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Grade : XII	Subject : Physics Worksheet	Chapters : 1,2,3,4,5,6,7,8
Date : 27/08/2019	Empower – 1	

SECTION – A

1. One requires 11eV of energy to dissociate a carbon monoxide molecule into carbon and oxygen atoms. The minimum frequency of the appropriate electromagnetic radiation to achieve the dissociation lies in

(a) visible region. (b) infrared region.

(c) ultraviolet region. (d) microwave region.

2. Light with an energy flux of 20 W/cm^2 falls on a non-reflecting surface at normal incidence. If the surface has an area of 30 cm^2. the total momentum delivered (for complete absorption) during 30 minutes is

(a) 36×10^{-5} kg m/s. (b) 36×10^{-4} kg m/s.

(c) 108×10^{4} kg m/s. (d) 1.08×10^{7} kg m/s.

3. If E and B represent electric and magnetic field vectors of the electromagnetic wave, the direction of propagation of electromagnetic wave is along

(a) E. (b) B. (c) B × E. (d) E × B.

4. The ratio of contributions made by the electric field and magnetic field components to the intensity of an EM wave is

5. (a) c : 1 (b) c^2 : 1 (c) 1 : 1 (d) $c^{1/2}$:1

6. An EM wave radiates outwards from a dipole antenna, with E_0 as the amplitude of its electric field vector. The electric field E_0 which transports significant energy from the source falls off as

(a) $1/r^3$ (b) $1/r^2$ (c)1/r (d) remains constant.

7. To reduce the reasonant frequency in an LCR series circuit with a generator

(a) the generator frequency should be reduced.

(b) another capacitor should be added in parallel to the first.

(c) the iron core of the inductor should be removed.

(d) dielectric in the capacitor should be removed.

8. An inductor of reactance 1 ohm and a resistor of 2 ohm are connected in series to the terminals of a 6 V (rms) a.c. source. The power dissipated in the circuit is

(a) 8 W. (b) 12 W. (c) 14.4 W. (d) 18 W.

9. The output of a step-down transformer is measured to be 24 V when connected to a 12 watt light bulb. The value of the peak current is

(a) $1/\sqrt{2}$ A. (b) $\sqrt{2}$ A. (c) 2 A. (d) $2\sqrt{2}$ A.

10. In an alternating current circuit consisting of elements in series, the current increases on increasing the frequency of supply. Which of the following elements are likely to constitute the circuit ?

(a) Only resistor. (b) Resistor and an inductor.

(c) Resistor and a capacitor. (d) Only a capacitor.

11. Electrical energy is transmitted over large distances at high alternating voltages. Which of the following statements is (are) correct?

(a) For a given power level, there is a lower current.

(b) Lower current implies less power loss.

(c) Transmission lines can be made thinner.

(d) It is easy to reduce the voltage at the receiving end using step-down transformers.

12. For an LCR circuit, the power transferred from the driving source to the driven oscillator is $P = I^2Z \cos\phi$.

(a) Here, the power factor $\cos \phi \geq 0$, $P \geq 0$.

(b) The driving force can give no energy to the oscillator ($P = 0$) in some cases.

(c) The driving force cannot syphon out ($P < 0$) the energy out of oscillator.

(d) The driving force can take away energy out of the oscillator.

13. When an AC voltage of 220 V is applied to the capacitor C

(a) the maximum voltage between plates is 220 V.

(b) the current is in phase with the applied voltage.

(c) the charge on the plates is in phase with the applied voltage.

(d) power delivered to the capacitor is zero.

14. An e.m.f is produced in a coil, which is not connected to an external voltage source. This can be due to

(a) the coil being in a time varying magnetic field.

(b) the coil moving in a time varying magnetic field.

(c) the coil moving in a constant magnetic field.

(d) the coil is stationary in external spatially varying magnetic field, which does not change with time.

15. The mutual inductance M12 of coil 1 with respect to coil 2

(a) increases when they are brought nearer.

(b) depends on the current passing through the coils.

(c) increases when one of them is rotated about an axis.

(d) is the same as M21 of coil 2 with respect to coil 1.

16. A circular coil expands radially in a region of magnetic field and no electromotive force is produced in the coil. This can be because

(a) the magnetic field is constant.

(b) the magnetic field is in the same plane as the circular coil and it may or may not vary.

(c) the magnetic field has a perpendicular (to the plane of the coil) component whose magnitude is decreasing suitably.

(d) there is a constant magnetic field in the perpendicular (to the plane of the coil) direction.

17. Resistance of galvanometer is G. If shunt required to make its range n times is S, then n = …….

(a) G/S (b) 1 – G/S (c) 1 + G/S (d) S/G

18. A Straight conducting wire of length 0.5 m and carrying current 1.2 A is placed perpendicular in uniform magnetic field of 2 T. Magnetic force acting on it will be ……..N

(a) 2.4 (b) 1.2 (c) 3 (d) 2

19. The electric field of an electromagnetic wave is given by **E** = 10 sin [30 x 10^{14} t – 10^{7} x] .Then the radiation pressure will be……..Pa

(a) 4.42 x 10^{-8} (b) 442 (c) 4.42 x 10^{-6} (d) 4.42 x 10^{10}

20. Micro waves are used for communication and in RADAR because……..

(a) They have short wave length (c) It has very less diffraction

(b) It has more diffraction (d) It propagates with high speed.

21. From the following which is a wrong characteristic of electromagnetic waves ?

(a) The maximum and minimum magnitude of electric field and magnetic field vectors produce at same time and same point.

(b) The energy of electromagnetic wave divides equally in electric field and magnetic field.

(c) The electric field and magnetic field vectors oscillate in mutually perpendicular and also perpendicular to the direction of propagation of the wave.

(d) Medium is not required for propagation of electromagnetic wave.

22. Maxwell's equations indicated the fundamental basic of …….

(a) Only Charge (c) Only Magnetism

(b) Only Mechanics (d) Both (a) and (b)

23. The resistance of 100 **Ω** and the coil of inductance of 0.5 H are connected in series with AC source 240V, 50 Hz. Time different between maximum voltage and maximum current will be ……. (Take V = $V_m$sinwt)

(a) 3.2 ms (b) 6.4 ms (c) 3.2 s (d) 1.6 ms

24. A step down transformer is used to reduce the main supply of 220 V to 10 V. If the primary draws 5 A and secondary 88 A current, calculate the efficiency of the transformer is ……..%

(a) 8.8 (b) 80 (c) 88 (d) 8

25. 9 mA electric current is flowing through a conducting wire then number of electrons passing through it in 3min is ……..

(a) 2 x 10^{18} (b) 10^{18} (c) 2 x 10^{19} (d) 1.01 x 10^{19}

SECTION – B

1. Estimate the average drift speed of conduction electrons in a copper wire of cross-sectional area 2.5 x 10^{-7} m^2 carrying a current of 2.7 A. Assume the density of conduction electrons to be 9 x 10^{28} m^{-3}. **2014**
A cell of emf 'E' and internal resistance 'r' is connected across a variable resistor 'R'. Plot a graph showing variation of terminal voltage 'V' of the cell versus the current 'I'. Using the plot, show how the emf of the cell and its internal resistance can be determined. **2014**

2. Considering the case of a parallel plate capacitor being charged, show how one is required to generalize Ampere's circuital law to include the term due to displacement current. **2014**

3. Write two properties of a material for making (a) a permanent magnet, and (b) an electromagnet. 2017

4. The electric field and electric potential at any point due to a point charge kept in air is 20 NC^{-1} and 10JC^{-1} respectively. Compute the magnitude of this charge. Derive the equation for a dipole in a uniform magnetic field. **2006**

5. State the principle of working of a cyclotron. Write two uses of this machine. **2006**

6. Define electric flux. Write its S.I. Units. A spherical rubber balloon carries a charge that is uniformly distributed over its surface. As the balloon is blown up and increases in size, how does the total electric flux coming out of the surface change? Give reason. **2007**

7. Deduce an expression for the electric potential due to an electric dipole at any point on its axis. Mention one contrasting feature of electric potential of a dipole at a point as compared to that due to single charge. **2007**

8. An inductor 200 mH, a capacitor of 500 uF and a resistor of 10 ohms are connected in series to a 100 V, variable frequency a.c. source. Calculate the

(i) frequency at which the power factor of the circuit is unity

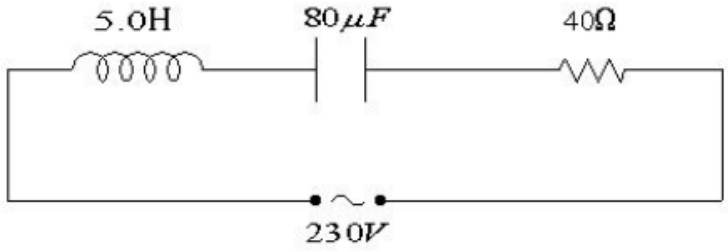
(ii) current amplitude at this frequency
(iii) Q-factor **2008**

9. Prove that an ideal capacitor, in an a.c. circuit does not dissipate power. **2008**

10. What is electric flux? Write its S. I. Units. Using Gauss's theorem, deduce an expression for the electric field at a point due to a uniformly charged infinite plane sheet. **2006**

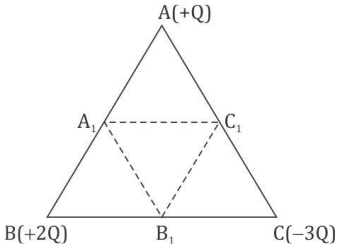
11. Derive a mathematical expression for the force per unit length experienced by each of the two long current carrying conductors placed parallel to each other in air. Hence define one ampere of current. **2006, 2007**

12. The given circuit diagram shows a series LCR circuit connected to a variable frequency 230 V source:



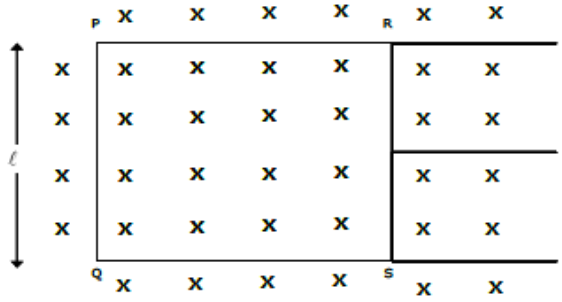
(a) Determine the source frequency, which drives the circuit in resonance.
(b) Obtain the impedance of the circuit and the amplitude of current at the resonating frequency.
(c) Determine the rms potential drops across the three elements of the circuit.
(d) How do you explain the observation that the algebraic sum of the voltage of the three elements obtained in (c) is greater than the supplied voltage? **2006**

13. Three point charges, + Q + 2Q and – 3Q are placed at the vertices of an equilateral triangle ABC of side *l*. If these charges are displaced to the mid-point A1, B1 and C1, respectively, find the amount of the work done in shifting the charges to the new locations. **2015**



14. Draw a labelled diagram of a moving coil galvanometer. State the principle on which it works. Deduce an expression for the torque acting on a rectangular current carrying loop kept in a uniform magnetic field. Write two factors on which the current sensitivity of a moving coil galvanometer depends. **2007**

15. Figure shows a rectangular conducting loop PQSR in which an RS of length 'l' is movable. The loop is kept in a uniform magnetic field 'B' directed downward perpendicular to the plain of the loop. The arm RS is moved with a uniform speed 'v'. **2009**



Deduce an expression for
(i) The emf induced across the arm 'RS',
(ii) The external force required to move the arm, and
(iii) The power dissipated as heat.

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