

HSC12th PHYSICS

PART - I

(30x1=30)

Choose the correct answer

- 1) Electric field intensity is 400 V m^{-1} at a distance of 2 m from a point charge. It will be 100 V m^{-1} at a distance? (a) 50 cm (b) 4 cm (c) 4 m (d) 1.5 m
- 2) Which of the following quantities is scalar?
(a) dipole moment (b) electric force
(c) electric field (d) electric potential
- 3) A capacitor of capacitance $6 \mu\text{F}$ is connected to a 100 V battery. The energy stored in the capacitor is --- a) 30 J b) 3 J c) 0.03 J d) 0.06 J
- 4) A non-polar dielectric is placed in an electric field (E). Its induced dipole moment --
a) zero b) acts in the direction of E c) acts opposite to the direction of E
d) acts perpendicular to E
- 5) According to Faraday's law of electrolysis, when a current is passed, the mass of ions deposited at the cathode is independent of
a) current (b) charge (c) time (d) resistance
- 6) Phosphor – bronze wire is used for suspension in a moving coil galvanometer, because it has
(a) high conductivity (b) high resistivity
(c) large couple per unit twist (d) small couple per unit twist
- 7) In a thermocouple, the temperature of the cold junction is 200°C , the temperature of inversion is 600°C , then the neutral temperature is -----
a) 310°C b) 320°C c) 300°C d) 315°C
- 8) Lenz's law is in accordance with the law of
(a) conservation of charges (b) conservation of flux
(c) conservation of momentum (d) conservation of energy
- 9) The part of the AC generator that passes the current from the coil to the external circuit is
(a) field magnet (b) split rings (c) slip rings (d) brushes
- 10) In LCR circuit when $X_L = X_C$, the current -----
a) is zero b) is in phase with the voltage
c) leads the voltage d) lags behind the voltage
- 11) RMS value of AC flowing through a resistor is 5 A. Its peak value is
a) 3.536 A b) 70.7 A c) 7.07 A d) 7 A

12) *Electromagnetic waves are*

- (a) *transverse*(b) *longitudinal*(c) *may be longitudinal or transverse*
(d) *neither longitudinal nor transverse*

13) *A light of wavelength 6000 Å is incident normally on a grating 0.005 m wide with 2500 lines. Then the maximum order is*(a) 3 (b) 2 (c) 1 (d) 4

14) *Dark lines in solar spectrum is called ----*

- a) Raman line b) Fraunhofer lines c) Stoke's line d) Anti-stokes line

15) *In Newton's ring experiment, light of wavelength 5890 Å is used. The order of the dark ring produced where the thickness of the air film is 0.5890 μm is -----* a) 2 b) 3 c) 4 d) 5

16) *The ratio of the radii of the first three Bohr orbit is,*

- (a) 1 : 1/2 : 1/3 (b) 1 : 2 : 3 (c) 1 : 4 : 9 (d) 1 : 8 : 27

17) *The elliptical orbits of electron in the atom were proposed by*

- (a) J.J.Thomson (b) Bohr (c) Sommerfeld (d) de Broglie

18) *The unit of Rydberg's constant is ----* a) m b) no unit c) m⁻² d) m⁻¹

19) *A Coolidge tube operates at 18600 V. The maximum frequency of X-ray radiation emitted from it is* a) 4.5 x 10¹⁸ Hz b) 45 x 10¹⁸ Hz c) 4.05 x 10¹⁸ Hz d) 45.5 x 10¹⁸ Hz

20) *The work function of a photoelectric material is 3.3 eV. The threshold frequency will be equal to* (a) 8 × 10¹⁴ Hz (b) 8 × 10¹⁰ Hz (c) 5 × 10²⁰ Hz (d) 4 × 10¹⁴ Hz.

21) *According to relativity, the length of a rod in motion*

- (a) *is same as its rest length*(b) *is more than its rest length*(c) *is less than its rest length*
(d) *may be more or less than or equal to rest length depending on the speed of the rod*

22) *In the nuclear reaction ${}_{80}\text{Hg}^{198} + X \rightarrow {}_{79}\text{Au}^{198} + {}_1\text{H}^1$, X-stands for*

- (a) *proton*(b) *electron* (c) *neutron* (d) *deuteron*

23) *The binding energy of ${}_{26}\text{Fe}^{56}$ nucleus is*

- (a) 8.8 MeV (b) 88 MeV (c) 493 MeV (d) 41.3 MeV

24) *The time taken by the radioactive element to reduce 1/e time is -----*

- a) *half life*(b) *mean life* c) *half life /2* d) *twice the mean life*

25) *The radius of nucleus is 5.2 F. The number of nucleons in the nucleus is ----*

- a) 2 b) 104 c) 64 d) 128

26) *A logic gate which has an output '1' when the inputs are compliment to each other is –*

- a) AND b) NAND c) NOR d) EXOR

27) *An oscillator is*(a) *an amplifier with feedback*(b) *a convertor of ac to dc energy*

(c) nothing but an amplifier (d) an amplifier without feedback

28) According to the laws of Boolean algebra, the expression $(A + AB)$ is equal to

- (a) A (b) AB (c) B (d) \bar{A}

29) In amplitude modulation

(a) the amplitude of the carrier wave varies in accordance with the amplitude of the modulating signal.

(b) the amplitude of the carrier wave remains constant

(c) the amplitude of the carrier varies in accordance with the frequency of the modulating signal

(d) modulating frequency lies in the audio range

30) 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

PART- II Answer any fifteen questions.

(15x3=45)

31) Define one coulomb.

32) What is corona discharge?

33) An incandescent lamp is operated at 240 V and the current is 0.5 A. What is the resistance of the lamp ?

34) Define transition temperature.

35) Distinguish emf and potential difference.

36) Define Peltier coefficient.

37) *A capacitor blocks d.c but allows a.c. Explain.*

38) Write the equation of a 25 cycle current sine wave having rms value of 30 A.

39) Why does sky appear blue in color?

40) Define specific rotation.

41) What are the characteristics of LASER?

42) Calculate the longest wavelength that can be analysed by a rock salt crystal of spacing $d = 2.82 \text{ \AA}$ in the first order.

43) Mention the applications of electron microscope.

44) Define curie.

45) How do you classify the neutrons in terms of its kinetic energy?

46) What is zener breakdown?

47) Draw the circuit diagram of NPN transistor in CE mode.

48) Write the Barkhausen conditions for oscillation.

49) When the negative feedback is applied to an amplifier of gain 50, the gain after feedback falls to 25. Calculate the feedback ratio.

50) What is meant by skip distance?

PART – III

(7x5=35)

- Answer question No.60 is Compulsory.
- Answer any six questions of the remaining 11 questions.
- Draw diagrams wherever necessary.

51) Two capacitances $0.5 \mu\text{F}$ and $0.75 \mu\text{F}$ are connected in parallel and the combination to a 110 V battery. Calculate the charge from the source and charge on each capacitor.

52) Define mobility. Establish the relation between drift velocity and current.

53) Explain the working of Leclanche cell.

54) Explain how will you convert galvanometer into a voltmeter.

55) Obtain an expression for the current flowing in a circuit containing resistance only to which alternating emf is applied. Find the phase relationship between voltage and current.

56) Write a note on Nicol prism.

57) Write the properties of Cathode rays

58) Obtain Einstein's photoelectric equation.

59) At what speed is a particle moving if the mass is equal to three times its rest mass.

60) a) Determine the amount of Po^{210} required to provide a source of α particles of activity 5 milli curie. Given $T_{1/2}$ of polonium is 138 days. **Or**

b) The radioactive isotope ${}_{84}\text{Po}^{214}$ undergoes a successive disintegration of two α -decays and two β -decays. Find the atomic number and mass number of the resulting isotope.

61) Explain how operational amplifier is used as a summer.

62) *What are the applications of radar?*

PART – IV

(4x10=40)

- **Answer any four questions in detail.**
- **Draw diagrams whenever necessary.**

63) *State the principle and explain the construction and working of Vande Graaff generator.*

64) *Deduce the relation for the magnetic induction at a point along the axis of a circular coil carrying current.*

65) *Describe the principle, construction and working of a single – phase a.c generator.*

66) *Derive an expression for bandwidth of interference fringes in Young's double slit experiment.*

67) *State and obtain Bragg's law. Explain how a Bragg's spectrometer can be used to determine the wavelength of X-rays.*

68) *Obtain an expression to deduce the amount of the radioactive substance present at any moment. Obtain the relation between half-life period and decay constant.*

69) *What is rectification? Explain the working of bridge rectifier.*

70) *Make an analysis of AM wave. Plot the frequency spectrum.*

.....*ALL THE BEST*

by

R.Vinothkumar M.sc., M.Phil.

Genius Tuition Centre,

Coimbatore - 641 006.

Cell No. : 88702 49542, 9597248278