

I. Choose the most suitable answer :

15 x 1 = 15

1. The capacitance of a capacitor is
 - a) directly proportional to the charge q given to it.
 - b) inversely proportional to its potential u
 - c) directly proportional to the charge q and inversely proportional to the potential u
 - d) independent of both the charge q and potential v
2. The electric potential at a point due to a charge of $100\mu\text{C}$ at a distance of 9 metres is
 - a) 9V
 - b) 100V
 - c) $100\mu\text{C}$
 - d) 10^5V
3. In the case of insulators, as the temperature decreases, the resistivity
 - a) decreases
 - b) increases
 - c) remains constant
 - d) becomes zero
4. If the coil is parallel to the magnetic field the torque is
 - a) Zero
 - b) minimum
 - c) maximum
 - d) infinity
5. Electromagnetic induction is not used in
 - a) transformer
 - b) room heater
 - c) AC generator
 - d) choke coil
6. In a series LCR circuit at resonance the current value is decided by
 - a) Capacitor
 - b) inductor
 - c) resistor
 - d) all of these
7. In Newton's ring experiment the radii of m^{th} and $(m + 4)^{\text{th}}$ dark rings are respectively $\sqrt{5}$ mm and $\sqrt{7}$ mm. What is the value of m ?
 - a) 2
 - b) 4
 - c) 8
 - d) 10
8. Atomic spectrum should be
 - a) pure line spectrum
 - b) emission band spectrum
 - c) absorption line spectrum
 - d) absorption band spectrum
9. Maser materials are
 - a) diamagnetic ions
 - b) paramagnetic ions
 - c) ferromagnetic ions
 - d) nonmagnetic ions
10. X – rays are used in millikan's oil drop experiment to.....
 - a) produce vacuum inside
 - b) evaporate the oil drops
 - c) ionize the air inside
 - d) heat the oil drops
11. At the threshold frequency, the velocity of the electrons is
 - a) zero
 - b) maximum
 - c) minimum
 - d) infinite
12. The ionisation power is maximum for
 - a) neutrons
 - b) α -particles
 - c) γ -rays
 - d) β -particles
13. which of the following is not a moderator.....
 - a) liquid sodium
 - b) paraffin
 - c) graphite
 - d) heavy water
14. Avalanche breakdown is primarily dependent on the phenomenon of
 - a) collision
 - b) ionization
 - c) doping
 - d) recombination
15. Printed documents to be transmitted by fax are converted into electrical signals by the process of
 - a) reflection
 - b) scanning
 - c) modulation
 - d) light variation

II. Answer the following questions: [Any 6] [Compulsory : 19]

6 x 2 = 12

16. Why is it safer to be inside a car than standing under a tree during lightning?

17. Distinguish between electric power and electric energy.
18. How can we increase the current sensitivity of a galvanometer.
19. Why can a D.C ammeter not read A.C?
20. Write any three uses of infrared radiations.
21. What are the drawbacks of Sommerfield atom model?
22. The radioactive isotope ${}_{84}\text{Po}^{214}$ under goes a successive disintegration of two α decays and two β decays. Find the atomic number and mass number of the resulting isotope.
23. Give the Barkhausen criteria for oscillations.
24. When there is no feedback the gain of the amplifier is 100. If 5% of the output voltage is feed back into the input through a negative feedback network, find out the voltage gain after feedback.

III. Answer the following questions: [Any 6] [Compulsory : 28] 6 x 3 = 18

25. Define electric potential at a point. Obtain an expression for electric potential due to a point charge.
26. How will you compare the e.m.f.s of two cells using a potentiometer?
27. What are the reasons for various energy losses in a transformer? Explain how they can be minimized.
28. A soap film of refractive index 1.33, is illuminated by white light incident at an angle 30° . The reflected light is examined by a spectroscope in which dark band corresponding to the wavelength 6000\AA is found. Calculate the smallest thickness of the film.

29. Prove that the energy of an electron of hydrogen atom in the n^{th} orbit is $E_n = \frac{-me^4}{8\epsilon_0^2 n^2 h^2}$

30. State the laws of photoelectric emission.
31. Explain Soddy – Fajan’s radioactive displacements laws.
32. Explain the working of a half wave diode rectifier.
33. Mention the merits and demerits of satellite communication.

IV. Answer the following questions: 5 x 5 = 25

34. What is an electric dipole? Derive an expression for the electric field due to an electric dipole at a point on its axial line. **[Or]**
Make an analysis of amplitude modulated wave. Plot the frequency spectrum.
35. i) State ohm’s law
ii) State faraday’s first law of electrolysis and describe the experimental verification. **[Or]**
Discuss with theory the method of inducing e.m.f in a coil by changing its orientation with respect to the direction of the magnetic field.
36. Deduce the relation for the magnetic induction at a point along the axis of a circular coil carrying current. **[Or]**
Describe the principle and action of a Bainbridge mass spectrometer in determining the isotopic masses.
37. On the basis of wave theory, explain total internal reflection. Write the conditions for the total internal reflection to take place. **[Or]**
i) What are the limitations of electron microscope?
ii) How fast would a rocket have to go relative to an observer for its length to be corrected to 99% of its length at rest.
38. How will you determine the wavelength of X –rays using Bragg’s spectrometer? Write any four properties of X –rays. **[Or]**
Sketch the circuit of a Colpitts oscillator and explain its working.

S/O K.Thiyagarajan,
No:28, New St,Avampalayam,
Abdulapuram post,
Melmanavoor,
Vellore- 632010
Ph.No:9865444826

www.nammakalvi.org