Class : 12

Register Number

COMMON HALF YEARLY EXAMINATION - 2023 - 24

PHYSICS

[Time Allowed : 3.00 Hours] [Max. Marks : 70]

15x1=15

PART-I

I. **Choose the correct answer.**

1. Calculate the resultant capacitances for the following combinations of Capacitors

a) $3C_0$ b) C_0 c) $\frac{2}{3}C_0$ d) $\frac{3}{2}C_0$

2. In Joule's heating law, When R and T are constant, If the H is taken along the Y - axis and I^2 along the x - axis, the graph is

a) Straight Line b) parabola c) Circle d) Ellipse

3. Suppose a Cyclotron is operated to accelerate Protons with a magnetic field of Strength 0.5 T Calcula the frequency in which the Electric Field between two dees could be reversed

a) 7.6×10^{-6} Hz b) 76 Hertz c) 7.6×10^{6} Hz d) 76×10^{6} Hz

4. A Step - down transformer reduces the supply voltage from 220V to 11V and increase the current from to 100 A. Then its efficiency is

a) 1.2 b) 0.83 c) 0.12 d) 0.9

5. Which of the following electromagnetic radiations is used for viewing objects through fog.

a) Microwave b) Gamma rays c) X - rays d) Infrared

6. Name of the Universal Gates are

a) NAND & NOT b) NOT & NOR c) NOR & OR d) NAND & NOR

7. An Artifical Radio - active Isotope used in Smoke detector

a) Cobalt - 60 b) Radium - 226 c) Americium - 241 d) Plutonium - 238

8. An object is placed infront of a Convex mirror of focal length of f and the maximum and minimum di of an object from the mirror such that the image formed is real and magnified.

a) 2 f and C b) C and α c) f and o d) None of the above

9. The Lens which is used to correct the Near sightedness problem.

(a) Concave Lens (b) Convex Lens (c) Bifocal Lens (d) Progressive Lens

10. If the mean wavelength of Light from SUN is taken as 550nm and its mean power as 3.8×10^{26} the number of photons emitted per second from the sun is of the order of

a) 10^{45} b) 10^{42} c) 10^{54} d) 10^{51}

11. The nuclear Radius of $^{216}_{84}Po$ is

a) 6.97 F b) 1.2 F c) 7.2 F d) 8.4 F

12. The Electrostatic Potential at infinity is ($r = \infty$)

(a) Infinitive (b) Minimum (c) Zero (d) Maximum

13. The speed of the Electromagnetic wave is a medium, If the amplitude of Electric and Magneti 3×10^4 NC^{-1} and 2×10^{-4} T respectively.

(a) 1.5×10^8 ms^{-1} (b) 0.67×10^{-8} ms^{-1} (c) 5×10^8 ms^{-1} (d) 1×10^{-8} ms^{-1}

14. The barrier potential of p - n junction depends on

a) Type of Semi conductor material (b) Amount of doping

c) Temperature d) All the above

15. The particle which gives mass to protons and neutrons are

a) Higgs particle b) Einstein particle c) Nano particle d) Bulk particle

PART - B

II. **Answer Any Six of The Following. (Answer Question No.24 Compulsory)** 6x2 =12

16 During Lightning accompained by a Thunderstorm it is always safer to sit inside a bus than in open ground or under a tree Why?

17 Define Temperature Co - efficient of Resistance?

18 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?

19 State Fleming's Right Hand Rule

20 Write down any four properties of Electromagnetic Waves?

21 What are the two conditions for total Internal Reflection to take place?

22 List out the applications of Mobile Communication?

23 Define Work Function of a metal

24 The wavelength of Light is 450 nm How much phase will differ for a path of 3mm?

PART-C

III. **Answer Any Six of The Following. (Answer Question No.33 Compulsory)** 6x3=18

25 What are the applications of Capacitors?

26 Draw the electrical network for the given Boolean Equation and Prove the same with Truth Table

$A + \bar{A}B = A + B$

27 Distinguish Soft and Hard Ferromagnetic materials?

28 Derive an Equation for energy and energy density stored in an Inductor?

29 List out the Characteristics of the image formed by a Plane Mirror

30 State and Explain Brewster's law

31 List out the laws of Photoelectric Effect

32 Discuss the spectral series of Hydrogen Atom

33 The resistance of a wire is 20Ω What will be new resistance, if it is stretched uniformly 8 times its original length?

PART-D

IV. **Answer ALL Questions.** 5x5 =25

34 a) Obtain the expression for Electric Field due to an infinitely long charged wire

(OR)

b) State and Prove De - Morgan's First and Second Theorem with (Logic circuit diagram and Truth -table

35 a) Describe the Microscopic model of current and obtain general form of Ohm's law

(OR)

b) Obtain the equation for radius of illumination (or) Snell's window

a) Derive the expression for the force on a current carrying conductor in a Magnetic Field

(OR)

b) Discuss the diffraction at a Single slit and Obtain the condition for n^{th} minimum

37 a) Explain the Construction and Working of a Transformer

(OR)

b) Derive the expression for the radius and velocity of an electron of Hydrogen atom using Bohr Atom model

38 a) What is Absorption Spectrum? Explain the types of absorption spectrum

(OR)

b) Describe briefly Davisson - Germer Experiment which demonstrated the wave nature of Electrons