PHYSICS

BOOKS - JEEVITH PUBLICATIONS

PHYSICS (KANNADA ENGLISH)

SUPER MODEL QUESTION PAPER (WITH ANSWERS)

Part A

1. Name the apparatus to detect charge on a body

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2. Write the equivalent mathematical form for Ohm's law.

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3. Name the type of induced emf associated with a conductor moving in a static magnetic field.

4. Give the mathematical form of Ampere's circuital law.

5. Long distance radio broadcasts use short wave bands. Why ?

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6. A particle is acceelerated bty applying an electric field how does its de broglic wave length change ?

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7. What the is rest mass energy of a photon?

8. Explain electromagnetic radiations.

9. Why are nuclear forces called exhange forces ?

10. What is amplitude modulation ?

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11. What is the direction of induced electric

field in a dielectric medium ?

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12. Name any one device that works based on balanced condition of the Wheatstone's bridge or network.

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13. Mention the value of gyromagnetic ratio for an electron.

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14. What is mutual induction ?

15. Name a polarised electromagnetic wave.

16. Optical and radio telescopes are built on the ground but x ray astronomy is possible only from satellites orbiting the earth why?

17. State Brewester's law

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18. What is a photon?

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19. Who introduced the concept of matter waves ?

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20. Who proposed the first model of an atom ?

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Part B

1. Define effective resistance of a number of resistors connected in a series or parallel combination

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2. State Kirchhoff's laws of Electrical network.

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3. State and explain Gauss's law in magnetism.

4. Give the expression for Lorentz force acting on a moving electric charge in a combined electric and magnetic field.

5. Distinguish between HF chokes and LF chokes.

6. Explain myopia or short sighteness with a neat labelled diagram

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7. Distinguish between p type and n type semiconductors

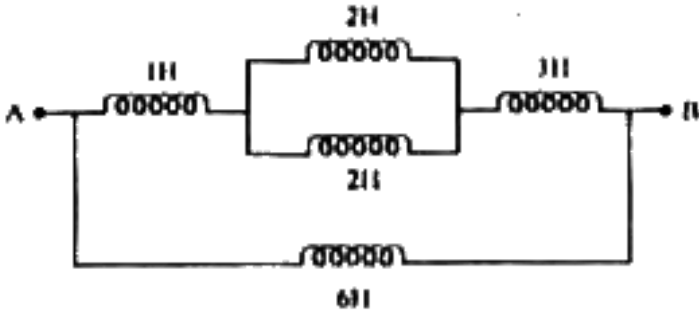▶ **Watch Video Solution**

8. Draw block diagram of a reciever

9. Give an expression for electrostatic force in position vector form

10. Calculate the equivalent inductance between A and B from the following circuit.

11. Draw voltage and current waveform in a pure resistro connected to ac

12. Mention any one demerit of newton's corpuscular theory of light

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13. Write the symbol and truth table for a logic NOT gate

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14. What are space waves used for ?

15. A carrier wave of peak voltage 12 V is used to transmit a message signal. What should be the peak voltage of the modulating signal in order to have a modulation index of 75% ?

16. Mention and five properties of electric field lines.

17. Mention any two factors on which the capacitance of a parallel plate capacitor depends.

18. State and explain ohm's law

19. Define the terms :

(i) Declination

(ii) Inclination or Dip.

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20. State Faraday's law of electromagnetic induction.

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21. Name the type of lens used to correct

(i) Myopia

(ii) Hypermietropia

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22. What is a NAND gate?

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23. Draw block diagram of a reciever

Part C

1. Derive an expression for electric potential energy of a systemm of charges in an electric field.

2. Derive an expression for capacitance of a paralle plate capacitor

3. Give any three pracitical application of high energetic charged particles obtained in a cyclotron

4. Define self inductane of a solenoid. On what factors does it depend ?

5. Show that voltage in an inductor leads the current by $\pi/2$ rad for a pure inductor

6. Write any three difference between interference and diffraction.

7. Explain Werner Heisenberg's uncertainty principle (qualitative).

8. Explain a typical p-n juction solar cell with a neat labelling

9. Give the expression for torque experienced by an electric dipole in an uniform electric field in a vector form. Give the meaning of the symbols used.

10. Give the expression for electric field intensity due to an infinite thin plane sheet. Give the meaning of the symbols used.

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11. Starting from an expression for torque acting on a bar magnet obtain an expression for potential energy

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12. Show that the sum of electrostatic energy and magnetic energy in an LC oscillator equals $\dfrac{q_0^2}{2C}$.

13. S.T f=$\dfrac{R}{2}$ in the case of a spherical mirror where symbols have their usual notations

14. Show that the two waves interfere constructively when the path difference between them is an integral multiple of wavelength Light of wavelenght 2000 A can just eject electron from a metal surface calculate the work function of the metal

15. Explain briefly the doping level and size of three regions of a transistor

16. Obtain the relation between electric field and electric potential due to a point charge.

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17. Derive the expression for energy stored in a charged capacitor.

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18. How is a galvanometer converted into a voltmeter?

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19. Derive the expression for emf induced in a straight conductor moving perpendicular to a uniform magnetic field.

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20. What is a transformer ? Mention two sources of energy loss in a transformer

21. Mention any three application of polaroids

22. Write any three experimental observations of photoelectric effect

23. Distinguish between p type and n type semiconductors

Part D

1. Derive an expression for electrical conductivity.

2. Obtain an expression for the force between two straight parallel conductor carrying current. Hence define ampere.

3. Explain briefly how bar magnets act as equivalent solenoids.

4. Derive referaction formula (for object in air and image in the denser medium) for refraction of light at a spherical surface

5. State the law of radioactivity and hence, show that $N = N_0 e^{-\lambda t}$.

6. Show that voltage gain in a transistor amplifier in CE mode is negative and hence obtain an expression for that voltage gain

7. An oil drop of 12 excess electrons is held stationary under a constant electric field of $2.55 \times 10^4 NC^{-1}$ in Millikan's oil drop experiment. The density of the oil is

$1.26 \times 10^3 kgm^{-3}$. Estimate the radius of the drop $\left(g = 9.81ms^{-2}, e = 1.60 \times 10^{-19}C\right)$.

8. (a) Six lead acid type of secondary cells each of 2.0 V and internal resistance 0.015 w are joined in series to provide a supply resistance of 8.5w what are the current drawn from the supply and its terminal voltage

(b) A secondary cell after long use has an e.m of 1.9 V and largic internal resistance of 380w

what maximum current can be draw from the cell ? Could the cell drive the starting motor of a car ?

9. A circuit constaing 80 m H inductor and 60 μF capacitor in series is coinnected toa 230 V 50 Hz suply the resistacne of the circuit is fnegligible

(a) obtain the current amplitude and r.m.s values

(b) what is the average power transferred fto the induyctor ?

(c) whaqt is the average power transferred to teh inductor ?

(d) what is the average power transferred to the capacitor ?

(e) What is the total average power absrobed by the circuit (averaged over one complete cycle)?

10. Calculate the distance between the centers of 4th and 7th bright fringes in an interference pattern produced in young's slit experiment. Give separation between the slits $= 1.1 \times 10^{-3}$, wavelength of light used $= 589.3nm$, and distance of the screen from the double slit $= 1.3m$.

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11. A 12.5eV electron beam is used to bombard gaseous hydrogen at room temperature What series of wavelengths will be emitted.

12. How is the electric potential at a point due to a given charge measured? Obtain an expression for the electric potential at a point due to an isolated point charge.

13. What is a hysteres curve ? Give any one application of study of hysteresis curve

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14. Obtain an expression for the impedance of a series LCR circuit. (using phasor diagram method).

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15. Obtain the expression for fringe width in the case of interference of light waves.

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16. Deduce the condition for balance of a wheatstone's bridge using Kirchoffs rules .

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17. Derive the expression for magnetic field at a point on the axis of a circular current loop.

18. Write any five properites of ferromagnetic materials

19. Derive th lens maker's formula.

20. State the law of radioactivity and hence, show that $N = N_0 e^{-\lambda t}$.

21. What is rectification with relevant circuit diagram and waveform explain the working of p-n junction dioide as full wave rectifier

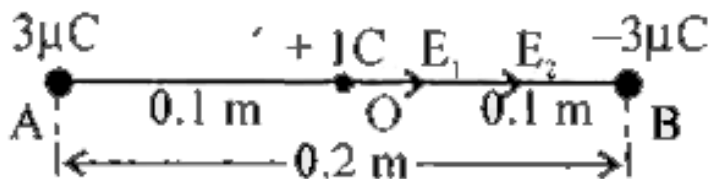**22.** Two point charges $q_A = 3\mu C$ and $q_B = -3\mu C$ are located 0.2 m apart in vacuum.

a. What is the electric field at the mid point O of the line AB joining the two charges?

b. If a negative test charge of magnitude $1.5 \times 10^{-9}C$ is placed at this point, what is the force experienced by the test charge?

23. Which two resistors are connected in series with a cell of emf 2V and negligible internal resistance, a current of (2/5)A flows in the circuit. When the resistances are in parallel, the main current is (5/3)A. Calculate the resistances.

24. A source of alternating emf of 220 V-50 Hz is connected in series with a resitance of 200Ω

an inductance of 100 mH and a capacitance of $30\mu F$ does the current lead or lag the voltage and by what angle ?

25. Light of wavelength 6000 $\overset{\circ}{A}$ is used to obtain interference fringe of width 6 mm in a young's double slit experiment. Calculate the wavelength of light required to obtain fringe of width 4 mm if the distance between the

screen and slits is reduced to half of its initial value.

26. The first member of the Balmer series of hydrogen atom has wavelength of 656.3 nm. Calculate the wavelength and frequency of the second member of the same series. Given, $c = 3 \times 10^8 m/s$.