

Physics 12th Public Exam Question Paper 2013

MARCH – 2013
PHYSICS

Time Allowed: 3 Hours

Maximum Marks: 150
30 x 1 = 30

PART - I

Note: i) Answer all the questions.

ii) Choose and write the correct answer.

iii) Each question carries one mark.

- The electrical resistivity of a thin copper wire and a thick copper rod are respectively $p_1\Omega\text{m}$ and $p_2\Omega\text{m}$ then?
(a) $p_1 > p_2$ (b) $p_2 > p_1$ (c) $p_1 = p_2$ (d) $p_2/p_1 = \infty$
- The instantaneous emf and current equations of an a.c. circuit are respectively $e = 200\sin\left(\omega t + \frac{\pi}{3}\right)$ and $i = 10 \sin \omega t$ The average power consumed over one complete cycle is:
(a) 2000W (b) 1000W (c) 500W (d) 707W
- The nuclear radius of ${}_4\text{Be}^8$ nucleus is:
(a) $1.3 \times 10^{-15}\text{m}$ (b) $2.6 \times 10^{-15}\text{m}$ (c) $1.3 \times 10^{-13}\text{m}$ (d) $2.6 \times 10^{-13}\text{m}$
- Electromagnetic waves are
(a) transverse (b) longitudinal
(c) may be longitudinal or transverse (d) neither longitudinal nor transverse
- Which of the following quantities is scalar?
(a) dipole moment (b) electric force
(c) electric field (d) electric potential

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- The self inductance of a straight conductor is
(a) zero (b) infinity (c) very large (d) very small
- The stopping potential of a metal surface is independent of
(a) frequency of incident radiation (b) intensity of incident radiation
(c) the nature of the metal surface (d) velocity of the electrons emitted
- For a transistor connected in common emitter mode [CE] the slope of the input characteristic curve gives:
(a) input impedance (b) current gain
(c) reciprocal of input impedance (d) voltage gain
- The specific charge of cathode ray particle
(a) depends on nature of the cathode (b) depends on nature of the anode
(c) depends on nature of gas atoms present inside discharge tube
(d) independent of all the above
- The half life period of N^{13} is 10.1 minute. Its life time is
(a) 5.05 minute (b) 20.2 minute (c) infinity (d) $\frac{10.1}{0.6931}$ minute

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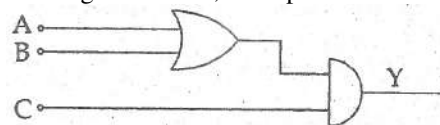
11. The direction of force on a current carrying conductor placed in a magnetic field is given by
(a) Fleming's Left Hand Rule (b) Fleming's Right Hand Rule
(c) End Rule (d) Right Hand Palm Rule
12. In young's double slit experiment, band width β contains
(a) a bright band only (b) a dark band only
(c) either a bright band or a dark band (d) both a bright band and a dark band
13. The electric field outside the plates of two oppositely charged plane sheets of charge density σ is
(a) $+\frac{\sigma}{2\epsilon_0}$ (b) $-\frac{\sigma}{2\epsilon_0}$ (c) Zero (d) $\frac{\sigma}{\epsilon_0}$
14. 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
15. The RF channel in a radio transmitter produces
(a) audio signals (b) both audio signal and high frequency carrier waves
(c) high frequency carrier waves (d) low frequency carrier waves
16. A light of wavelength 6000 Å is incident normally on a grating 0.005m wide with 2500 lines. Then the maximum order is.
(a) 1 (b) 3 (c) 2 (d) 4
17. The elliptical orbits of electron in the atom were proposed by
(a) J.J.Thomson (b) Bohr (c) Sommer field (d) de Broglie
18. The explosion of atom bomb is based on the principle of
(a) uncontrolled fission reaction (b) controlled fission reaction
(c) fusion reaction (d) thermonuclear reaction

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19. Printed documents to be transmitted by fax are converted into electrical signal by the process of
(a) reflection (b) scanning (c) modulation (d) light variation
20. Which of the following devices does not allow d.c. to pass through?
(a) resistor (b) capacitor (c) inductor (d) all of the above
21. According to Rutherford atom model, the spectrum emitted by an atom is.
(a) line spectrum (b) continuous spectrum
(c) continuous absorption spectrum (d) band spectrum
22. X ray is
(a) Conversion of momentum (b) Conversion on energy into mass
(c) Principle of conservation of charge
(d) Phenomenon of conversion of kinetic energy into radiation
23. Two point charges $+q$ and $-q$ are placed at points A and B respectively separated by a small distance. The electric field intensity at the midpoint O of AB
(a) is zero (b) acts along AB
(c) acts along BA (d) acts perpendicular to AB

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24. The power loss is less in transmission lines, when
 (a) voltage is less but current is more (b) both voltage and current are more
 (c) voltage is more but current is less (d) both voltage and current are less
25. Polarising angle for water is $53^{\circ}4'$. If light is incident at this angle on water and reflected, the angle of refraction is.
 (a) $126^{\circ}56'$ (b) $36^{\circ}56'$ (c) 30° (d) $36^{\circ}20'$
26. 1 Curie is.
 (a) activity of 1 g of uranium (b) 1 disintegration / second
 (c) 3.7×10^{10} becquerel (d) 1.6×10^{12} disintegration / second
27. Which of the following devices has a source of emf inside it?
 (a) Voltmeter (b) Ammeter (c) Ohmmeter (d) Rectifier
28. An electric dipole of dipole moment 'p' is kept parallel to an electric field of intensity 'E'. The work done in rotating the dipole through an angle of 90° is
 (a) Zero (b) -pE (c) pE (d) 2pE
29. The number of de Broglie waves of an electron in the n^{th} orbit of an atom is.
 (a) n (b) n-1 (c) n+1 (d) 2n
30. If the output Y of the following circuit is 1, the inputs ABC must be.



- (a) 010 (b) 100 (c) 101 (d) 110

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PART – II

15 x 3 = 45

Note: i) Answer any *fifteen* questions.

31. Define one “Coulomb” on the basis of Coulomb’s law.
32. What is a polar molecule? Give an example.
33. State Ohm’s law.
34. Compare emf and potential difference.
35. A manganin wire of length 2m has a diameter of 0.4 mm with a resistance of 70Ω . Find the resistivity of the material.
36. What are the limitations of a cyclotron.
37. A solenoid of length 1 m and 0.05 m diameter has 500 turns. If a current of 2A passes through the coil, calculate the coefficient of self induction of the coil.
38. What is meant by rms (effective) value of alternating current?
39. An LC resonant circuit contains a capacitor 400 pF and an inductor $100\mu\text{H}$. It is set into oscillations coupled to an antenna. Calculate the wavelength of the radiated electromagnetic wave.

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40. What are Fraunhofer lines?
41. How much should be the voltage of an X-ray tube, so that the electrons emitted from the cathode may give an X-ray of wavelength 1 Å after striking the target?
42. What are the two important facts established by Laue experiment?
43. State the postulates of special theory of relativity.
44. Explain α – decay with an example.
45. Write the uses of nuclear reactor.
46. The base current of the transistor is $50\mu\text{A}$ and collector current is 25mA . Determine the value of β .
47. What are the advantages of negative feedback?
48. Draw summing amplifier circuit using operational amplifier.
49. State De Morgan's theorems.
50. What are the advantages of digital communication?

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PART – III

7 x 5 = 35

Note: i) Answer the question No.54 compulsorily.

ii) Answer any six of the remaining 11 questions.

iii) Draw diagrams wherever necessary.

51. Write the properties of electric lines of forces.
52. Explain the determination of the internal resistance of a cell using voltmeter.
53. Write any five applications of superconductors.
54. Two parallel wires each of length 5m are placed at a distance of 10 cm apart in air. They carry equal currents along the same direction and experience a mutually attractive force of $3.6 \times 10^{-4}\text{N}$. Find the current through the conductors.
(OR)
A rectangular coil of 500 turns and of area $6 \times 10^{-4}\text{m}^2$ is suspended inside a radial magnetic field of induction 10^{-4}T by a suspension wire of torsional constant $5 \times 10^{-10}\text{Nm per degree}$. Calculate the current required to produce a deflection of 10° .
55. Explain the energy losses in a transformer. How are they minimized?
56. State and prove Brewster's law.
57. Explain the spectral series of hydrogen atom. (diagram not necessary)
58. Derive an expression for de Broglie wavelength of matter waves.
59. A metallic surface when illuminated with light of wavelength 3333 Å emits electrons with energies upto 0.6 eV. Calculate the work function of the metal.

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60. Calculate the time required for 60% of a sample of radon to undergo decay (Given $T_{1/2}$ of Radon = 3.8 days)
61. Explain the working of a diode as a half wave rectifier.
62. State the principle of Radar. What are the applications of Radar?

PART – IV

4 x 10 = 40

Note: i) Answer any *four* questions in detail.
ii) Draw diagrams wherever necessary.

63. Derive an expression for electric potential at a point due to an electric dipole. Explain the special cases.
64. Discuss the motion of a charged particle in a uniform magnetic field.
65. Discuss with theory the method of inducing emf in a coil by changing its orientation with respect to the direction of the magnetic field.

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66. Explain Raman effect with the help of energy level diagram.
67. Explain the working of Ruby Laser with the help of energy level diagram.
68. Explain the construction and working of a Geiger-Muller counter.
69. With a neat circuit diagram, explain the working of a single stage CE amplifier. Draw the frequency response curve and discuss the results.
70. Make an analysis of amplitude modulated wave. Plot the frequency spectrum.