



SAIVA BHANU KSHATRIYA COLLEGE
(Aruppukottai Nadargal Uravinmurai Pothu Abi Viruthi Trustuku Pathiyapattathu)
ARUPPUKOTTAI
DEPARTMENT OF PHYSICS
QUESTION BANK

Class:	B.Sc.,		
Semester (UG - III & V; PG - III) :	III	Subject Code :	SPH8A31
Name of the Subject :	Electricity & Electronics		

Section A (Multiple Choice Questions)

Unit I: Electrostatics

- The electric field at a point inside a charged sphere of conducting material is
(a) zero (b) constant and nonzero
(c) dependent on distance from the centre
(d) dependent on the charge & radius of the conductor
- A sphere of capacitance 8F can be given a potential of 8 volts by
(a) connecting it across a 8 volt battery
(b) connecting it to the positive terminal of a 8 volt battery and earthing the other terminal
(c) giving it 1 Coulomb of charge (d) giving it 64 Coulomb of charge
- Farad is unit of
(a) self-inductance (b) capacitance
(c) mutual inductance (d) conductance of an electrolyte
- When air in a capacitor is replaced by a medium of dielectric constant k, the capacitance
(a) decreases k times (b) increases k times
(c) increases k^2 times (d) Remains constant
- The capacitance of a paralleled plate capacitor doesn't depend upon
(a) the distance between the plates (b) area of the plates
(c) medium between the plates (d) metal of the plates

Unit II: Current Electricity

- Kirchhoff's second law is based on the law of the conservation of
(a) Charge (b) Energy (c) Momentum
(d) Sum of mass & energy
- A Wheatstone's bridge is most sensitive, if for given small value of the resistance difference of balance, the deflection in the galvanometer is
(a) zero (b) maximum (c) minimum (d) large
- Constantan wire is used for making standard resistance because it has
(a) low specific resistance (b) high specific resistance
(c) negligible temperature coefficient of resistance (d) high melting point
- If the length of potentiometer wire is increased, then the length of the previously obtained balance point will
(a) Increase (b) Decrease (c) Remains unchanged
(d) Become two times
- In potentiometer, a balance point is obtained, when
(a) The emf of the battery becomes equal to the emf of the experimental cell
(b) The p.d of the wire between the +ve and jockey becomes equal to the emf of the experimental cell
(c) The p.d of the wire between the +ve point and jockey becomes equal to the emf of the battery
(d) The p.d across the potentiometer wire becomes equal to the emf of the battery

Unit III: Magnetic effect of Electric Current and Alternating Current

- A moving coil type of galvanometer is based upon the principle that



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- (a) wire carrying a current experiences a force in magnetic field
(b) wire carrying current produces a magnetic field
(c) it has a horse shoe type magnet (d) all are true
12. The ballistic galvanometer measures
(a) current (b) charge (c) potential (d) capacity
13. The average value of AC over a complete cycle is
(a) I_{\max} (b) Zero (c) $I_{\max} / \sqrt{2}$ (d) $I_{\max} / 2$
14. In an LCR series circuit connected to A.C. supply, the current becomes maximum when
(a) $X_L = X_C$ (b) $X_L > X_C$ (c) $X_L < X_C$ (d) $\sqrt{(X_L \cdot X_C)}$
15. $\cos \Phi$ in the A.C circuit is called
(a) Phase factor (b) Power factor
(c) Form factor (d) Frequency factor

Unit IV: Electronics

16. A P-N junction diode is said to be forward biased, when
(a) No potential difference is applied across P and N regions
(b) A potential difference is applied across P and N regions, P region positive and N region positive
(c) A potential difference is applied across P and N region making P region negative and N region positive
(d) A magnetic field is applied in the region of junction
17. The current obtained from a simple filterless rectifier is
(a) Varying direct current (b) Constant direct current
(c) Direct current mixed with alternating current (d) Eddy current
18. The output of a rectifier circuit is pulsating voltage which is a mixture of an AC component and DC component. The circuit used to eliminate AC from DC voltage is called
(a) a rectifier (b) a filter (c) an oscillator (d) an amplifier
19. An oscillator requires
(a) negative feedback (b) positive feedback
(c) no feedback (d) continuous AC supply
20. An ideal OP-AMP has bandwidth
(a) zero (b) small (c) large (d) infinite

Unit V: Number system and Logical Circuit

21. Boolean algebra is essential based on
(a) Symbols (b) Logic (c) Truth (d) numbers
22. In Boolean Algebra $A+A =$
(a) 1 (b) 0 (c) A (d) \bar{A}
23. The output of 2 input OR gate is 0 only when its
(a) Both inputs are 0 (b) Either input is zero
(c) Both inputs are 1 (d) Either input is one
24. The only function of NOT gate is to
(a) Stop a signal (b) Recomplement a signal
(c) Invert an input signal (d) Act as a universal gate
25. NAND gate is a combination of
(a) AND gate and NOT gate (b) AND gate and OR gate
(c) NOT gate and OR gate (d) NOT gate and NOT gate

Section B (7 mark Questions)



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Unit I: Electrostatics

26. State and explain Gauss law in electrostatics
27. Define Electric potential. Explain its unit.
28. Discuss the relation between electric intensity and potential.
29. Derive an expression for the capacity of a parallel plate condenser.
30. Obtain expression for the energy of a charged capacitor.

Unit II: Current Electricity

31. State and explain Kirchhoff's law on electricity.
32. Describe the measurement of current using potentiometer.
33. Describe an experiment to calibrate an ammeter, using a potentiometer.
34. Describe an experiment to calibrate low range voltmeter using a potentiometer and a standard cell.
35. Describe in brief the potentiometer method of comparing two low resistances.

Unit III: Magnetic effect of Electric Current and Alternating Current

36. Derive an expression for the torque on a current loop in a uniform magnetic field.
37. Explain the damping correction of B.G.
38. What is RMS value of an AC voltage? Express it in terms of the peak value.
39. Give the difference between series and parallel resonance.
40. Obtain the expression for the power in an AC circuit. What is meant by 'Power factor'?

Unit IV: Electronics

41. Describe the working of a junction diode.
42. Explain with proper circuit diagram the construction, working and uses of "Light Emitting Diode".
43. What is meant by transistor biasing? Describe the working of voltage divider bias circuit. Why is voltage divider bias commonly used in transistor?
44. Explain what is modulation?
45. Explain how an op-amplifier can be used as an inverting amplifier.

Unit V: Number system and Logical Circuit

46. State De Morgan's Theorems.
47. Explain the action of the two input AND gate with an electrical circuit.
48. Give the truth tables of NAND gate and explain.
49. Explain how the NOR gate can be converted into OR, NOT and AND gates.
50. Give the truth table, Boolean expression and symbol of an OR gate.

Section C (10 mark Questions)

Unit I: Electrostatics

51. State and explain Gauss's theorem. Applying Gauss's theorem, find the electric field due to a cylindrical conductor of infinite length
52. Find out the capacity of a spherical conductor with the outer sphere earthed

Unit II: Current Electricity

53. Using Kirchhoff's laws, derive an expression for the sensitivity of Wheatstone's bridge. How do the positions of cell and galvanometer affect the sensitivity?
54. Explain with relevant theory, how the Carey Foster's bridge is used to determine the resistance of a wire.



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Unit III: Magnetic effect of Electric Current and Alternating Current

55. Describe the construction, action and theory of ballistic galvanometer.
56. Explain LCR series resonance circuit.

Unit IV: Electronics

57. Draw the Bridge rectifier circuit and explain its working.
58. Describe the working of Hartley oscillator theory.

Unit V: Number system and Logical Circuit

59. What is an EX-OR gate? Give the logic block diagram and truth table. Show that $Y=(A+B)(\bar{A}+\bar{B})$
60. Prove that:
 - a. $A(\bar{A}+B) = AB$
 - b. $A(B+\bar{B}) = A$