Class : 12   **Higher Secondary Quarterly Examination 2017-18**   *Register Number*

Time Allowed : 3 Hours]   **PHYSICS**   [Max. Marks : 150

INSTRUCTION : 1.Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall
Supervisor immediately.

2.Use blue or black ink to write and pencil to draw diagrams.

PART-1

Note: (i) Answer all the questions   30x1=30

(ii) Choose and write the correct answer

1. The number of electric lines of force originating from a charge of 1 nC is ---------

   a) 1.129×10^{11} b) 113   c) 1.129×10^{5} d) 8.85×10^{-12}

2. Electric potential energy (U) of two point charges is -----

   a) $\dfrac{q_1 q_2}{4\pi\epsilon_0 r_2}$ b) $\dfrac{q_1 q_2}{4\pi\epsilon_0 r}$ c) PE cos0   d) PE sin 0

3. A dipole is placed in a uniform electric field with its axis parallel to the field. It experiences

   a) Only a net force   b) Only a torque

   c) Both a net force and torque   d) neither a net force nor a torque

4. Four point charges – Q,-q, 2q and 2Q are placed, one at each corner of the square. The relation between Q and q
   for which the potential at the centre of the square is zero is

   a) Q = -q   b) Q = -$\dfrac{1}{q}$ c) Q = q   d) Q = $\dfrac{1}{q}$

5. The electric field outside the plates of two oppositely charged plane sheets of charge density σ is ------

   a) $\sigma/2\epsilon_0$ b) $-\sigma/2\epsilon_0$ c) σ/ϵ_0 d) zero

6. The capacitance of a capacitor--------

   a) depends on charge   b) depends on electric potential

   c) depends on both charge and electric potential   d) depends on neither charge nor electric potential

7. If the length of a copper wire has a certain resistance R, then on doubling the length its specific resistance

   a) Will be doubled   b) will become ¼ th   c) will become 4 times   d) will remain the same

8. When n resistors of equal resistances(R) are connected in parallel the effective resistance is -----

   a) $\dfrac{n}{R}$ b) $\dfrac{R}{n}$ c) $\dfrac{1}{nR}$ d) nR

9. When two resistors R_1, R_2 are connected in series, they consume 12W power. When they are connected in parallel,
   they consume 50W power. What is the ratio of power of individual resistors R_1 and R_2

   a) 3   b) $\dfrac{3}{2}$ c) $\dfrac{1}{4}$ d) 4

10. The slope of V-I characteristics of ohmic conductor is

    a) Resistance   b) Specific Resistance   c) Conductance   d) Temperature coefficient of Resistance

11. Nichrome wire is used as heating element because it has ------'
    a) low Specific Resistance b) low Melting Point c) high Specific Resistance d) high Conductivity

12. The period of revolution of a charged particle inside a cyclotron does not depend on
    a) the magnetic induction
    b) the charge of the Particle
    c) the velocity of the Particle
    d) the mass of the Particle

13. The magnetic induction at the centre of a circular coil carrying current, if the current through the coil is doubled and the radius of the coil halved becomes
    a) Halved
    b) unchanged
    c) Doubled
    d) FourTimes

14. In a thermocouple, the temperature of the cold junction is 20⁰C , the neutral temperature is270⁰C then the inversion temperature is ------
    a) 520 ⁰C
    b) 540⁰C
    c) 500⁰C
    d) 510⁰C

15. The Self-inductance of a straight conductor is
    a) zero
    b) infinity
    c) Very large
    d) Very Small

16. Which of the following cannot be stepped up in a transformer?
    a) input Current
    b) input Voltage
    c) input Power
    d) all

17. The power factor of RLC series circuit in resonance is
    a) $\dfrac{1}{2}$
    b) $-\dfrac{1}{2}$
    c) 1
    d) 0

18. An a.c. voltage is applied to a resistance R and an inductor L in series. If R and the inductive reactance are both equal to 3Ω, the phase difference between the applied voltage and the current in the circuit is --------
    a) $\dfrac{\pi}{6}$
    b) $\dfrac{\pi}{4}$
    c) $\dfrac{\pi}{2}$
    d) zero

19. The unit henry can also be written as ------
    a) VsA^{-1}
    b) WbA
    c) Ωs^{-1}
    d) all

20. Atomic spectrum should be
    a) pure Line Spectrum b) emission Band Spectrum c) absorption line Spectrum d) absorption Band Spectrum

21. When a drop of water is introduced between the glass plate and plano convex lens in Newton's rings system , the ring system ----------
    a) contracts
    b) expands
    c) remains same
    d) first expands then contracts

22. A light of wavelength 6000A⁰ 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

23. If the wave length of the light is increased four times, then the amount of scattering is
    a) increased by 16 times
    b) decreased by 16 times
    c) increased by 256 times
    d) decreased by 256 times

24. In young's double slit experiment 12 fringes are obtained in a certain fragment of the screen, when light of wavelength of light 600nm is used. If the wavelength of light is changed to 400 nm, the number of fringes observed in the same segment of the screen is ---------
    a) 12
    b) 18
    c) 24
    d) 30

25. Velocity of electromagnetic waves through vaccum is ....

a) $\sqrt{\mu\epsilon}$ b) $\dfrac{1}{\sqrt{\mu_0\epsilon_0}}$ c) $\sqrt{\dfrac{\mu}{\epsilon}}$ d) $\sqrt{\dfrac{\epsilon}{\mu}}$

26. According to Bohr's postulates, which of the following quantities take discrete values?

a) kinetic energy b) potential energy c) angular momentum d) momentum

27. In Laser, if the number of atoms in ground state is N_G number of atoms in excited state is N_E then after pumping process

a) $N_G > N_E$ b) $N_E > N_G$ c) $N_G = N_E$ d) $N_E = 0$

28. The ratio of minimum to maximum wavelength in Balmer series is -------

a) 5 : 9 b) 5 : 36 c) 1 : 4 d) 3:4

29. The number of waves in a distance of 1 meter is

a) Wave Length b) Wave Number c) Band Width d) Frequency

30. For the first order X-ray diffraction , the wavelength of the X-ray is equal to the lattice spacing at a glancing angle of ------

a) 15^0 b) 60^0 c) 45^0 d) 30^0

PART – II

15 x 3 = 45

Note : Answer any fifteen questions:

31. What is additive nature of charges? Give an example

32. State the working of microwave oven.

33. Calculate the electric potential at a point due to a charge of 100 µC located at 9m away .

34. Distinguish between drift velocity and mobility .

35. Why is copper wire not suitable for a potentiometer?

36. State Kirchoff's voltage law.

37. What are the applications of secondary cells?

38. Two wires A and B are formed from the same material, have same mass. Diameter of wire A is half of diameter of wire B. If the resistances of wire A is 32 Ω, find the resistance of wire B.

39. Define 1 ampere.

40. On increasing the current sensitivity , voltage sensitivity does not increase. Why?

41. 1A long straight wire carrying current produces a magnetic induction of 4×10^{-6}T at a distance of 15cm. Calculate the value of current through the wire.

42. Distinguish between inductive reactance and capacitive reactance.

43. A solenoid with 800 turns has length 40cm and area of cross-section 20 cm². When a current of 3 A flows through the solenoid, what is the value of self inductance of the solenoid.

44. Define rms value of alternating current.

45. What is Tyndal Scattering?

46. A plano- convex lens of redius 3m is placed on an optically flat glass plate and is illuminated by a monochromatic light. The radius of the 8th dark ring is 3.6 mm. Calculate the wavelength of light used.   G / 12 / Phy / 3

47. State the principle of Millikan's oil drop experiment.

48. State Moseley's law.

49. Distinguish between spontaneous emission and stimulated emission.

50. Give the applications of X-rays in scientific research.

PART - III

51. Derive an expression for energy stored in a capacitor

52. Give the applications of superconductors.

53. State Faraday's first law of electrolysis and explain how it is verified experimentally.

54. The resistance of a field coil measures 50Ω at $20^{0}C$ and $65\ \Omega$ at $70^{0}C$. Find the temperature coefficient of reisistance.

55. State and explain Biot-Savart law.

56. Explain the method of converting galvanometer into voltmeter.

57. Give the various power losses in transformer and explain the method of minimising them.

58. A capacitor of capacitance $2\mu F$ is in an a.c. circuit of frequency 1000 Hz . If the rms value of the applied emf is 10 V , find the effective current flowing in the circuit.

59. State and Prove Brewster's law.

60. A soap film of refractive index 1.33, is illuminated by white light incident at an angle 30^{0} . The reflected light is examined by spectroscope in which dark band corresponding to the wavelength$6000A^{0}$is found. Calculate the smallest thickness of the film.   (OR)

    A plane transmission grating has 5000 lines/cm Calculate the angular separation in second order spectrum of red line $7070A^{0}$ and blue line $5000A^{0}$

61. Give the properties of Canal rays.

62. Explain Laue's experiment for X-ray diffraction.

PART - IV

63. Derive an expression for electric potential at any point due to an electric dipole. Discuss the special cases.

64. State Gauss's law and derive an expression for electric field intensity due to an infinitely long straight conductor with uniform charge density.

65. Explain Joule's calorimeter experiment to verify Joule's law of heating.

66. Discuss with theory the method of inducing emf in a coil by changing its orientation with respect to the direction of the magnetic field.

67. What are eddy currents? How are the minimised? Explain any three of their applications.

68. Explain Raman effect.

69. On the basis of wave theory, explain total internal reflection.

70. Using Bohr's postulates, derive an expression for radius of nth circular orbit of hydrogen atom.