orbit of hydrogen atom.

(h =  $6.6 \times 10^{-34}$  Js; m =  $9.1 \times 10^{-31}$  kg)

- 8. List out salient features of magnetic Lorentz force.
- 9. Find the impedance of a series RLC circuit, if the inductive reactance, capacitive reactance and resistance are 184  $\Omega$ , 144  $\Omega$ , and 30  $\Omega$  respectively. Also calculate the phase angle between voltage and current.

## <u>JULY 2022</u>

- 1. Obtain an expression for energy stored in the parallel plate capacitor.
- 2. 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?
- 3. Give the construction and working of a photo emissive cell.
- 4. Mention the differences between interference and diffraction.
- 5. What is Zener diode? Mention any two uses of Zener diode.
- 6. What is Seebeck effect? State the applications of Seebeck effect.
- 7. What are the properties of Cathode rays?
- 8. AC is advantageous than DC. Explain.
- 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.

## MARCH 2023

- 1. Derive an expression for electrostatic potential due to a point charge.
- 2. State Kirchhoff's First and Second Rules.
- 3. Explain the conversion of galvanometer into an ammeter.
- 4. How will you induce an emf by changing the area enclosed by the coil?
- 5. What are Fraunhofer lines? How are they useful in the identification of elements present in the Sun?
- The given circuit has two ideal diodes connected as shown in figure below. Calculate the current flowing through the resistance R<sub>1</sub>



- 7. What is optical path? Write down the equation for optical path and mention what each term represents.
- 8. Write any three Laws of Photoelectric Effect.
- Calculate the amount of energy released in joules when 1 kg of <sup>235</sup><sub>92</sub>U undergoes fission reaction.

## JUNE 2023

- 1 State and explain the principle of potentiometer.
- 2. Find the ratio of the intensities of light with wavelength 500 nm and 300 nm which undergo Rayleigh scattering.
- 3. Explain the various energy losses in a transformer.
- 4. State and prove Brewster's law.
- 5. Calculate the electric flux through the rectangle of side 5 cm and 10 cm kept in the region of a uniform electric field 100 NC<sup>-1</sup>. The angle  $\theta$  is 60° . If  $\theta$  becomes zero, what is the electric flux?
- 6. Explain the alpha decay process with example.
- 7. Write down Maxwell equations in integral form.
- 8. List out the advantages and limitations of frequency modulation.
- 9. A coil of a tangent galvanometer of diameter 0.24 m has 100 turns. If the horizontal component of Earth's magnetic field is  $25 \times 10^{-6}$  T then, calculate the current which gives a deflection of 60°.

## MARCH 2019

1. (a) Derive an expression for electric field intensity due to an electric dipole at a point on its axial line.

## (OR)

- (b) Obtain an expression for the magnetic induction at a point due to an infinitely long straight conductor carrying current.
- 2. (a) State Faraday's II Law of electrolysis. How is it verified experimentally?

(Old Syllabus)

## (OR)

- (b) Explain Raman Scattering of Light. (Old Syllabus)
- (a) Discuss with theory the method of inducting emf in a coil by changing its orientation with respect to the direction of the magnetic field.

## (OR)

- (b) Explain the working of a half wave diode rectifier.
- 4. (a) Explain the spectral series of hydrogen atom. (Diagram not necessary)

## (OR)

- (b) Explain the function of AM radio transmitter with neat block diagram.
- 5. (a) Explain the construction and working of a Geiger-Muller Counter.

(Old Syllabus)

## (OR)

(b) Explain the working of photo emissive cell. Write any two applications of photoelectric cells.

# MARCH 2020

1. (a) Obtain the expression for the induced emf by changing relative orientation of the coil with the magnetic field (Graph not necessary?

# (OR)

- (b) Derive the mirror equation and the equation for lateral magnification.
- 2. (a) Deduce the expression for the force between two long parallel current carrying conductors.

## (OR)

- (b) Write down Maxwell equations in integral form.
- 3. (a) Describe Davission Germer experiment which demonstrated the wave nature of Electrons.

## (OR)

- (b) (i) Derive an expression for the orbital energy of an electron in hydrogen atom using Bohr theory.
  - (ii) An electron in Bohr's hydrogen atom has an energy of -3.4 eV.What is the angular momentum of the electron?
- 4. (a) Explain the working of the transistor as an oscillator.

## (OR)

- (b) Find out the phase relationship between voltage and current in a pure inductive circuit.
- 5. (a) State Gauss Law in electrostatics. Obtain an expression for Electric field due to an infinitely long charged wire.

# (OR)

(b) How the emf of two cells compared using potentiometer?

## SEPTEMBER 2020

1. (a) Explain the construction and working of transformer and define its efficiency.

## (OR)

- (b) Derive the equation for the angle of deviation produced by a prism and thus obtain the expression for refractive index of material of the prism.
- 2. (a) Obtain the condition for bridge balance in Wheatstone's bridge.

## (OR)

- (b) (i) State Ampere's Circuital Law.
  - (ii) Find the magnetic induction due to a long straight conductor using Ampere's Circuital Law.
- (a) Derive an expression for the radius of the orbit of electron in an atom using Bohr atom model.

# (OR)

- (b) (i) Write down any six properties of electromagnetic wave.
  - (ii) Compute the speed of electromagnetic wave in a medium if the amplitudes of electric and magnetic fields in it are  $3 \times 10^4$  NC<sup>-1</sup> and  $2 \times 10^{-4}$  T respectively.
- 4. (a) Obtain Lens Maker's Formula, from that derive Lens equation.

# (OR)

- (b) Describe the function of transistor as an amplifier with the neat circuit diagram. Sketch the input and output waveform.
- 5. (a) (i) Obtain Einstein's Photoelectric equation with necessary explanation.
  - (ii) What will happen to the stopping potential in the following cases when;
    - (A) Work function of the metal is increased.
    - (B) Intensity of incident ray is increased.

# (OR)

(b) Explain in detail the effect of introducing a dielectric medium between the plates of a parallel plate capacitor, when the capacitor is disconnected from the battery.

## SEPTEMBER 2021

1. (a) Deduce the relation for the magnetic field at a point due to an infinitely long straight conductor carrying current.

# (OR)

- (b) Obtain the law of radioactivity.
- 2 (a) Calculate the electric filed due to a dipole on its axial line.

# (OR)

- (b) What is Frequency Modulation? List out the advantages and limitations of frequency modulation.
- 3. (a) (i) Derive an expression for de-Broglie wavelength of electrons.
  - (ii) Calculate the momentum of an electron with kinetic energy 2 eV.

# (OR)

- (b) Write down Maxwell equations in integral from.
- 4. (a) Explain about Astronomical telescope and obtain the equation for the magnification.

# (OR)

- (b) (i) Explain the equivalent resistance of a series resistor network.
  - (ii) A copper wire of cross-sectional area 0.5 mm<sup>2</sup> carries a current of 0.2 A. If the free electron density of copper is 8.4 x 10<sup>28</sup> m<sup>-3</sup> then compute the drift velocity of free electrons.
- 5. (a) Obtain Lens maker's formula.

# (OR)

(b) Derive an expression for phase angle between the applied voltage and current in a series RLC circuit.

# MAY 2022

1. (a) Explain the construction and working of full wave rectifier.

(OR)

- (b) Explain the construction and working of transformer.
- 2. (a) Derive an expression for electrostatic potential due to an electric dipole.

# (OR)

- (b) Obtain the equation for bandwidth in Young's Double Slit Experiment.
- 3. (a) Using Biot-Savart Law deduce the relation for the magnetic field at a point due to an infinitely long straight conductor carrying current.

# (OR)

- (b) Discuss the spectral series of hydrogen atom.
- 4. (a) (i) How do you we obtain characteristic X-ray spectra?
  - (ii) Calculate the cut-off wavelength and cut-off frequency of X-rays from an X-ray tube of accelerating potential 20,000 V.

# (OR)

- (b) What is spectrum? Explain the types of emission spectrum.
- 5. (a) Obtain Lens maker's formula.

# (OR)

(b) Explain the determination of the internal resistance of cell using voltmeter.

## <u>JULY 2022</u>

1. (a) Obtain the condition for bridge balance in Wheatstone's bridge.

(OR)

- (b) (i) What is half-life and mean life of a radioactive nucleus?
  - (ii) Calculate the number of nuclei of carbon-14 un-decayed after
    22,920 years if the initial number of carbon-14 atoms is 10,000. The
    half –life of carbon-14 is 5730 years.
- 2. (a) Describe the Fizeau's method to determine the speed of light.

(OR)

- (b) (i) Write down the properties of electromagnetic waves.
  - (ii) 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.
- 3. (a) Explain in detail the construction and working of a Van de Graaff generator. **(OR)** 
  - (b) Explain about Compound Microscope and obtain the equation for the Magnification.
- 4. (a) Show that the mutual inductance between a pair of coils is same ( $M_{12} = M_{21}$ ). (OR)
  - (b) State and prove De Morgan's first and second theorem.
- (a) (i) Obtain Einstein's photoelectric equation with necessary explanation.
  (ii) List out the characteristics of photons.

(OR)

(b) Derive the expression for the force on a current carrying conductor in a magnetic field.

## **MARCH 2023**

- 1. (a) (i) State Coulomb's Law in electrostatics
  - (ii) State the differences between Coulomb force and Gravitational force.

# (OR)

- (b) Describe the Fizeau's method to determine the speed of light.
- 2. (a) Discuss the working of Cyclotron in detail.

# (OR)

- (b) Discuss the diffraction at single slit and obtain the condition for n<sup>th</sup> minimum.
- (a) Derive an expression for phase angle between the applied voltage and current in a series RLC circuit.

## (OR)

- (b) Describe Davisson-Germer experiment which demonstrated the wave nature of the electrons.
- 4. (a) Describe the microscopic model of current and obtain microscopic form of Ohm's Law.

# (OR)

- (b) Derive an expression for Radius and Velocity of an electron in the n<sup>th</sup> orbit using Bohr atom model.
- 5. (a) (i) Write down the properties of electromagnetic waves.
  - (ii) 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.

# (OR)

(b) Describe the function of a transistor as an amplifier with the neat circuit diagram. Sketch the input and output waveforms.

## JUNE 2023

1. (a) (a) What is absorption spectrum? Explain its types.

## (OR)

- (b) Obtain the law of radioactive decay.
- 2. (a) Obtain the conditions for bridge balance in Whetstone's bridge.

## (OR)

- (b) Obtain the equation for bandwidth in Young's double slit experiment.
- (a) Explain in detail the principle, construction and working of a Van de Graff generator.

## (OR)

- (b) What is dispersion? Obtain the equation for dispersive power of a medium.
- 4. (a) (i) State Ampere's circuital law.
  - (ii) Find the magnetic field due to long, straight conductor using Ampere's circuital law.

## (OR)

- (b) State and prove De Morgan's first and second theorems.
- 5. (a) Explain the working of a single phase AC generators with necessary diagram.

## (OR)

- (b) (i) List out the characteristics of photons. (any two)
  - (ii) Calculate the momentum of an electron with kinetic energy 2 eV