



PHYSICS

BOOKS - CHHAYA PHYSICS (BENGALI ENGLISH)

QUESTION PAPER OF WBCHSE 2019

Part A

1. A carbon resistor is coloured with four different bands red, green, orange and silver respectively. Find the range of its probable resistance.

Or, EMF of an electrical cell is 2 volt. A 10Ω resistance is joined at its two ends then potential difference is measured 1.6 volt. Find out the internal resistance and lost volt.



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2. A copper wire of length l metre is bent to form a circular loop. If I amp current flows through the loop, find out the magnitude of magnetic moment of the loop.

Or, Write down the Biot-Savart law. Show its vector form.



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3. Name any two electromagnetic waves. State any one similarity and one dissimilarity between them.



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4. How many α and β -particles are emitted when U^{238} changes to Pb^{206} due to radioactivity? Atomic number of U^{238} changes

to Pb^{206} are 92 and 82 respectively.



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5. A TV tower is 120 m high. How much more height is to be added to it its coverage range is to become double?

Or, Draw a neat diagram of Amplitude Modulated Wave. Write down the formula of 'Modulation Index'.



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6. State Gauss' theorem. With the help of this theorem, find out the electrical intensity at any nearby point due to a uniformly charged thin and long straight wire.

Or, Define electrical dipole moment. An electrical dipole is placed

within a uniform electric field (E) and is rotated to an angle

$\angle(\theta) = 180^\circ$. find out the work done.



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7. On what factors does the capacitance of a capacitor depend ?



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8. Two capacitors of capacitances $20\mu\text{F}$ and $60\mu\text{F}$ are connected in series. If the potential difference between the two ends of the combination is 40 volt, calculate the terminal potential difference of each capacitor.



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9. Define electromagnetic unit of current.



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10. What do you mean by angle of dip at a place? At what place on the earth's surface will the horizontal and vertical components of earth's magnetic field be equal?



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11. What is wavefront of a wave?



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12. Prove the laws of reflection by using Huygens' principle.

Or, In Young's double slit experiment, what is the effect on the interference pattern if,

(i) The distance between the two slits is halved.

(ii) The distance between the screen and the plane of slits is doubled.

(iii) one of the slits is covered with translucent paper.



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13. In case of refraction write down the relation between critical angle and refractive index of the denser medium.



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14. An object of height 2.5 cm is placed perpendicularly on the principal axis of a concave mirror of focal length f at a distance of $\frac{3}{4}f$. What will be the nature of the image of the object and its height?



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15. A person uses spectacles of power +2D. What type of defect of vision is it?



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16. Under what potential difference should an electron be accelerated to obtain de Broglie wavelength of 0.6\AA ?

$$(h = 6.62 \times 10^{-34} \text{ J. s}, m_e = 9.1 \times 10^{-31} \text{ kg})$$



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17. Give an example of production of electron by photon.

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18. Write down Einstein's photoelectric equation.

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19. Light rays of wavelength λ and $\frac{\lambda}{2}$ are incident on a photosensitive metal surface. If the maximum kinetic energy of the emitted photoelectrons from the metal surface in 2nd case be 3 times the maximum kinetic energy of emitted photoelectrons in the 1st case, then determine the work function of the metal.



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20. How are the characteristic X-rays spectrum formed?



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21. What is mean life of a radioactive element?



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22. Establish a relation between half-life and decay constant.



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23. Draw the V-I characteristic curve for forward and reverse bias of a p-n junction diode. (Graph paper is not required)



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24. What are the majority and minority carriers in a p-type semiconductor?



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25. Write down the symbol and truth table of OR gate.



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26. Convert the binary number 10011 into decimal equivalent.

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27. Transistor-what does it mean ?

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28. In a potentiometer experiment why is it necessary to use a long wire? Length and resistance of a potentiometer wire are 4 m and 10Ω respectively. It is connected to a cell of emf 2 volt. Another cell when joined to this potentiometer and null point is measured at 250 cm. Find out the emf of the second cell.

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29. In a metre bridge when the resistance in the left gap is 2Ω and an unknown resistance in the right gap, the balance point is

obtained at 40 cm from zero end. On shunting the unknown resistance with 2Ω , find the shift of the balance point on the bridge.



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30. What is shunt?



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31. 36 cells each of internal resistance 0.5Ω and emf 1.5 V each are used to send current through an external circuit of 2Ω resistance. Find the best mode of grouping then for maximum current and the current through the external circuit.



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32. State Lenz's law related to the electromagnetic induction.

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33. What is eddy current?

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34. What is meant by 'self-inductance of coil is 1 H'?

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35. Establish an expression for self-inductance of solenoid.

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36. Determine the resonance frequency ω_r of a series LCR circuit with $L = 2.0 \text{ H}$, $C = 32\mu\text{F}$ and $R = 10\Omega$. What is the Q-value of this circuit?



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37. Two convex lenses of focal lengths f_1 and f_2 respectively are placed in contact with each other. Then what will be power of their equivalent lens?



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38. Write down the conditions for constructive interference.



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39. The refractive index of glass is 1.55. what is its polarising angle? Determine the angle of refraction for the polarising angle.

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Part B Section I

1. Select the correct answer out of the options given against each question and write in the box provided on right hand side bottom:

The dimension of electric potential is

A. $ML^2T^2A^{-1}$

B. $ML^2T^{-3}A^{-1}$

C. MLT^2A^{-1}

D. $ML^2T^3A^{-1}$

Answer:



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2. Select the correct answer out of the options given against each question and write in the box provided on right hand side bottom:

A wire is stretched by 1 % but volume remains constant, then

- A. resistivity increases by 1%
- B. resistance increases by 2%
- C. resistivity decreases by 1%
- D. resistance decreases by 2%

Answer:



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3. Select the correct answer out of the options given against each question and write in the box provided on right hand side bottom:

The energy of an electron revolving around the nucleus of H-atom is -1.51 eV Angular momentum of this electron will be

A. $\frac{h}{2\pi}$

B. $\frac{2h}{2\pi}$

C. $\frac{3h}{2\pi}$

D. $\frac{4h}{2\pi}$

Answer:



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4. Select the correct answer out of the options given against each question and write in the box provided on right hand side bottom:

Angle of dip is $90^\circ N$ at

- A. magnetic south pole
- B. magnetic north pole
- C. geographic south pole
- D. geographic north pole

Answer:



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5. Select the correct answer out of the options given against each question and write in the box provided on right hand side

bottom:

The equation of an ac is $i = 3 \sin \omega t + 4 \cos \omega t$. Then rms value of this current will be

A. $\frac{3}{\sqrt{2}}$

B. $\frac{4}{\sqrt{2}}$

C. $\frac{7}{\sqrt{2}}$

D. $\frac{5}{\sqrt{2}}$

Answer:



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6. Select the correct answer out of the options given against each question and write in the box provided on right hand side

bottom:

A biconvex lens behaves like a convergent in air but behaves like

a divergent in water. Then refractive index (μ_L) of the lens will be

A. $\mu_L = 1$

B. $\mu_L = 1.33$

C. $\mu_L > 1.33$

D. $1 < \mu_L < 1.33$

Answer:



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7. Select the correct answer out of the options given against each question and write in the box provided on right hand side bottom:

The process in which the amplitude of the carrier wave is made

proportional to the instantaneous amplitude of the signal wave
is called

- A. amplitude modulation
- B. demodulation
- C. rectification
- D. amplification

Answer:



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8. Select the correct answer out of the options given against each question and write in the box provided on right hand side bottom:

Two point charge separated by a distance d apart each other

with a repulsion force 9N. If the separation between $3d$, the force of repulsion will be

- A. 1 N
- B. 3 N
- C. 6 N
- D. 27 N

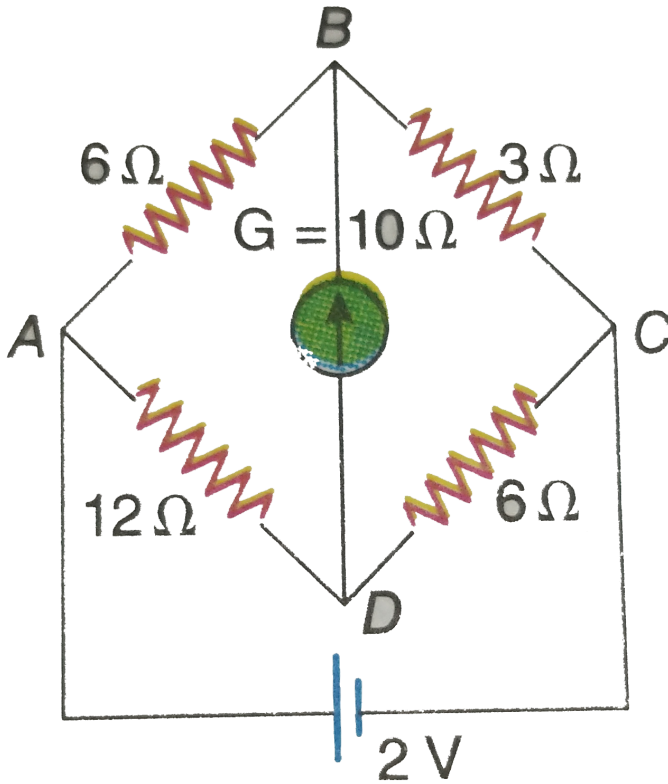
Answer:

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9. Select the correct answer out of the options given against each question and write in the box provided on right hand side bottom:

In the circuit $AB = 6\Omega$, $BC = 3\Omega$, $CD = 6\Omega$, $DA = 12\Omega$, $G = 10\Omega$

, Current through galvanometer is



A. 8.7 mA

B. 7.8 mA

C. 8.7 A

D. 0

Answer:



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10. Select the correct answer out of the options given against each question and write in the box provided on right hand side bottom:

+ q point charge is placed at the centre of a hemispherical surface . Amount of electrical flux crossing through the surface will be

A. $\frac{q}{\epsilon_0}$

B. $\frac{q}{2\epsilon_0}$

C. $\frac{q}{3\epsilon_0}$

D. $\frac{2q}{\epsilon_0}$

Answer:



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11. Select the correct answer out of the options given against each question and write in the box provided on right hand side bottom:

An α -particle and a proton having same momentum enter into a region of uniform magnetic field and move in circular paths. The ratio of the radii of curvature of their circular paths. The ratio of the radii of curvature of their circular paths $\frac{r_\alpha}{r_p}$ in the field is

A. 1

B. $\frac{1}{4}$

C. $\frac{1}{2}$

D. 4

Answer:



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12. Select the correct answer out of the options given against each question and write in the box provided on right hand side bottom:

A straight conductor of length 0.5 m is placed in a magnetic field $\vec{B} = (2\hat{i} + 4\hat{j})\text{T}$. It carries a current 1A along +ve x-axis. The magnitude and direction of force acting on the conductor respectively are

- A. 2N along +ve z - axis
- B. $\sqrt{18}\text{N}$ along +ve z - axis
- C. 4N along +ve y - axis
- D. $\sqrt{2}\text{N}$ along +ve x - axis

Answer:



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13. Select the correct answer out of the options given against each question and write in the box provided on right hand side bottom:

Two waves, whose intensities are 9:16 are made to interfere. The ratio of maximum and minimum intensities in the interference pattern is

- A. 49: 1
- B. 49: 16
- C. 7: 1
- D. 4: 3

Answer:

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14. Select the correct answer out of the options given against each question and write in the box provided on right hand side bottom:

If V_1 increases from 2 V to 6 V then change of current will be



- A. zero
- B. 20 mA
- C. $\frac{80}{3}$ mA
- D. 40 mA

Answer:



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Part B Section II

1. Answer the question in one sentence each

(Alternatives are to be noted):

After what time will the direction of current in an electric supply line of frequency 50 Hz be reversed?

Or, Which physical quantity has unit $\text{Wb} \cdot \text{m}^{-2}$? Is it scalar or vector?



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2. Answer the question in one sentence each

(Alternatives are to be noted):

How is the direction of a magnetic field \vec{B} at a point related to the magnetic line of force passing through that point?

Or, A long straight wire of length l is moving within a uniform magnetic field B with a velocity v perpendicular to the field. how much emf will induce?



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3. Answer the question in one sentence each

(Alternatives are to be noted):

At which temperature is a semiconductor completely transformed to an insulator?



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4. Answer the question in one sentence each

(Alternatives are to be noted):

On what condition a convex lens produces real images of an object on a screen at two positions of the lens?

Or, Sunray, sodium light and headlight of an automobile - which of these light are polarised?



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