Bihar Board Class 12 Physics Set E 2026

Question Paper

Conducted by the Bihar School Examination Board (BSEB)

Time Allowed: 3 hrs 15 min **Maximum Marks: 70**

General Instructions

(i) This question booklet is divided into two sections: **Section A** and **Section B**. The paper has **96 questions** (70 + 20 + 6) and carries **70 marks**.

(ii) In **Section A**, there are 70 objective type questions, out of which **any 35 questions** are to be answered, each carrying **1 mark**. If more than 35 questions are answered, only the first 35 answers are evaluated. The answers are marked on the OMR answer sheet.

(iii) In **Section B**, there are 20 short answer type questions, out of which **any 10 questions** are to be answered, each carrying **2 marks**.

(iv) Apart from these, Section B has 6 long answer type questions, out of which **any 3 questions** are to be answered, each carrying **5 marks**.

(v) Candidates must enter the 10-digit Question Booklet Serial No. on the OMR answer sheet and should give their answers in their own words as far as practicable.

(vi) Figures in the right-hand margin indicate full marks. 15 minutes of extra time have been allotted to read the questions carefully.

Section A: Objective Type Questions (any 35 to be answered, 1 mark each)

1. When an electric dipole $\vec{p}$ is placed in a uniform electric field $\vec{E}$, then at what angle between $\vec{p}$ and $\vec{E}$, the value of torque will be maximum ? [1 mark]

(A) $0°$

(B) $45°$

(C) $90°$

(D) $180°$

2. A circular loop of radius R carries a current I. Its magnetic dipole moment is [1 mark]

(A) IR^2

(B) IR

(C) $2\pi IR$

(D) πIR^2

3. When the tube length of microscope is increased, its magnifying power [1 mark]

(A) increases

(B) decreases

(C) becomes zero

(D) remains unchanged

4. Cathode rays are group of [1 mark]

(A) electrons

(B) protons

(C) neutrons

(D) none of these

5. When a soap bubble is charged, then its size [1 mark]

(A) increases

(B) decreases

(C) remains unchanged

(D) nothing can be said

6. If the area of plates of a capacitor is halved, then the capacitance will [1 mark]

(A) become double

(B) become half

(C) remain same

(D) become four times

7. Choke coil works on the principle of [1 mark]

(A) self induction

(B) transient current

(C) mutual induction

(D) wattless current

8. If a bar magnet is cut into two equal pieces transverse to its length, then each piece will [1 mark]

(A) lose its magnetism

(B) become a single pole

(C) behave as a new magnet with a greater magnetic moment

(D) behave as a new magnet with reduced magnetic moment

9. In an ac circuit of capacitance the current from potential difference is [1 mark]

(A) forward

(B) backward

(C) both are in same phase

(D) none of these

10. A capacitor is a perfect insulator for [1 mark]

(A) alternating currents

(B) direct currents

(C) both (A) and (B)

(D) none of these

11. The unit of displacement current is [1 mark]

(A) Am

(B) A

(C) $\Omega\mathrm{A}$

(D) $\Omega\mathrm{mA}$

12. The solar spectrum is [1 mark]

(A) continuous

(B) line spectrum

(C) spectrum of black lines

(D) spectrum of black bands

13. The field of view is maximum for [1 mark]

(A) plane mirror

(B) convex mirror

(C) concave mirror

(D) cylindrical mirror

14. The ratio of the refractive index of red light to blue light in air is [1 mark]

(A) less than unity

(B) greater than unity

(C) equal to unity

(D) none of these

15. The nuclear density is approximately [1 mark]

(A) independent of mass number

(B) directly proportional to mass number

(C) inversely proportional to mass number

(D) directly proportional to $A^{1/3}$

16. In a transistor [1 mark]

(A) concentration of impurities in the collector is minimum

(B) concentration of impurities in the emitter is minimum

(C) concentration of impurities in the base is minimum

(D) concentrations of impurities in all the three regions are same

17. Coulomb's law is valid for [1 mark]

(A) Point charges only

(B) Dispersed charges only

(C) Both point charges and dispersed charges

(D) Neutral particles

18. S.I. unit of electric flux is [1 mark]

(A) Vm

(B) Vm^2

(C) Jm

(D) NC^{-1}

19. A cell of internal resistance r is connected to an external resistance R. The current will be maximum in R, if [1 mark]

(A) $R = \frac{r}{2}$

(B) $R = r$

(C) $R > r$

(D) $R < r$

20. If L and R represent inductance and resistance respectively, then the unit of L/R will be [1 mark]

(A) ohm

(B) second

(C) volt

(D) ampere

21. In a metallic conductor, the current is carried by [1 mark]

(A) free electrons

(B) protons

(C) free electrons and protons

(D) bound electrons

22. 'World Wide Web' was invented by [1 mark]

(A) Tim Berner-Lee

(B) John Logie Baird

(C) Alexander Bain

(D) G. Marconi

23. Which of the following expressions represents electrical energy ? [1 mark]

(A) $V \cdot I \cdot t$

(B) $V \cdot I$

(C) $I \cdot R^2 \cdot t$

(D) $\frac{V^2}{R}$

24. When an alpha-particle is brought towards another alpha-particle, the potential energy of the system [1 mark]

(A) increases

(B) decreases

(C) remains unchanged

(D) none of these

25. Dielectric constant of water is [1 mark]

(A) 80

(B) 1

(C) 0

(D) ∞

26. The relationship between current density $\vec{J}$, specific conductance σ and electric field intensity $\vec{E}$ is [1 mark]

(A) $\vec{E} = \sigma\vec{J}$

(B) $\vec{E} = \frac{\sigma}{\vec{J}}$

(C) $\vec{J} = \frac{\vec{E}}{\sigma}$

(D) $\vec{J} = \sigma \vec{E}$

27. **The yellow colour code value of carbon resistance is** [1 mark]

(A) 4

(B) 2

(C) 3

(D) 5

28. **Relative permeability is equal to** [1 mark]

(A) $\mu_r = \mu_o \cdot \mu$

(B) $\mu_r = \dfrac{\mu}{\mu_o}$

(C) $\mu_r = \dfrac{\mu_o}{\mu}$

(D) $\mu_r = \sqrt{\mu \cdot \mu_o}$

29. **Who first explained electromagnetic waves mathematically ?** [1 mark]

(A) Einstein

(B) Faraday

(C) Maxwell

(D) Hertz

30. **Which factor of the following does not affect resistance of a conducting wire ?** [1 mark]

(A) Length

(B) Temperature

(C) Material

(D) Voltage applied

31. **When a dielectric is placed in an external electric field, the effective electric field inside the dielectric** [1 mark]

(A) Decreases

(B) Increases

(C) Becomes zero

(D) Remains same

32. **A capacitor of capacitance $1\ \mu\text{F}$ is kept at $1\ \text{V}$ potential difference between the plates. The charge on the charged capacitor will be** [1 mark]

(A) $1\ \text{C}$

(B) zero

(C) $1\ \mu\text{C}$

(D) none of these

33. **If a charged particle of mass m and charge q enters a uniform magnetic field B at an angle θ in the direction of field with velocity v, then the path of the particle is helical. The radius of circular path of the helix will be** [1 mark]

(A) $\frac{mv}{qB}$

(B) $\frac{mv\cos\theta}{qB}$

(C) $\frac{mv\sin\theta}{qB}$

(D) $\frac{2\pi mv}{qB}$

34. **An ideal ammeter has** [1 mark]

(A) zero resistance

(B) infinite resistance

(C) high resistance

(D) negative resistance

35. **Remote control for televisions uses** [1 mark]

(A) infrared waves

(B) ultraviolet waves

(C) radio waves

(D) microwaves

36. **The momentum (p) of photon is** [1 mark]

(A) $\frac{\lambda}{h}$

(B) $\frac{h}{\lambda}$

(C) $\frac{hc}{\lambda}$

(D) $h\lambda$

37. **The radius of the lowest Bohr's orbit in hydrogen atom is r_0. The radius of Bohr's second orbit is** [1 mark]

(A) r_0

(B) $2r_0$

(C) $4r_0$

(D) $\frac{r_0}{2}$

38. **If magnetic field is same but the area of the loop is increased, then the flux** [1 mark]

(A) increases

(B) decreases

(C) becomes zero

(D) remains unchanged

39. The voltage of domestic ac is 220 V. What does this represent ? [1 mark]

(A) Peak value voltage

(B) Mean value voltage

(C) Root mean voltage

(D) Root mean square voltage

40. The wavefront due to a point source at a finite distance from the source is [1 mark]

(A) plane

(B) circular

(C) cylindrical

(D) spherical

41. For destructive interference, the path difference should be equal to [1 mark]

(A) $n\lambda$

(B) $(2n+1)\frac{\lambda}{2}$

(C) zero

(D) infinity

42. In an electric field with intensity $E = 0$, the change of potential V with distance r will be [1 mark]

(A) $V \propto \frac{1}{r^2}$

(B) $V \propto \frac{1}{r}$

(C) $V \propto r$

(D) $V =$ constant and independent of r

43. The equivalent resistance of resistors in parallel combination [1 mark]

(A) decreases

(B) increases

(C) remains same

(D) none of these

44. The magnetic field lines inside a current-carrying solenoid are [1 mark]

(A) circular

(B) diverging

(C) parabola

(D) parallel and straight

45. Coherent sources are those sources for which [1 mark]

(A) phase difference remains constant

(B) amplitude remains constant

(C) frequency remains constant

(D) both phase difference and frequency remain constant

46. Natural light from the sun is [1 mark]

(A) polarised

(B) unpolarised

(C) partially polarised

(D) linearly polarised

47. Radioactivity was discovered by [1 mark]

(A) Marie Curie

(B) Pierre Curie

(C) Ernest Rutherford

(D) Henri Becquerel

48. The example of a broadcast mode of communication is [1 mark]

(A) radio

(B) telephone

(C) television

(D) both (A) and (C)

49. Which device is used as a voltage regulator ? [1 mark]

(A) Transistor

(B) Transformer

(C) Zener diode

(D) Photodiode

50. To remove hypermetropia, lens used is [1 mark]

(A) convex

(B) concave

(C) cylindrical

(D) plano-convex

51. Inverse square law of intensity of light, i.e., intensity $\propto \frac{1}{r^2}$ is applicable for [1 mark]

(A) point source

(B) linear source

(C) cylindrical source

(D) plane source

52. The kinetic energy (K) of an electron in a Bohr orbit is related to its potential energy (U) by

[1 mark]

(A) $K = U$

(B) $K = -U$

(C) $K = -\frac{U}{2}$

(D) $K = -2U$

53. Semiconductor is damaged by the strong current due to [1 mark]

(A) lack of free electrons

(B) excess of protons

(C) excess of electrons

(D) excess of neutrons

54. The valency of impurity element to convert a germanium crystal into a p-type semiconductor is [1 mark]

(A) 2

(B) 3

(C) 4

(D) 5

55. In a communication system, a repeater is [1 mark]

(A) a receiver

(B) a transmitter

(C) a combination of a receiver and transmitter

(D) none of these

56. The maximum velocity of an electron emitted from a metal surface becomes two times when the frequency ν of the incident light is doubled. The work function of the metal is [1 mark]

(A) $\frac{2h\nu}{3}$

(B) $\frac{h\nu}{3}$

(C) zero

(D) $\frac{h\nu}{2}$

57. The dimensions of $\frac{B_0^2}{\mu_0}$ will be the same as that of [1 mark]

(A) energy density

(B) work

(C) momentum

(D) electric flux

58. Nickel is [1 mark]

collegedunia

(A) Paramagnetic

(B) Diamagnetic

(C) Ferromagnetic

(D) None of these

59. In a half-wave rectifier, if the input frequency is 50 Hz, then output frequency will be [1 mark]

(A) 25 Hz

(B) 100 Hz

(C) 0 Hz

(D) 50 Hz

60. How many joules of energy will be released due to mass defect of 1 mg ? [1 mark]

(A) 9×10^6 J

(B) 3×10^8 J

(C) 9×10^{10} J

(D) 3×10^2 J

61. The ratio of de Broglie wavelength associated with two electrons accelerated through 49 V and 64 V is [1 mark]

(A) $\frac{49}{64}$

(B) $\frac{64}{49}$

(C) $\frac{7}{8}$

(D) $\frac{8}{7}$

62. A ray of light is incident normally on a plane mirror. The angle of reflection will be [1 mark]

(A) 90°

(B) 0°

(C) will not be reflected

(D) none of these

63. The phase difference ϕ is related to path difference λ by [1 mark]

(A) $\frac{\lambda}{\pi}\phi$

(B) $\frac{\pi}{\lambda}\phi$

(C) $\frac{\lambda}{2\pi}\phi$

(D) $\frac{2\pi}{\lambda}\phi$

64. The surface charge densities on the surface of two conducting spheres of radii r_1 and r_2 are equal. The ratio of electric field intensities on the surfaces is [1 mark]

(A) $\frac{r_1}{r_2}$

(B) $\frac{r_1^2}{r_2^2}$

(C) $\frac{r_2^2}{r_1^2}$

(D) $1 : 1$

65. Ohm's law does not apply, when [1 mark]

(A) temperature changes

(B) temperature is constant

(C) potential difference changes

(D) none of these

66. An example of natural electromagnetic induction is [1 mark]

(A) radio

(B) television

(C) battery charging

(D) lightning strike

67. Which quantity decreases in step-down transformer ? [1 mark]

(A) Current

(B) Voltage

(C) Frequency

(D) Power

68. The refractive index of water is 1.33. What will be the speed of light in water ? [1 mark]

(A) 1.33×10^8 m/s

(B) 4×10^8 m/s

(C) 2.25×10^8 m/s

(D) 3×10^8 m/s

69. The maximum kinetic energy of the photoelectrons varies [1 mark]

(A) linearly with the frequency and the intensity of the incident radiation

(B) linearly with the frequency and is independent of the intensity of the incident radiation

(C) inversely with the frequency and is independent of the intensity of the incident radiation

(D) inversely with the intensity and is independent of the frequency of the incident radiation

70. Which of the following are known as nucleons ? [1 mark]

(A) Only protons

(B) Protons and electrons

(C) Protons and neutrons

(D) Neutrons and electrons

Section B: Short Answer Type Questions (any 10 to be answered, 2 marks each)

SA-1. **What is Lorentz force ?** [2 marks]

SA-2. **Write any two characteristics of matter waves.** [2 marks]

SA-3. **What is spherical aberration ?** [2 marks]

SA-4. **Write the expression for power factor of LCR circuit.** [2 marks]

SA-5. **What is Malus's law ?** [2 marks]

SA-6. **How are electromagnetic waves different from sound waves ? Write any two differences.** [2 marks]

SA-7. **Differentiate between primary and secondary rainbows.** [2 marks]

SA-8. **What are 'α' and 'β' parameters of transistor? What is their relation?** [2 marks]

SA-9. **Write truth table and Boolean expression of OR and AND gates.** [2 marks]

SA-10. **What are donor and acceptor impurities ?** [2 marks]

SA-11. **Define half-life. State the relation between half-life and decay constant.** [2 marks]

SA-12. **Write the unit and dimensional formula of permittivity of free space.** [2 marks]

SA-13. **What will be the effect on resistance of a metallic conductor and a semiconductor on increasing the temperature ? Explain with reasons.** [2 marks]

SA-14. **Explain sky waves and space waves.** [2 marks]

SA-15. **The maximum and minimum amplitudes for an amplitude modulated wave are 12 V and 3 V respectively. Calculate the value of modulation index.** [2 marks]

SA-16. **Define current density.** [2 marks]

SA-17. **Define ionization energy. What is its value for hydrogen atom ?** [2 marks]

SA-18. **What is the difference between magnification and magnifying power ?** [2 marks]

SA-19. **What is the use of a step-up transformer ?** [2 marks]

SA-20. **What is wattless current?** [2 marks]

Section B: Long Answer Type Questions (any 3 to be answered, 5 marks each)

LA-21. **Derive an expression for torque experienced by electric dipole placed in external electric field.** [5 marks]

LA-22. **Find the expression of the comparison of e.m.f.s of two cells by a potentiometer.** [5 marks]

LA-23. **Draw a ray diagram to show the refraction of light through glass prism. Derive the formula for the determination of refractive index of the material of the prism.** [5 marks]

LA-24. **What are energy bands ? How are these formed ? Distinguish between conductors, semiconductors and insulators on the basis of formation of the energy bands.** [5 marks]

LA-25. **Mention the defects of human vision and describe the methods to remove them.** [5 marks]

LA-26. **Derive an expression for the average value of alternating current.** [5 marks]