XLL PHYSICS HALF PORTION

TINE : 3 HRS TOTAL MARK : 70 M

SECTION – A (15 X 1 = 15M)

Choose the correct best answer

1. Which of the following is an electromagnetic wave ?
   a) Beta rays b) Gamma rays c) alpha rays d) all
2. A step –down transform reduces the supply voltage from 220 V to 11 V and increase the current from 6 A to 100 A .then its efficiency is
   a) 1.2 b) 0.9 c) 0.12 d) 0.83
3. 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 m^2
   a) 0.8 b) 0.5 c) 1.2 d) 1.0
4. In India electricity is supplied for domestic use at 220 V .It is supplied at 110 V in USA .if the resistance of a 60 W bulb for use in India is R , the resistance of a 60 W bulb for use in USA will be
   a) R / 2 b) 2R c) R d) R/4
5. 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) Energy density b) capacitance c) Voltage d) charge
6. Which one of the following is a non –polar molecule ?
   a) NH_3 b) HCl c) N_2O d) CO_2
7. When n resistor of equal resistance are connected in Series ,the effective resistance is
   a) R/n b) nR c) 1/ nR d) n/R
8. One tesla Is equivalent to
   a) Weber b) Am c) Am^2 d) Weber $–m^{-2}$
9. A power of 11 kW is in transmitted through 220 V .The current through line wire is
   a) 5 A b) 0.5 A c) 50 A d) 500 A
10. …… waves have Longest wavelength
    a) UV b) IR c) Micro d) Radio
11. 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
    a) 2×10^8 m/s b) 5.5×10^8 m/s c) 3×10^8 m/s d) 2.5×10^8 m/s
12. When the current changes from + 2A to – 2A in 0.05s, an emf of 8 V is induced in a coil .the co-efficient of self- induction of the coil is
    a) 0.2 H b) 0.4 H c) 0.8 H d) 0.1 H
13. The vertical component of Earth's magnetic field at a place is equal to the horizontal component .What is the value of angle dip at this place?
    a) 30^0 b) 60^0 c) 45^0 d) 90^0
14. A toaster operating at 240 V has a resistance of 120 ohm. Its power is
    a) 400 W b) 2 W c) 240 W d) 480 W
15. Calculate the number of electrons in one coulomb of negative charge …..electrons

a) 6.25×10^{18} b) 0.25×10^{18} c) 1.25×10^{18} d) 3.25×10^{18}

SECTION – B (6 X 2 = 12M)

Answer any six questions compulsory question no 24.

16. Applications of capacitors
17. State Joule's law of heating
18. What is meant by Hysteresis?
19. How will you define Q – factor
20. Why are e.m .waves non mechanical
21. What are the difference between Coulomb force and gravitational force ?
22. Write down the equation for a sinusoidal voltage of 50 Hz and its peak value is 20 V .Draw the corresponding voltage versus time graph
23. An electric heater of resistance 10 ohm connected to 220 V power supply is immersed in the water of 1 kg .How long the electrical heater has to be switched on to increase its temperature from 30^0 C to 60^0 C .(specific heat capacity of water is s= 4200 J / kg / k
24. Calculate the magnetic field at the centre of a square loop which carries a current of 1.5 A ,length of each side being 50 cm

SECTION –C (6X 3 = 18 M)

Answer any six questions compulsory question no 33.

25. Discuss the basic properties of electric charges
26. What is electric power and electric energy ?
27. Discuss the conversation of galvanometer into an ammeter
28. Obtain an expression for motional emf from Lorentz force
29. Write down Maxwell equations in integral form
30. Derive an expression for the torque experienced by a dipole due to a uniform electric field
31. 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?
32. A Water molecule has an electric dipole moment of 6.3×10^{-30} Cm .A sample contains 10^{22} water molecule ,with all the dipole moments aligned parallel to the external electric field of magnitude 3×10^5 N C^{-1} . How much work is required to rotate all the water molecule from angle equal to 0^0 to 90^0
33. Calculate the instantaneous value at 60^0 Average value and RMS value of an alternating current whose peak value is 20 A .

SECTION – D (5 X 5 = 25 M)

Answer all questions

34.a) Explain in detail the construction and working of a van de graaff generator

(or)

b) Calculate the electric field due to a dipole on its equatorial plane

35. a) Describe the microscopic model of current and obtain general form of ohm's law

(or)

b) (i) Two electric bulbs marked 20 W -220 V and 100 W -220 V are connected in series to 440 V supply .Which bulbs will get fused ?

(ii) A battery has an emf 12 V and connected to a resistor of 3 ohm. The current in the circuit is 3.93 A. Calculate (a) terminal voltage and the internal resistance of the battery (b)

power delivered by the battery and power delivered to the resistor

36. a) Derive the expression for the force between two parallel ,current –carrying conductors

(or)

b) Discuss the working of Cyclotron in detail

37. a) Explain the working of a Single –phase AC generator with necessary diagram

(or)

b) Obtain an expression for average power of AC over a cycle .Discuss its special cases

38. a) Explain the types of emission spectra

(or)

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

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