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MODEL QUESTION PAPERS FOR ANNUAL EXAMINATION 2022-23

II PUC - PHYSICS (33)

MODEL QUESTION PAPER – 1

TIME: 3 Hour 15 Min

Max marks: 70

General Instructions

- 1) All parts are compulsory.
- 2) Part - A questions has to be answered in the first two pages of the answer-booklet. For Part-A questions, first written answer will be considered for answering marks.
- 3) Answers without relevant diagram / figure / circuit wherever necessary will not carry any marks.
- 4) Direct answers to the numerical problems without detailed solutions will not carry any marks.

PART - A

I. Pick the correct option among the four given options for **ALL** of the following questions:

15 × 1 = 15

1. An uncharged body can be charged by the method of
(A) induction (B) friction (C) conduction (D) all of these
2. Electric potential 'V' due to an electric dipole is related to the distance 'r' of the observation point as:
(A) $V \propto r$ (B) $V \propto r^{-1}$ (C) $V \propto r^2$ (D) $V \propto r^{-2}$
3. The electric potential inside a conducting sphere is
(A) is zero
(B) increases from centre to the surface
(C) decreases from centre to the surface
(D) remains constant from centre to the surface
4. In the series combination of two resistors
(A) the current through each resistance is same.
(B) the voltage through each resistance is same.
(C) neither current nor voltage through each resistance is same.
(D) both current and voltage through each resistance are same.
5. When a charge enter in an uniform magnetic field perpendicularly, it moves in
(A) Linear motion (B) circular motion
(C) helical motion (D) oscillatory motion
6. At Curie point of ferromagnetic material becomes
(A) Diamagnetic (B) Paramagnetic
(C) Strongly ferromagnetic (D) non-magnetic
7. Eddy currents produced in a conductor are responsible for:
(A) damping (B) loss of energy (C) heating (D) All of the above
8. Which of the following is/are equal to Henry?
(A) Volt second/ampere. (B) Volt (second)²/coulomb.
(C) Joule (second)²/(coulomb)² (D) All of these
9. In an AC circuit containing only resistor
(A) the current leads the voltage by 90° (B) the current lags the voltage by 90°
(C) the current leads the voltage by 180°
(D) the current and the voltage are in phase

10. Electromagnetic waves are
 (A) transverse in nature
 (B) longitudinal in nature
 (C) may be longitudinal or transverse in nature
 (D) neither be longitudinal nor be transverse
11. Which of these statements is correct about rainbow?
 (A) In primary rainbow, red colour is on the outside and violet colour is on the inside.
 (B) In primary rainbow, violet colour is on the outside and red colour is on the inside.
 (C) In secondary rainbow, light wave suffers one total internal reflection before coming out.
 (D) secondary rainbow is brighter than primary rainbow,
12. Optical fibre works on the principle of
 (A) reflection of light
 (B) total internal reflection of light
 (C) refraction of light
 (D) none of these
13. The maximum kinetic energy of emitted electrons in photoelectric effect is linearly depends on
 (A) intensity of incident radiation
 (B) frequency of incident radiation
 (C) both (A) and (B)
 (D) neither (A) and (B)
14. The binding energy per nucleon is almost constant for many nuclei. It shows that nuclear forces are
 (A) Charge independent
 (B) short range in nature
 (C) saturated in nature
 (D) attractive in nature
15. Which of the following gates corresponds to the truth table given here:
- | A | B | Y |
|---|---|---|
| 0 | 0 | 1 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |
- (A) NAND (B) OR (C) NOR (D) AND

II. Fill in the blanks by choosing appropriate answer given in the brackets for ALL the following questions:

5 × 1 = 5

(Magnetic dip, Fe-56, trivalent, charge, polarisation)

16. The outward electric flux through a closed surface is equal to the $\frac{1}{\epsilon_0}$ the _____ enclosed
17. The angle between the direction earth's total magnetic field and the horizontal line drawn in the magnetic meridian at a place is called _____
18. _____ establishes the transverse nature of light
19. The binding energy per nucleon is maximum for _____
20. A _____ impurity is added to pure germanium to get a p-type semiconductor.

PART-B**III. Answer any FIVE of the following questions:****5 X 2=10**

21. Write any two characteristics of equipotential surfaces.
22. Write the expression for the magnetic force experienced by a current carrying conductor in uniform magnetic field and explain the terms
23. Define geographic and magnetic meridian.
24. Give two applications of eddy currents.
25. What is a transformer? Mention any one power loss in the transformer.
26. What is displacement current? Mention its need.
27. List any two uses of Polaroids.
28. Name the spectral series of hydrogen atom which lies in ultra violet and visible regions of electromagnetic spectrum.
29. Mention two properties of nuclear forces.

PART-C**IV. Answer any FIVE of the following questions:****5 X 3=15**

30. State and explain Coulomb's law.
31. Arrive at an expression for electric current in terms of drift velocity.
32. With neat diagram explain how to convert a galvanometer into an ammeter?
33. Write any three properties of paramagnetic substances.
34. Obtain the expression for the magnetic energy stored in a coil (solenoid).
35. Obtain the relation between the radius of curvature and focal length in concave mirror.
36. Give Bohr's postulates for atom model.
37. Calculate the BE of α particle .given $m_p = 1.00728$ amu $m_n = 1.00867$ amu and $m_\alpha = 4.003$ amu.
38. Distinguish between extrinsic and intrinsic semiconductors.

PART - D**IV. Answer any THREE of the following questions.****3 × 5 = 15**

39. Obtain the expression for the electric field at any point on the equatorial plane of an electric dipole.
40. Assuming the expression for drift velocity, derive the expression for conductivity of a material
41. Using Biot Savart's law, derive the expression for magnetic field at a point on the axis of a circular current loop.
42. What is focal length of a lens? Derive an expression for equivalent focal length of two thin lenses in contact.
43. (i) Define work function and threshold wavelength. (2)
- (ii) Write any three experimental observations of photoelectric effect. (3)
44. (i) What is p-n junction diode? (1)
- (ii) Explain the working of p-n junction diode when it is forward biased. (2)
- (iii) Draw the I-V characteristics for both forward bias and reverse bias of semiconductor diode. (2)

VI. Answer any TWO of the following questions.**2 × 5 = 10**

45. A 600 pF capacitor is charged by a 200 V supply. Calculate the electrostatic energy stored in it. It is then disconnected from the supply and is connected in parallel to another uncharged 600 pF capacitor. What is the energy stored in the combination?

46. Two cells of emf 3 V and 2V and internal resistances 1.5Ω and 1Ω respectively are connected in parallel across 3Ω resistor such that they tend to send current through resistor in the same direction. Calculate potential difference across 3Ω resistors.
47. A 60V, 10W lamp is to be run on 100V, 60 Hz ac mains. Calculate the inductance of a choke coil required to be connected in series with it to work the bulb.
48. In a Young's double slit experiment, the slit separation is 1 mm and the screen is 1m from the slits. For a monochromatic light of wavelength 500 nm, calculate the distance between 3rd minima and central maxima.

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II PUC - PHYSICS (33)

MODEL QUESTION PAPER - 2

Time: 3 hours 15 min.

Max Marks: 70

General Instructions:

1. All parts are compulsory.
2. Part - A questions have to be answered in the first two pages of the answer-booklet.
For Part - A
 1. Questions, first written-answer will be considered for awarding marks.
 2. Answers without relevant diagram / figure / circuit wherever necessary will not carry any marks.
 3. Direct answers to the numerical problems without detailed solutions will not carry any marks.

PART - A

I. Pick the correct option among the four given options for ALL of the following questions:- 15x1=15

1. According to Gauss's Law electric field of an infinity long straight wire is proportional to

(A) r	(B) $1/r^2$	(C) $\frac{1}{r^3}$	(D) $\frac{1}{r}$
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2. One Joule per Coulomb is

(A) Watt	(B) Volt	(C) ampere	(D) Farad
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3. Potential energy of an electric dipole in uniform electric field is maximum when angle between \vec{E} and \vec{p} is equal to

(A) 180°	(B) 90°	(C) 45°	(D) 0°
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4. Wire bound resistors are made by winding wire of an alloy like

(A) manganin	(B) silver	(C) platinum	(D) aluminium
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5. The nature of force between conductors carrying parallel and anti parallel current are

(A) Parallel current repel and anti parallel current attract	(B) Parallel current attract and anti parallel current repel
(C) Both currents attract	(D) Both currents repel
6. Magnetic susceptibility of diamagnetic substance

(A) decreases with temperature	(B) Is not affected by temperature
(C) Increases with temperature	(D) First increases then decreases with temperature
7. Magnetic braking system in trains work on the principle of

(A) mutual induction	(B) self induction	(C) Eddy current	(D) electrical resonance
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- 8 Lenz's Law follows from the principal of conservation of
 (A) mass (B) charge (C) momentum (D) energy
- 9 In a transformer if the secondary coil has less number of turns than primary ($N_s < N_p$) then current in the secondary coil is
 (A) reduced (B) increased (C) constant (D) zero
- 10 The electromagnetic waves having shortest wavelength
 (a) X-Ray (b) UV Ray (C) Gamma Ray (D) IR Ray
- 11 Mirage is a phenomenon due to
 (A) dispersion of light (B) total internal reflection of light
 (C) diffraction of light (D) interference of light
- 12 Diffraction of light is due to
 (A) Superposition of two waves
 (B) Superposition of two coherent source
 (C) Superposition of secondary wavelets from a wave front
 (D) Superposition of incoherent
- 13 Momentum of photon of wavelength λ
 (A) $\frac{h\lambda}{c^2}$ (B) $\frac{h\lambda}{c}$ (C) zero (D) $\frac{h}{\lambda}$
- 14 Identify the particle 'P' in the reaction $\text{proton} \longrightarrow \text{neutron} + \text{neutrino} + P$
 (A) electron (B) proton (C) antineutrino (D) positron
- 15 The Truth Table of a logic gate is given by the corresponding logic gate is

Input		Output
A	B	Y
0	0	0
1	0	1
0	1	1
1	1	1

- (A) OR Gate (B) And Gate (C) NOT Gate (D) NAND Gate

II. Fill in the blanks by choosing appropriate answer given in the brackets for ALL the following questions: 5x1=5

(Magnetization, electric dipole, large diameter, electrical energy, slow down)

16. A system of two equal and opposite point charges separated by a distance is called ___
17. ___ is defined as the net magnetic moment/ unit volume
18. For better resolution telescope must have ___ objective
19. Function of a moderator in a nuclear reactor is to ___ fast neutrons.
20. Solar cells convert solar energy in to ___

PART B

III. Answer any FIVE of the following questions: 5x2=10

21. Draw equipotential surface for
 (a) dipole (b) two identical positive charges,
22. Mention any two uses of cyclotron.
23. Give any two properties of ferromagnetic material.
24. State and explain Faraday's Law of electromagnetic induction.
25. Write an expression for resonant frequency of LCR series circuit and explain the terms.
26. State Ampere Maxwell Law. Write its mathematical form.
27. What is Polaroid? Mention one of its uses.
28. Write any two limitations of Bohr's model of hydrogen atom.
29. Define binding energy of a nucleus. What is its significance?

PART – C

IV. Answer any **FIVE** of the following questions:

5×3=15

30. Derive an expression for torque experienced by an electric dipole placed in uniform electric field.
31. Derive the expression for drift velocity of the electrons in terms of relaxation time.
32. Explain how to convert a galvanometer into a voltmeter with circuit diagram.
33. Explain briefly Hysteresis Loop.
34. Derive an expression for motional e.m.f in a conducting rod moving in uniform magnetic field.
35. Define critical angle and write two conditions for total internal reflection to occur
36. State postulates of Bohr's Theory
37. Radius of ${}^8\text{Be}$ is 2.6 fermi. What is the radius of ${}^{27}\text{Al}$ nucleus in fermi?
38. Write any three differences between intrinsic and extrinsic semiconductor.

PART – D

V. Answer any **THREE** of the following questions:

3×5=15

39. Obtain an expression for electric field due to a uniformly charged infinite plane sheet using Gauss law.
40. Derive an expression for conductivity of a conductor in terms of relaxation time.
41. Derive an expression for torque acting on a current loop placed in a uniform magnetic field
42. Obtain an expression for equivalent focal length of combination of two thin convex lenses in contact. Name one optical instrument which uses as combination of lenses
43. a. Define work function of a metal. (1)
b. Write Einstein's photoelectric equation and explain the terms. (2)
c. Mention any two experimental results using Einstein's photoelectric equation. (2)
44. a. What are LED's? Mention any one use of LED. (2)
c. With a circuit diagram explain how Zener diode can be used as a voltage regulator. (3)

VI. Answer any **TWO** of the following questions:-

2×5=10

45. Three capacitors of capacitance 2PF, 3pF and 4pF are connected in parallel. What is the total capacitance of the combination? Determine charge on each capacitor if the combination is connected to a 100 V supply.
46. Two cells of EMF 2 V and 4V internal resistance 1Ω and 2Ω respectively are connected in parallel across 10Ω resistor such that they tend to send current through resistor in same direction. Calculate potential difference across 10Ω resistor.
47. An LCR series circuit with 10Ω resistor 200 mH inductor and capacitor is connected to 220 Volts 50 Hz AC source. Calculate the capacitance 'C' of the capacitor, if the power factor of the circuit is unity and also calculate Q- factor of the circuit.
48. In Young's double slit experiment that distance between slit is 0.5 mm. The screen is placed 1m away from the slit it is found that 5th bright fringe is at a distance of 4.13 mm from 2nd dark fringe. Find the wavelength of light used.

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II PUC - PHYSICS (33)

MODEL QUESTION PAPER – 3

TIME: 3 Hour 15 Min

Max marks: 70

General Instructions

- 1) All parts are compulsory.
- 2) Part - A questions has to be answered in the first two pages of the answer-booklet. For Part-A questions, first written answer will be considered for answering marks.
- 3) Answers without relevant diagram / figure / circuit wherever necessary will not carry any marks.
- 4) Direct answers to the numerical problems without detailed solutions will not carry any marks.

PART A

I. Pick the correct option among the four given options for ALL of the following questions:

15X1=15

1. The direction of electric field at a point due to positively charged point charge is
 - (A) Directed away from the point charge
 - (B) Directed towards the point charge
 - (C) Directed either away from point charge or towards the point charge
 - (D) Rather directed from point charge or towards the point charge.
2. Equipotential of finite distance from a collection of charges whose total sum is not zero are approximately
 - (A) Spheres
 - (B) Planes
 - (C) Paraboloids
 - (D) Elliproids
3. Energy which is stored in a capacitor is in the form of
 - (A) Magneto static potential energy E
 - (B) electrostatic potential energy
 - (C) kinetic energy
 - (D) All the above
4. Mobility of charge carrier in a conductor is defined as
 - (A) $\frac{\text{Electric field}}{\text{Magnitude of drift velocity}}$
 - (B) $\frac{\text{Magnitude of drift velocity}}{\text{Electric field}}$
 - (C) $\text{Electric field} \times \text{Magnitude of drift velocity}$
 - (D) None of these
5. In a cyclotron, a charged particle
 - (A) undergoes acceleration all the time
 - (B) speed up between the dees because of electric field
 - (C) speed up in a dees
 - (D) slow down within a dee and speed up between dees
6. the magnetic field lines of a magnet
 - (A) form continuous closed loop
 - (B) do not intersect each other
 - (C) do not form closed loops
 - (D) both (A) and (B)
7. A coil of metal wire is kept stationary in a non-uniform magnetic field
 - (A) an emf and current are both induced in the coil
 - (B) a current but no emf is induced in the coil
 - (C) an emf but no current is induced in the coil
 - (D) neither emf nor current is induced in the coil
8. The mutual inductance between the two coils depends upon
 - (A) the medium between the coils only
 - (B) the separation between the coils only
 - (C) both the medium and separation
 - (D) neither the medium nor the separation

9. For a series LCR circuit at resonance, the statement which is not true is
 (A) Wattless current is zero
 (B) Power factor is zero
 (C) Peak energy stored by a capacitor = Peak energy stored by an inductor
 (D) Average power = Apparent power
10. Out of the following options which one can be used to produce a propagating electromagnetic wave?
 (A) a charge less particle (B) an accelerating charge
 (C) a charge moving at constant velocity (D) a stationary charge
11. A short pulse of white light is incident from air to a glass slab at normal incidence. After travelling through the slab, the first colour to emerge is
 (A) Red (B) Violet (C) Blue (D) Green
12. When a plane wave passes through a convex lens, the type of emergent wavefront is
 (A) Plane (B) Spherical (C) Cylindrical (D) None of these
13. For a given photosensitive material, the photoelectric current is directly proportional to the
 (A) frequency of incident light (B) intensity of incident light
 (C) wavelength of incident light (D) intensity of emergent light
14. When a nucleus in an atom undergoes a radioactive decay the electronic energy level of the atom
 (A) do not change for any type of radioactivity
 (B) change for α and β not for γ radioactivity
 (C) change for α radioactivity but not for others
 (D) change for β radioactivity but not for others
15. Hole is a
 (A) Antiparticle of electron (B) A vacancy created when electron leaves a covalent bond
 (C) Absence of free electron (D) An artificially created particle

II. Fill in the blanks by choosing appropriate answer given in the brackets for ALL the following questions: 5X1=5

($n = \tan i_p$, isotones, insulating, magnetic intensity, rectification)

16. Charging by friction is greatly preferred for _____ materials.
17. Magnetisation is directly proportional to _____.
18. Brewster's law is given by _____.
19. Nuclei with same number of neutrons but different atomic number are called _____.
20. If an alternating voltage is applied across the diode, the current flows only in that part of the cycle when the diode is in forward bias, this property is called _____.

PART B

III. Answer any FIVE of the following questions: 5X2=10

21. What is electrostatic shielding? Mention any one use of it.
22. Write the expression for force acting on current carrying conductor kept in an external magnetic field and explain the terms.
23. Define (i) magnetic declination and (ii) magnetic inclination at a place.
24. Write any two advantages of eddy current.
25. Mention any two sources of energy loss in a transformer.

26. Mention any two applications of X-rays.
27. State Huygen's principle.
28. Draw the energy level diagram for H-atom.
29. Write any two differences between nuclear fusion and nuclear fission.

PART C

IV. Answer any FIVE of the following questions:

5X3=15

30. Write any three general properties of electric field lines.
31. State and explain Ohm's law and write any one of its limitation.
32. With neat diagram explain how do you convert a galvanometer into voltmeter?
33. Distinguish between diamagnetic and paramagnetic substances.
34. Derive the expression for energy stored in a current carrying self inductance coil.
35. Derive the relation between focal length and radius of curvature of spherical mirror.
36. State Bohr's postulates.
37. Calculate the energy released during α decay of ${}^{268}_{96}U \rightarrow {}^{234}_{92}Th + {}^4_2He$
 Given: $m[{}^{238}_{92}u] = 238.05079u$ $m[{}^{234}_{90}Th] = 234.04363u$ $m[{}^4_2He] = 4.00260u$
38. Explain with circuit diagram how zener diode acts as a voltage regulator?

PART D

V. Answer any THREE of the following questions:

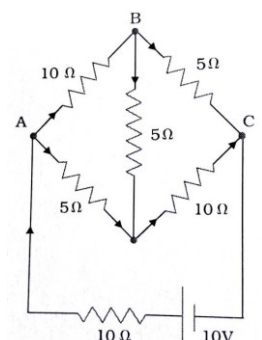
3X5=15

39. Obtain an expression for the electric field at a point along the axis of an electric dipole.
40. Derive an expression for equivalent emf and internal resistance of two cells connected in parallel.
41. Derive an expression for magnetic field at a point due to current carrying circular loop by using Biot-Savart's law.
42. Arrive at the expression for refractive index of material of prism in terms of angle of the prism and angle of minimum deviation.
43. (a) Write Einstein's photoelectric equation and explain the terms. (2)
 (b) Write any three characteristics of photon. (3)
44. (a) Give any two differences between forward bias and reverse bias of p-n junction diode. (2)
 (b) Distinguish between conductor, semiconductor and insulator based on band theory of solids. (3)

VI. Answer any TWO of the following questions:

2X5=10

45. A regular hexagon of side 10 cm has a charges $+5\mu c$, $+4\mu c$, $+3\mu c$, $-5\mu c$, $+2\mu c$ and $+1\mu c$ at its vertices. Calculate the potential at the centre of the hexagon.
46. Determine the current in each branch of the network shown in the figure.



47. A coil of inductance $0.50 H$ and resistance 100Ω is connected to a $240V$, $50Hz$ ac supply.
- What is the maximum current in the coil?
 - What is the time lag between the voltage maximum and the current maximum?
48. In a double slit experiment the angular width of a fringe is found to be 0.2° on a screen placed $1m$ away the wavelength of light used is $600 nm$ what will be the angular width of the fringe. If the entire experimental apparatus is immersed in water? Take refractive index of water to be $\frac{4}{3}$.

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II PUC - PHYSICS (33)
MODEL QUESTION PAPER - 4

TIME: 3 Hour 15 Min

Max marks: 70

General Instructions

- All parts are compulsory.
- Part - A questions has to be answered in the first two pages of the answer-booklet. For Part-A questions, first written answer will be considered for answering marks.
- Answers without relevant diagram / figure / circuit wherever necessary will not carry any marks.
- Direct answers to the numerical problems without detailed solutions will not carry any marks.

Part-A

I. Pick the correct option among the four given options for ALL of the following questions: 15×1=15

- A method for charging a conductor without bringing a charged body in contact with it is called

A) Magnetization	B) Electrification
C) Electrostatic Induction	D) Electromagnetic Induction
- The SI unit of electric potential is

A) Volt	B) Farad (F)	C) Joule	D) V/m
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- which among the following is an example of polar molecule

A) O_2	B) H_2	C) N_2	D) H_2O
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- A resistor is marked with the rings coloured brown black, green and gold. The resistance in ohm is,

A) $(3.5 \times 10^5 \pm 5\%)$	B) $(1.10 \times 10^5 \pm 10\%)$
C) $(1.8 \times 10^6 \pm 5\%)$	D) $(1 \times 10^6 \pm 5\%)$
- The nature of parallel and antiparallel Currents are
 - parallel currents repel and antiparallel currents attract
 - parallel currents attract and antiparallel currents repel.
 - both currents attract
 - Both currents repel
- Which of the following is responsible for the Earth's magnetic field?
 - Convective currents in Earth's are (dynamo effect)
 - Directive currents in the earth's core
 - Rotational motion of earth
 - Translational motion of earth
- Lenz's law is a consequence of the law of Conservation of

A) charge	B) Energy	C) Induced emf	D) Induced current
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- 8) Induction furnace make use of
 A) self induction
 B) mutual induction
 C) Eddy currents
 D) none of these
- 9) A transformer works on the principles of
 A) self induction
 B) electrical inertia
 C) mutual induction
 D) magnetic effect of the electrical current
- 10) Which of the following electromagnetic waves has smallest wavelength?
 A) x - ray
 B) microwaves
 C) γ - rays
 D) radio waves
- 11) Mirage is a phenomenon due to
 A) refraction of light
 B) reflection of light
 C) total internal reflection of light
 D) both (A) and (B)
- 12) By Huygen's wave theory of light we cannot explain the phenomenon of
 A) Interference
 B) Diffraction
 C) photoelectric Effect
 D) refraction
- 13) In photoelectric effect, stopping potential depends on
 A) frequency of incident light
 B) photoelectric work function
 C) intensity of incident light
 D) both (A) and (B)
- 14) The nuclei of which of the following pairs of nuclei are isotones
 A) ${}_{34}\text{Se}^{74}$, ${}_{31}\text{Ca}^{71}$
 B) ${}_{42}\text{MO}^{92}$, ${}_{40}\text{Zr}^{92}$
 C) ${}_{38}\text{Sr}^{81}$, ${}_{38}\text{Sr}^{86}$
 D) ${}_{20}\text{Ca}^{40}$, ${}_{66}\text{S}^{32}$
- 15) At absolute zero, Si acts of a
 A) metal
 B) semiconductor
 C) insulator
 D) none of these

II. Fill in the blanks by choosing appropriate answer given in the brackets for All the following question: 5×1=5

[Controlled chain reaction, Electrification, One, Diamagnetic, Polaroid]

- 16) The process of addition of electrons to a body _____
- 17) _____ materials are weakly repelled by the magnets
- 18) A device used to produce and analyze plane - polarized light _____
- 19) _____ is the principle of nuclear reactor.
- 20) Inputs of NAND gates are A=1, B=0 the output is _____

PART - B

III Answer any FIVE of the following question 5×2=10

- 21) Draw the equipotential surface for a dipole.
- 22) Mention any two uses of cyclotron.
- 23) State and explain Gauss's law in magnetism.
- 24) Mention an expression for self inductance of a solenoid and explain the symbols.
- 25) Define Q-Factor of a series LCR circuit? Mention the expression for Q-Factor of a series LCR circuit.
- 26) Mention any two uses of X-ray.
- 27) Write the expression for limit of resolution of a microscope and explain the terms.
- 28) Mention the expression For Rydberg's constant and explain the symbols.
- 29) Give any two differences between nuclear fission and nuclear fusion.

PART-C

V. Answer any FIVE of the following questions

5×3=15

- 30) Mention the three properties of electric field line.
- 31) Derive an Expression of equivalent resistance of two resistor in series
- 32) With a circuit diagram explain how a galvanometer is converted into an ammeter?
- 33) Define the terms;
 - a) Magnetic declination
 - b) magnetic dip
 - c) Horizontal components of earth's magnetic field.
- 34) Explain the coil and magnet experiment to demonstrate Electromagnetic Induction.
- 35) Draw a neat labeled diagram of refracting telescope.
- 36) Write Bohr's postulates.
- 37) A given coin has a mass of 3.0 g, Calculate the nuclear energy that would be required to separate all the neutrons and protons from each other. For simplicity, assume that the coin is entirely made of ${}_{29}\text{Cu}^{63}$ atoms (of mass 62.9296 m)
- 38) Explain the working of zener diode as a voltage regulator

PART - D

V answer any THREE of the following questions:

3×5=15

- 39) Derive an expression for electric field at a point on the axis of dipole
- 40) Deduce the condition for balance of the Whetstone bridge using Kirchhoff's laws.
- 41) Derive an expression for magnetic field at any point on the axis of a circular current loop by applying Biot-Savart's law
- 42) Derive an expression for the refractive index (n) of material of a prism in terms of angle of minimum deviation (D) and angle of the prism (A).
- 43)
 - a) Define photo electric work function (1)
 - b) Mention the Hertz observation on photoelectric effects (2)
 - c) Expression for de-Broglie wavelength of a photon and explain the symbols. (2)
- 44)
 - a) What is energy gap? (1)
 - b) What are Intrinsic and extrinsic semiconductors? (2)
 - c) Mention any two applications of solar cell. (2)

VI Answer any TWO of the following questions: -

2×5=10

- 45) A 900 pF Capacitor is charged by 100 V battery. How much of electrostatic energy is stored by the capacitor? The capacitor is disconnected from the battery and connected to another 300 pF capacitor. Calculate the electrostatic energy stored by the system and loss of energy after Connecting.
- 46) A uniform wire of resistance 12Ω is cut into three pieces in the ratio 1:2:3 and are connected to form a triangle. A cell of e.m.f 8 volts and internal resistance 1Ω is connected across the highest of the three resistors. Calculate the current through each part of the circuit.
- 47) A series LCR circuit with $R = 20\Omega$, $L = 1.5\text{H}$, and $C=35\mu\text{F}$ is connected to a variable frequency 200V ac supply. When the frequency of the Supply equals the natural frequency of the circuit. What if the average power transferred to the circuit in one complete cycle?

48) In an oil immersion microscope oil of refractive index 1.414 is used. The wavelength of light of used is 4850 \AA and Semi Vertical angle is 45° . Calculate the limit of resolution and resolving power.

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II PUC - PHYSICS (33)
MODEL QUESTION PAPER - 5

TIME: 3 Hour 15 Min

Max marks: 70

General Instructions

- 1) All parts are compulsory.
- 2) Part - A questions has to be answered in the first two pages of the answer-booklet. For Part-A questions, first written answer will be considered for answering marks.
- 3) Answers without relevant diagram / figure / circuit wherever necessary will not carry any marks.
- 4) Direct answers to the numerical problems without detailed solutions will not carry any marks.

PART-A

I. Pick the correct option among four given for ALL of the following questions:

15x1=15

1. The Electrostatic force between two point charges in a medium depends on

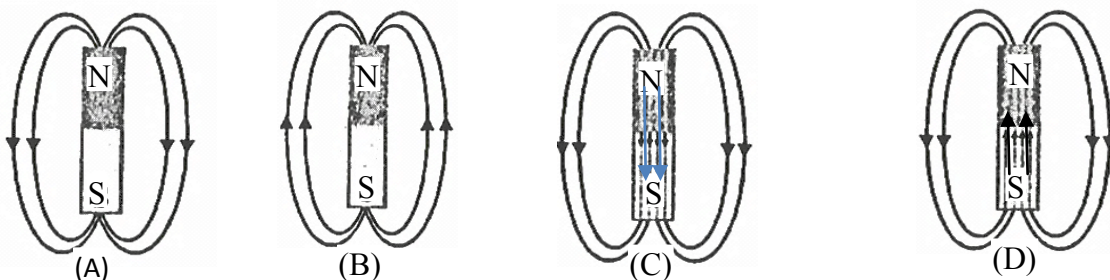
(A) the magnitude of the charges	(B) the distance between the charges
(C) all the above said factors	(D) present in dielectric constant
2. If a unit positive charge is moving from one point to another in an equipotential surface, then

(A) Work is done on charge	(B) Work is done by charge
(C) Work is constant on charge	(D) no work is done.
3. When a dielectric medium is introduced between charged parallel plate capacitor then capacity

(A) decreases	(B) increases	(C) remain same	(D) none of these
---------------	---------------	-----------------	-------------------
4. Kirchhoff's laws are applicable to

(A) only D.C. circuits	(B) only A.C. circuits
(C) both D.C. and A.C circuits	(D) none
5. A beam of electron passes un deflected through mutually perpendicular electric and magnetic fields. If the electric field is switched off, and the same magnetic field is maintained, the electrons move

(A) in a circular orbit	(B) along a parabolic path
(C) along a straight line	(D) in an elliptical orbit
6. The magnetic field lines due to a bar magnet are correctly shown in



7. Faraday's law of electromagnetic induction states that the induced emf in a circuit is
 (A) proportional to magnetic flux density
 (B) inversely proportional to the rate of change of magnetic flux density
 (C) proportional to magnetic field around
 (D) proportional to the rate of change of magnetic flux.
8. The eddy currents are used in
 (A) magnetic break in train.
 (B) induction furnace for melting of iron ore.
 (C) electromagnetic damping in a galvanometers as dead beat.
 (D) All the above.
9. Relation between the peak value(I_0) and the r.m.s value (I_{rms}) of a sinusoidal A.C. is
 (A) $I_{rms} = I_0\sqrt{2}$ (B) $I_{rms} = \frac{I_0}{\sqrt{2}}$ (C) $I_{rms} = \frac{\sqrt{2}}{I_0}$ (D) $I_0 = \left(\frac{2\sqrt{2}}{\pi}\right)I_{rms}$
10. The radiation used to destroy cancer tissue is
 (A) gamma rays (B) IR rays (C) microwaves (D) UV rays
11. As observed from the surface of the moon, the sky appears
 (A) White (B) blue (C) black (D) red
12. Maximum diffraction takes place in a given slit for
 (A) infrared light (B) radio waves (C) γ - rays (D) ultraviolet light
13. The electrons are emitted in the photoelectric effect from a metal surface
 (A) Only if the frequency of the incident radiation is above a certain threshold value
 (B) Only if the temperature of the surface is high
 (C) At a rate that is independent of the nature of the metal
 (D) With a maximum velocity proportional to the frequency of the incident radiation
14. Rutherford's α -particle experiment showed that the atoms have
 (A) Proton (B) Nucleus (C) Neutron (D) Electrons
15. The truth table shown is of :
 (A) NAND gate
 (B) OR gate
 (C) NOR gate
 (D) AND gate

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

II. Fill in the blanks by choosing appropriate answer given in the brackets for ALL the following questions; 5x1=05

(Polarization of light, paramagnetic, newton-square meter/coulomb, decreases, greater than)

16. S.I unit of electric flux is -----.
17. A ferromagnetic substance becomes ----- substance above Curie temperature
18. Phenomenon of ----- is confirmed the transverse nature of light
19. Mean life of radioactive substance is -----half-life of that substance.
20. The depletion region of the semiconducting diode is -----in forward bias.

PART-B

III. Answer any *five* of the following questions;

5x2=10

21. What are polar and non-polar molecules?
22. Write the expression for force acting on a moving charge in a magnetic field and explain the terms.
23. State and explain the Curie's law in magnetism.
24. What is AC generator? Which principle behind working of it.?
25. Draw the ray diagram of a compound microscope.
26. Mention two applications of infrared radiation.
27. How does resolving power of a microscope can be increased?
28. Draw the labelled diagram representing the schematic arrangement of Geiger – Marsden experiment for alpha - particle scattering.
29. Write any two characteristics of nuclear force.

PART-C

IV. Answer any *five* of the following questions;

5x3=15

30. Mention three basic properties of electric charges.
31. With the help of a circuit diagram, obtain the expression for equivalent resistance of two resistors connected in series.
32. By using Ampere circuital law derive an equation for magnetic field due to infinitely long straight current carrying wire.
33. Define a) magnetic declination, b) magnetic dip, and c) horizontal component of earth magnetic field
34. Deduce an equation for energy stored in the self-inductor.
35. Mention three applications of total internal reflection of light.
36. By assuming Bohr's postulates derive an expression for radius of n^{th} orbit of electron, revolving around the nucleus of hydrogen atom.
37. The half-life of a radioactive substance is 1 hour. How long will it take for 80% of the substance to decay?
38. With a circuit diagram, explain the working of p-n junction diode as half wave rectifier.

PART-D

V. Answer any *three* of the following questions;

3x5=15

39. State Gauss's law in electrostatics. Derive an expression for electric field due to uniformly charged thin plane sheet using the Gauss's law.
40. Obtain the balanced condition of the Wheatstone's network, using Kirchhoff's rules.
41. Derive an expression for force on a current carrying conductor is placed in a magnetic field. When it is maximum and minimum.
42. Derive the expression for refractive index of the material of the prism in terms of angle of the prism and angle of minimum deviation.
43. (i) Give two characteristics of photon. (2)
(ii) Mention three experimental observations of photoelectric effect. (3)
44. (i) What is photo diode? Mention its one use. (2)
(ii) Classify metals, semiconductors and insulators on the basis of energy bands. (3)

VI. Answer any *two* of the following questions;

2x5=10

45. A point charge of 25 μC is situated at a point O. A and B are points 0.05m and 0.15m away from this charge. Calculate the amount of work done to move an electron from B to A.

46. The number density of conduction electrons is $9.5 \times 10^{28} \text{ m}^{-3}$. Calculate the time taken by an electron to drift from one end of the wire 4 m long to the other end. The area of cross-section of the wire is $1.8 \times 10^{-6} \text{ m}^2$ and is carrying a current of 5 ampere.
47. A series LCR circuit with $R = 20 \Omega$, $L = 1.5 \text{ H}$ and $C = 35 \mu\text{F}$ is connected to a variable frequency 200 V ac supply. When the frequency of the supply equals the natural frequency of the circuit, what is the average power transferred to the circuit in one complete cycle?
48. A beam of light consists of wavelength 650 nm and 520 nm is used to obtain interference fringes in Young's double slit experiment. a) Find the distance of the third bright fringe on the screen from the central maximum for wavelength 650 nm. b) What is the least distance from the central maximum where the bright fringes due to both the wavelengths coincide? (Given, $D=2\text{m}$ and $d=1.5 \text{ mm}$)

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II PUC - PHYSICS (33)
MODEL QUESTION PAPER - 6

TIME: 3 Hour 15 Min

Max marks: 70

General Instructions

- 1) All parts are compulsory.
- 2) Part - A questions has to be answered in the first two pages of the answer-booklet. For Part-A questions, first written answer will be considered for answering marks.
- 3) Answers without relevant diagram / figure / circuit wherever necessary will not carry any marks.
- 4) Direct answers to the numerical problems without detailed solutions will not carry any marks.

PART - A

I. **Pick the correct option among the four given options for ALL of the following questions:** **15 × 1 = 15**

- 1) A sphere encloses an electric dipole within it. The total flux across the sphere is
(A) Zero (B) Half of that due to a single charge
(C) Double of that due to a single charge (D) Dependent on the position of dipole
- 2) The work done to move a charge on an equipotential surface is
(A) Infinity (B) Less than 1 (C) Greater than 1 (D) Zero
- 3) In a parallel plate capacitor, the capacitance increases if
(A) area of the plate is decreased (B) distance between the plates increases
(C) area of the plate is increased (D) dielectric constant decreases
- 4) Kirchhoff's junction rule is a reflection of
(A) conservation of momentum (B) conservation of current density vector
(C) conservation of charges (D) conservation of energy
- 5) The conversion of a moving coil galvanometer into a voltmeter is done by
(A) introducing a resistance of large value in series
(B) introducing a resistance of small value in parallel
(C) introducing a resistance of large value in parallel
(D) introducing a resistance of small value in series

- 6) Curie temperature is the temperature above which
 (A) a ferromagnetic substance becomes paramagnetic
 (B) a paramagnetic substance becomes diamagnetic
 (C) a ferromagnetic substance becomes diamagnetic
 (D) a paramagnetic substance becomes ferromagnetic
- 7) An inductor stores energy in the form of
 (A) electric field (B) magnetic field
 (C) both in electric and magnetic fields (D) its turns
- 8) In which of the following, the eddy current effect is not used ?
 (A) induction furnace (B) magnetic braking in train
 (C) electromagnet (D) electric heater
- 9) At resonance, the impedance offered by the LCR circuit is
 (A) zero (B) infinity (C) maximum (D) minimum
- 10) An electromagnetic wave can be produced, when charge is
 (A) moving with a constant velocity (B) moving in a circular orbit
 (C) moving in an electric field (D) both (B) and (C)
- 11) In total internal reflection when the angle of incidence is equal to the critical angle for the pair of medium in contact, the angle of refraction is
 (A) 180° (B) 0° (C) equal to angle of incidence (D) 90°
- 12) The colours seen in the reflected white light from a thin oil film are due to
 (A) diffraction (B) interference (C) polarization (D) dispersion
- 13) The maximum kinetic energy of the photoelectrons depends only on
 (A) applied potential (B) Frequency of incident radiation
 (C) Incident angle (D) Pressure
- 14) Hydrogen bomb works on the principle of
 (A) Nuclear fission (B) Nuclear fusion
 (C) Radioactive decay (D) None of these
- 15) When a pentavalent impurity is added to a pure semiconductor, it becomes
 (A) an insulator (B) an intrinsic semiconductor
 (C) p-type semiconductor (D) n-type semiconductor

II. Fill in the blanks by choosing appropriate answer given in the brackets for

ALL the following questions:

5 × 1 = 5

(Permanent Magnet, Radioactivity, Transverse, Insulators, Electric Charge)

- 16) A gold leaf electroscope is a device used to detect the presence of _____
- 17) _____ at room temperature retain their ferromagnetic property for a long period of time.
- 18) Light waves can be polarized because they are _____ in nature.
- 19) The phenomenon of spontaneous disintegration of heavy nuclei with emission of certain radiation is called _____
- 20) The semiconductors are _____ at absolute zero.

PART - B**III. Answer any FIVE of the following questions:****5×2=10**

- 21) What are polar and non-polar molecules?
- 22) When does the force experienced by a straight current carrying conductor placed in a uniform magnetic field become (a) maximum and (b) minimum?
- 23) Define magnetic declination and magnetic inclination at a place.
- 24) Mention any two applications of eddy currents.
- 25) What is transformer? On what principle transformer works?
- 26) What is displacement current? Give the expression for it.
- 27) Write any two uses of Polaroid.
- 28) Write any two limitations of Bohr's atomic model.
- 29) Define half life of a radioactive sample. Write the relationship between half life and mean life of radioactive element.

PART - C**VI. Answer any FIVE of the following questions:****5×3=15**

- 30) Write any three properties of electric field lines.
- 31) Draw graphs showing variation of resistivity with temperature for (a) Copper (b) Nichrome (c) Semiconductor.
- 32) Obtain the expression for radius of circular path of charged particle moving perpendicular to the magnetic field.
- 33) Write any three differences between diamagnetic and paramagnetic materials.
- 34) What is meant by an a.c generator? Write a schematic diagram of an a.c. generator and label the parts.
- 35) What is total internal reflection? Write two conditions for total internal reflection.
- 36) Write the three postulates of Bohr model of the hydrogen atom.
- 37) Calculate the mass defect and binding energy of an alpha particle. Given: The rest mass of alpha particle nucleus = 4.00260 u, mass of neutron = 1.008662 u and mass of proton = 1.007825 u
- 38) With neat diagram explain the Zener diode used as a voltage regulator.

PART - D**VII. Answer any THREE of the following questions:****3×5=15**

- 39) Derive an expression for electric field due to electric dipole at a point on an equatorial line.
- 40) Assuming the drift velocity of the electron, show that $\sigma = \frac{ne^2\tau}{m}$, where the symbols have usual meaning.
- 41) Derive the expression for the magnetic field at a point on the axis of a circular current loop, using Biot-Savart's law.
- 42) Deduce the relation between n, u, v and R for refraction at a spherical surface, where the symbols have their usual meaning.
- 43) (i) Write Einstein's photoelectric equation and explain the terms. (2)
(ii) Write any three experimental observations of photoelectric effect. (3)
- 44) (i) What is rectifier? (1)
(ii) Write the circuit diagram and input - output waveforms for a half wave rectifier. (2)
(iii) Explain the working of a half wave rectifier. (2)

VIII. Answer any TWO of the following questions:**2×5=10**

- 45) In a circular parallel plate capacitor radius of each plate is 6 cm and they are separated by a distance of 3 mm. Calculate the capacitance and the energy stored, when it is charged by connecting the battery of 200 V (Given: $\epsilon_0 = 8.854 \times 10^{-12}$ F/m).
- 46) Two cells of emf 2V and 4V and internal resistance 1Ω and 2Ω respectively are connected in parallel so as to send the current in the same direction through an external resistance of 20Ω . Find the potential difference across 20Ω resistor .
- 47) An AC source of 200 volt, 50 Hz is applied to a series LCR circuit in which $R = 3\Omega$, $L = 25\text{mH}$ and $C = 790\mu\text{F}$. Find (a) the impedance of the circuit and (b) current in the circuit.
- 48) In Young's double slit experiment while using a source of light of wavelength 4500 Å the fringe width is 5mm. If the distance between the screen and the plane of the slits is reduced to half, what should be the wavelength of light to get fringe width 4mm?

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II PUC - PHYSICS (33)
MODEL QUESTION PAPER - 7

TIME: 3 Hour 15 Min**Max marks:** 70**General Instructions**

- 1) All parts are compulsory.
- 2) Part - A questions has to be answered in the first two pages of the answer-booklet. For Part-A questions, first written answer will be considered for answering marks.
- 3) Answers without relevant diagram / figure / circuit wherever necessary will not carry any marks.
- 4) Direct answers to the numerical problems without detailed solutions will not carry any marks.

PART - A**I. Pick the correct option among the four given options for ALL of the following questions:****15 × 1 = 15**

1. Which one of the following is the SI unit of electric flux?
(A) N/m (B) Volt (C) Nm^2 (D) Nm^2/C
2. The maximum electric potential due to a charged conducting sphere of radius R will be
(A) On the surface of conducting sphere
(B) At a distance of 2R from the centre
(C) At a distance $3R/2$ from the centre
(D) At infinite distance from the centre
3. The capacitance of a parallel plate capacitor does not depend upon
(A) Distance between the plates (B) Area of the plates
(C) Medium between the plates (D) charge on the plate
4. The rate of flow of charge through any cross-section of a conductor is called
(A) Electric flux (B) electric current (C) electric charge (D) electric field

5. The magnetic force experienced by a charge is maximum when
 (A) Charge kept inside a magnetic field (B) charge moving parallel to field
 (C) Charge moving opposite to field (D) charge moving perpendicular to field
6. The SI unit of magnetic dipole moment is
 (A) tesla (B) weber (C) Am² (D) A/m
7. The polarity of induced emf tends to produce current, which described by
 (A) Faradays law (B) Gauss law (C) Lenz law (D) Coulombs law
8. A device which converts mechanical energy into electrical energy is
 (A) AC generator (B) Transformer (C) Rectifier (D) Battery
9. Transformer works on the principle of
 (A) Self-induction (B) Mutual induction (C) Superposition (D) Resonance
10. The electromagnetic radiation used in purification of water.
 (A) Gamma rays (B) UV rays (C) X-rays (D) IR rays
11. The angle of reflection for a normal incidence is
 (A) 0 (B) 30° (C) 90° (D) 45°
12. The phenomenon of bending of light at the edge of an obstacle is
 (A) Refraction (B) Dispersion (C) Diffraction (D) Reflection
13. Which of the following has the longest de-Broglie wavelength, if they are moving with same velocity?
 (A) Beta particle (B) alpha particle (C) neutron (D) proton
14. Nuclei having same mass number but different atomic number are
 (A) Isotopes (B) Isotones (C) Isomers (D) Isobars
15. The inputs A=0 and B=0 in a NOR gate the output is
 (A) 0 (B) 1 (C) -1 (D) none of these

II. Fill in the blanks by choosing appropriate answer given in the brackets for

ALL the following questions:

5 × 1 = 5

(Deuterium, Trivalent, tesla, Wavelength, shape)

16. Gauss law does not depend upon the -----of surface
17. SI unit of magnetic field intensity is -----
18. Resolving power of microscope can be increased by decreasing the -----
19. A Helium is obtained by fusion of two -----nucleus
20. p-type semiconductor is obtained by doping -----impurity to pure semiconductor

PART-B

III. Answer any FIVE of the following questions:

5×2=10

21. Mention the properties of equipotential surfaces
22. What is Cyclotron? Mention any one use of it.
23. State and explain Gauss law in magnetism.
24. Define Impedance. Mention its SI unit.
25. What is electrical resonance? Mention the expression for resonant frequency.
26. State and explain Ampere-Maxwell's law
27. Mention the factors on which fringe width depends upon.
28. Name any two spectral series of hydrogen atom.
29. Define the terms (i) half life (ii) mean life of radioactive substance

PART-C

IV. Answer any FIVE of the following questions:

5×3=15

30. Mention the properties of electric field lines
31. Obtain an expression for drift velocity of electrons in a conductor in terms of current.
32. Explain with suitable diagram how do you convert a galvanometer into ammeter?
33. Obtain an expression for radius of circular path traced by a charge when it enters perpendicular to a uniform magnetic field.
34. Derive an expression for motional emf in a conductor moving in magnetic field.
35. Obtain the relation between focal length and radius of curvature of concave mirror.
36. State Bohr's postulates for hydrogen atom .
37. Calculate the binding energy and binding energy per nucleon of ${}_{6}\text{C}^{12}$ from the following data:

Mass of carbon = 12.011 u, Mass of proton=1.00783 u, Mass of neutron=1.00867 u.

38. Distinguish between intrinsic and extrinsic semiconductors.

PART-D

V. Answer any THREE of the following questions:

3×5=15

39. Obtain an expression for electric field at a point on the equatorial plane of an electric dipole.
40. Derive an expression for effective emf and effective internal resistance of two cells connected in parallel.
41. Derive an expression for magnetic field at a point on the axis of circular current carrying conductor by using Biot-Savarts law.
42. Derive Lens makers formula.
43. (i) What is threshold frequency? (1)
(ii) Mention the Einstein's photoelectric equation and explain the terms. (2)
(iii) Write any two experimental observations of photoelectric effect. (2)
44. (i) What is rectification? (1)
(ii) Explain with the help of circuit diagram the working of half wave rectifier. (3)
(iii) Draw the input and output waveforms for a half wave rectifier. (2)

VI. Answer any TWO of the following questions:

2×5=10

45. In a parallel plate capacitor, each plate has an area of $9 \times 10^{-3} \text{ m}^2$ and the distance between the plates is 6 mm. Calculate the capacitance of the capacitor. If this capacitor is connected to a 100 V supply, what is the charge on each plate of the capacitors.
46. (i) Three resistors 1Ω , 2Ω & 3Ω are connected in series. What is the total resistance of the combination?
(ii) If the combination is connected to a battery of emf 8V, obtain the potential drop across each resistor.
47. Calculate the resonant frequency and Q-factor of series LCR circuit containing inductor of inductance 3H, capacitor of capacitance $27 \mu\text{F}$ and resistor of resistance 7.4Ω .
48. In Young's double slit experiment distance between the slits is 0.5 mm. When the screen is kept at distance of 1 m from the slits, the distance of 9th bright fringe from the central fringe is 8.835 mm. Find the wavelength of light used.

II PUC - PHYSICS (33)
MODEL QUESTION PAPER – 8

TIME: 3 Hour 15 Min**Max marks:** 70**General Instructions**

- 1) All parts are compulsory.
- 2) Part - A questions has to be answered in the first two pages of the answer-booklet.
For Part-A questions, first written answer will be considered for answering marks.
- 3) Answers without relevant diagram / figure / circuit wherever necessary will not carry any marks.
- 4) Direct answers to the numerical problems without detailed solutions will not carry any marks.

PART-A

I Pick the correct option among the four given options for ALL of the following questions:

15 x 1 = 15

1. Gauss's law is valid for

(A) Any closed surface	(B) Only regular closed surfaces
(C) Any open surface	(D) Only irregular open surfaces.
2. Which of the following is NOT true?

(A) For a point charge, the electrostatic potential varies as $1/r$
(B) For a dipole, the potential depends on the position vector and dipole moment vector
(C) For an electric dipole, potential varies as $1/r$ at large distance
(D) For a point charge, the electrostatic field varies as $1/r^2$
3. If we carry a charge once around an equipotential path, then work done by the charge is

(A) Infinity	(B) Positive	(C) Negative	(D) Zero
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4. Which of the following is responsible for the flow of current in a conductor?

(A) Protons	(B) Free electrons
(C) Positive ions	(D) Protons and holes
5. Tesla is the unit of

(A) Electric flux	(B) Magnetic flux
(C) Electric field	(D) Magnetic induction
6. Curie temperature is the temperature above which

(A) A ferromagnetic material becomes paramagnetic
(B) A paramagnetic material becomes diamagnetic
(C) A ferromagnetic material becomes diamagnetic
(D) A paramagnetic material becomes ferromagnetic
7. Magnetic lines of force

(A) Always intersect	(B) Are always closed
(C) Tend to crowd far away from the poles of magnet	
(D) Do not pass through vacuum	
8. Lenz's law is consequence of the law of conservation of

(A) Charge	(B) Momentum	(C) Mass	(D) Energy
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9. Eddy currents are produced when
 (A) A metal is kept in varying magnetic field
 (B) A metal is kept in the steady magnetic field
 (C) A circular coil is placed in a magnetic field
 (D) Through a circular coil, current is passed
10. In a pure capacitive circuit or In an ac circuit containing capacitance only, the current
 (A) Leads the e.m.f. by 90°
 (B) Lags behind the e.m.f. by 90°
 (C) Sometimes leads and sometime lags behind the e.m.f.
 (D) Is in phase with the e.m.f.
11. When light is refracted from air into glass
 (A) Its wavelength and frequency both increase
 (B) Its wavelength increases but frequency remains unchanged
 (C) Its wavelength decreases but frequency remains unchanged
 (D) Its wavelength and frequency both decrease
12. Two coherent sources of light can be obtained by
 (A) Two different lamps
 (B) Two different lamps but of the same power
 (C) Two different lamps of same power and having the same colour
 (D) None of the above
13. Photo cells are used for the
 (A) Reproduction of pictures from the cinema film
 (B) Reproduction of sound from the cinema film
 (C) Automatic switching of street light
 (D) Both (B) and (C)
14. In ${}_{88}\text{Ra}^{226}$ nucleus, there are
 (A) 138 protons and 88 neutrons
 (B) 138 neutrons and 88 protons
 (C) 226 protons and 88 electrons
 (D) 226 neutrons and 138 electrons
15. A P-type semiconductor can be obtained by adding
 (A) Arsenic to pure silicon
 (B) Gallium to pure silicon
 (C) Antimony to pure germanium
 (D) Phosphorous to pure germanium

II. Fill in the blanks choosing appropriate answer in the brackets for ALL the following questions. 5x1= 5

(*curie, perpendicular, infinity, zero, photodiode*)

16. The Electric field inside a charged spherical shell is _____
17. The Resistance of an Ideal voltmeter is _____
18. At the polarizing angle the reflected ray and refracted ray are always _____
19. Activity of radioactive substance is said to be 1 _____, when 3.7×10^{10} atoms disintegrates in 1 s.
20. _____ is used to detect optical signals.

PART – B**III. Answer any FIVE of the following questions:****5 x 2 = 10**

21. What are polar and non-polar molecules.
22. State and explain Ampere's circuital law.
23. What is magnetic hysteresis? Write the significance of the area of the hysteresis loop.
24. Mention any two factors on which the self-inductance of a coil depends.
25. Draw the resonance curve of series LCR circuit and indicate resonant frequency.
26. Write any two uses of UV rays.
27. For the refraction of parallel beam of light through a converging lens, draw shape of (i) incident and (ii) refracted wavefronts.
28. Define excitation energy and ionization energy of an atom.
29. Write the nuclear reaction equation for alpha decay of ${}_{92}\text{U}^{238}$.

PART – C**IV. Answer any FIVE of the following questions:****5 x 3 = 15**

30. State and explain Coulomb's law in electrostatics.
31. Derive an expression for conductivity of a conductor in terms of relaxation time.
32. With a circuit diagram, explain how a galvanometer can be converted into an ammeter.
33. Write any three differences between Diamagnetic and Ferro magnetic substances.
34. Derive the expression energy stored in a current carrying coil.
35. What is Total Internal Reflection? Mention the conditions for TIR.
36. Obtain an expression for the radius of n^{th} Bohr orbit of hydrogen atom using Bohr's postulates.
37. Calculate the binding energy per nucleon of an alpha particle from the following data and express it in MeV. Mass of helium nucleus = 4.00260 u. Mass of proton = 1.007825 u. Mass of neutron = 1.008665 u.
38. Give the differences between p-type and n-type semiconductors.

PART – D**V. Answer any THREE of the following questions:****3 x 5 = 15**

39. Derive an expression for electric field at a point on the axis of the dipole.
40. Obtain the condition for balance of a Wheatstone's network using Kirchhoff's laws.
41. Derive an expression for magnetic field at any point on the axis of a circular current loop by applying Biot-Savart's law.
42. Arrive at the expression for the refractive index of material of a prism in terms of angle of minimum deviation and angle of the prism.
43. (i) State three important properties of photons which describes the particle picture of electromagnetic radiation. (3)
- (ii) Write Einstein's photoelectric equation and explain the terms. (2)
44. (i) Mention any two differences between forward biased and reverse biased p-n junction. (2)
- (ii) Write the logic symbol and truth table for NAND gate. (3)

VI. Answer any TWO of the following questions:**2 x 5 = 10**

45. In a parallel plate capacitor with air between the plates, each plate has an area of $6 \times 10^{-3} \text{ m}^2$ and the distance between the plates is 3 mm. Calculate the capacitance of the capacitor. If the capacitor is connected to a 100 V supply, what is the charge on each plate of the capacitor (Absolute permittivity of free space = $8.85 \times 10^{12} \text{ Fm}^{-1}$)
46. Two cells of emf 3 V and 4 V and internal resistance 1 Ω and 2 Ω respectively are connected in parallel so as to send the current in the same direction through an external resistance of 5 Ω . Find the potential difference across 5 Ω resistor.
47. An ac source of 200 V and 50 Hz is applied across a series combination of $R = 20 \Omega$ and an inductor of 800 mH. Calculate (a) impedance of the circuit, (b) peak value of the current in the circuit and (c) power factor of the circuit.
48. In Young's double slit experiment while using a source of light of wavelength 4500 \AA , the fringe width is 5 mm. If the distance between the screen and the plane of the slits is reduced to half, what should be the wavelength of light to get fringe width 4 mm?

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II PUC - PHYSICS (33)**MODEL QUESTION PAPER - 9****TIME:** 3 Hour 15 Min**Max marks:** 70**General Instructions**

- 1) All parts are compulsory.
- 2) Part - A questions has to be answered in the first two pages of the answer-booklet. For Part-A questions, first written answer will be considered for answering marks.
- 3) Answers without relevant diagram / figure / circuit wherever necessary will not carry any marks.
- 4) Direct answers to the numerical problems without detailed solutions will not carry any marks.

PART - A**I. Pick the correct option among the four given options for ALL of the following questions:****15 X 1 = 15**

1. When a negative charge is placed at the centre of the sphere, the direction of the electric field on the Gaussian surface is

A) along the tangent to the surface	B) random
C) radially outward	D) radially inward
2. The electric potential inside a conducting sphere is

A) increases from centre to surface	B) decreases from centre to surface
C) remains constant from centre to surface	D) is zero at every point inside
3. Choose the correct statement.

A) polar molecules have permanent electric dipole moment
B) CO_2 molecule is a polar molecule
C) H_2O is a non - polar molecule
D) non polar molecules have permanent electric dipole moment

4. SI unit of current density
 A) ampere B) ampere / meter C) ampere / (meter)² D) ampere / (meter)³
5. To convert a galvanometer into a voltmeter, we connect
 A) high resistance in parallel B) high resistance in series
 C) low resistance in parallel D) low resistance in series
6. The value of magnetic permeability is maximum for a
 A) diamagnetic substance B) paramagnetic substance
 C) ferromagnetic substance D) none of the above
7. The inductance of a coil is directly proportional to
 A) its length B) the number of turns
 C) the resistance of the coil D) the square of the number of turns
8. Lenz's law is a consequence of the law of conservation of
 A) charge B) energy C) induced emf D) induced current
9. At resonance frequency the impedance in series LCR circuit is
 A) maximum B) minimum C) zero D) infinity
10. The amplitudes of electric and magnetic fields are related to each other by the relation
 A) $BE = C$ B) $B = EC$ C) $E = BC$ D) $BE = C^2$
11. A ray of light from air is incident in water. Then which property of light will not change in water?
 A) velocity B) frequency C) amplitude D) colour
12. In the phenomenon of interference there is
 Aa) annihilation of light energy B) addition of energy
 C) redistribution of light energy D) converted to one form to another
13. The number of electrons ejected during the photo-electric emission from metal surface is proportional to the
 A) frequency of light B) intensity of light
 C) work function of the material D) wavelength of light
14. In the reaction ${}_6\text{C}^{14} \longrightarrow {}_7\text{N}^{14} + \text{X}$, X is
 A) α particle B) β particle C) neutron D) γ ray
15. An n-type semiconductor is
 A) electrically neutral B) can be positively charged and negatively charged
 C) positively charge D) negatively charged

II. Fill in the blanks by choosing appropriate answer given in the brackets for ALL the following questions.

5 X 1 = 5

(Microscope, Gold, Positively, Photodiode, Iron)

16. If a glass rod is rubbed with silk, glass rod get..... charged.
17. Example of diamagnetic substances.....
18.is an optical instrument which forms a magnified image of very small objects held close to the eye.
19. The binding energy per nucleon is maximum for
20. is a reverse biased p-n junction diode.

PART - B

III. Answer any FIVE of the following questions:

5 X 2 = 10

21. What are dielectrics? Give example.
22. Mention any two uses of cyclotron.
23. Draw hysteresis curve for a ferromagnetic material.
24. State and explain Faraday's law of electromagnetic induction.

25. What is transformer? On which principle an transformer works?
26. Mention any two uses of X-ray.
27. What are the coherent sources? Give one example.
28. Write Einstein's equation of photoelectric effect and explain the terms.
29. What are nuclear fusion and nuclear fission?

PART - C

IV. Answer any FIVE of the following questions:

5 X 3 = 15

30. Mention any three properties of electric field lines.
31. State and explain ohm's law. Give its anyone limitations.
32. Obtain the expression for radius of circular path created by charge when its enters perpendicular to the direction of magnetic field.
33. Write any three difference between paramagnetic and ferromagnetic materials.
34. State and explain Lenz's law for induced emf.
35. With a neat diagram explain telescope and hence obtain an expression for magnifying power.
36. State Bhor's postulates of hydrogen atom.
37. A radioactive substance reduced to $1/16^{\text{th}}$ of its original mass in 2 hours. Calculate half - life period of substance.
38. Write the circuit diagram of a half wave rectifier and explain its working.

PART - D

V. Answer any THREE of the following questions:

3 X 5 = 15

39. Obtain the expression for the electric field at a point on the equatorial plane of an electric dipole.
40. Derive an expression of effective resistance of two resistors connected in parallel.
41. Using Biot Savart's law, derive the expression for magnetic field at a point on the axis of a circular current loop.
42. Derive the expression for the refractive index of the material of a prism in terms of the angle of the prism and angle of minimum deviation.
43. i) Mention any two properties of photon.
ii) Write the expression for de-Broglie wavelength of a photon and explain the term.
iii) An α - particle, a proton and an electron are moving with equal kinetic energy. Which one of these particles has the longest de Broglie wavelength?
44. i) What is a semiconductor? Give an example.
ii) Give any three difference between intrinsic and extrinsic semiconductors.

VI) Answer any TWO of the following questions :

2 X 5 = 10

45. Two capacitors of capacitance 600 pF are connected in series across a 200 V supply. Calculate
 - i) The effective capacitance of the combination.
 - ii) The potential difference across each capacitor.
 - iii) The total charge stored in the system.
46. Resistances 1Ω , 2Ω , 1Ω and 2Ω are connected in cyclic order in a Whetstones network. The resistance of the galvanometer in 10Ω . The emf of the cell is 2 V and its internal resistance is negligible. What is the current through the galvanometer.

47. A series LCR circuit is connected to 220 V ac source of variable frequency. The inductance of the coil is 5 H, capacitance of the capacitor is 5 μ F and resistance is 40 Ω . At resonance, calculate

- The resonant frequency.
- Current in the circuit.
- The inductive reactance.

48. A beam of light consisting of two wavelengths 500 nm and 400 nm is used to obtain interference fringes in Young's double slit experiment. The distance between the slits is 0.3 mm and the distance between the slits and the screen is 1.5 m. Compute the least distance of the point from the central maximum, where the bright fringes due to both the wavelengths coincide.

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II PUC - PHYSICS (33)
MODEL QUESTION PAPER – 10

TIME: 3 Hour 15 Min

Max marks: 70

General Instructions

- All parts are compulsory.
- Part - A questions has to be answered in the first two pages of the answer-booklet. For Part-A questions, first written answer will be considered for answering marks.
- Answers without relevant diagram / figure / circuit wherever necessary will not carry any marks.
- Direct answers to the numerical problems without detailed solutions will not carry any marks.

PART - A

I. Pick the correct option among the four given options for ALL of the following questions: 15×1=15

- The minimum value of a charged body can have
(A) 1.6×10^{-19} C (B) 1.6×10^{-18} C
(C) 10^{-19} C (D) 0.8×10^{-19} C
- Electric potential of earth is taken to be zero, because earth is a good.
(A) Insulator (B) Conductor
(C) Semi-conductor (D) Dielectric
- What is the angle of between electric field and equi-potential surface?
(A) 90° always (B) 0° always
(C) 0° to 90° (D) 0° to 180°
- Kirchoff's current law obeys conservation of
(A) Momentum (B) Energy (C) Angular momentum (D) Charge
- For the ideal voltmeter its resistance should be
(A) Zero (B) Infinite (C) 100Ω (D) None of these
- Magnetic meridian is a
(A) Point (B) Horizontal plane (C) Vertical plane (D) line along N-S

- 7) The best material for the core of a transformer is
 (A) Stainless steel (B) Hard steel (C) Soft iron (D) Mild steel
- 8) The magnetic flux linked with a coil N turns of area of cross section A held with its plane parallel to the field B is
 (A) $\frac{NAB}{2}$ (B) NAB (C) $\frac{NAB}{4}$ (D) Zero
- 9) When the frequency of AC is doubled, the impedance of an LCR circuit.
 (A) is doubled (B) increases (C) decreases (D) is halved
- 10) Which of the following radiation has the least wavelength?
 (A) γ -rays (B) UV-rays (C) IR-rays (D) X-rays
- 11) The image formed by convex mirror is
 (A) Real & inverted (B) Virtual & inverted
 (C) Virtual & erect
 (D) Cannot say anything, depends upon object position
- 12) Interference occurs in which of the following waves?
 (A) Longitudinal (B) Transverse (C) Electromagnetic (D) All of these
- 13) Photoelectric emission occurs only when the incident light has more than a certain minimum
 (A) frequency (B) wavelength (C) power (D) intensity
- 14) Solar energy is due to
 (A) Nuclear fission reaction (B) Nuclear fusion reaction
 (C) Chemical reaction (D) Combustions reaction
- 15) While making n-type si semiconductor, we have the doping of
 (A) Indium (B) Arsenic (C) Boron (D) Aluminium

II. Fill in the blanks by choosing appropriate answer given in the brackets for ALL the following questions. 5×1=5

(Negative, ∞ , 1, 0, positively)

- 16) The dielectric constant of metal is
- 17) Susceptibility of a diamagnetic substance is
- 18) The phase difference between any two points on a wavefront is
- 19) α -rays are charged particle.
- 20) To get an output Y=O from NOT gate, the input must be

PART - B

III Answer any FIVE of the following questions. 5×2=10

- 21) Write the properties of equipotential surfaces.
- 22) State Ampere's circuital law.
- 23) What is the significance of hysteresis curve?
- 24) What are eddy currents? How can they be minimized?

- 25) What is inductive & capacitive reactance?
- 26) Write any two characteristics of EM waves.
- 27) Define resolving of telescope on what factors does it depend?
- 28) Write the limitations of Bohr's theory of hydrogen atom.
- 29) Distinguish between Nuclear fission & nuclear fusion.

PART - C

V Answer any FIVE of the following questions

5×3=15

- 30) Show that coulomb's law obeys Newton's III law.
- 31) Find the equivalent resistance when the two resistors are connected in parallel.
- 32) Derive an expression for the force per unit length for the two parallel straight conductors carrying current in same direction.
- 33) Distinguish between paramagnetic & ferromagnetic substance.
- 34) Derive an expression for self inductance of a long solenoid.
- 35) Derive the relation between focal length & radius of curvature of a mirror.
- 36) Mention any spectral lines of hydrogen spectrum on the basis of Bohr's theory of atom.
- 37) Calculate the half-life of the radioactive element having decay constant 5.3×10^{-3} per year.
- 38) Distinguish between metal, semiconductor & insulator on the basis of Band theory of solids.

PART - D

V Answer any THREE of the following questions.

3×5=15

- 39) Derive an expression for electric field strength at a distance point situated along the equatorial line of an electric dipole.
- 40) What is drift velocity & relaxation time of free electrons in a metallic conductor carrying a current? Establish a relation between them.
- 41) Using Biot-Savart law, derive an expression for the magnetic field due to a circular coil carrying current at a point along its axis.
- 42) Derive an expression for lens maker's formula.
- 43) a) Define work function & threshold frequency. (2)
- b) Discuss the laws of photo electric emission with the help of Einstein's photo electric equation. (3)
- 44) a) What is rectifier? (1)
- b) Draw the circuit diagram of full-wave rectifier. (2)
- c) Explain the working of full-wave rectifier. (2)

VI Answer any TWO of the following questions.**2×5=10**

- 45) Two capacitors of capacitance $6\mu\text{F}$ & $12\mu\text{F}$ are connected in series with a battery the voltage across the $6\mu\text{F}$ capacitor is 2V. Compute the battery voltage.
- 46) The resistivity of a conductor is $6 \times 10^{-8} \Omega\text{m}$ at 50°C & $7 \times 10^{-8} \Omega\text{m}$ at 100°C . Calculate the mean temperature coefficient.
- 47) A $44\mu\text{H}$ inductor is connected to 220V, 50Hz AC supply, Determine the rms value of current in the circuit, also calculate the net power absorbed by the circuit in one complete cycle.
- 48) Two slits 0.125 mm apart are illuminated by light of wavelength 4500\AA . The screen is 1m away from the plane of the slits. Find the separation between the second bright fringes on both sides of the central maximum.

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II PUC - PHYSICS (33)
MODEL QUESTION PAPER - 11

TIME: 3 Hour 15 Min**Max marks:** 70**General Instructions**

- 1) All parts are compulsory.
- 2) Part - A questions has to be answered in the first two pages of the answer-booklet. For Part-A questions, first written answer will be considered for answering marks.
- 3) Answers without relevant diagram / figure / circuit wherever necessary will not carry any marks.
- 4) Direct answers to the numerical problems without detailed solutions will not carry any marks.

PART-A**I. Pick the correct option among the four given options for ALL of the following questions: 15 x 1 = 15**

1. Electric flux in an electric field \vec{E} through area \vec{dS} is given by
(A) $\epsilon_0 \vec{E} \cdot \vec{dS}$ (B) $\vec{E} \cdot \vec{dS}$ (C) \vec{E} / \vec{dS} (D) $\vec{E} \times \vec{dS}$
2. Electric Potential is
(A) Scalar and dimensionless quantity
(B) Vector and dimensionless quantity
(C) Scalar and dimensional quantity
(D) Vector and dimensional quantity
3. Charge on a spherical conductor resides
(A) at its surface (B) at its centre
(C) throughout the body (D) cannot be predicted
4. The accurate measurement of emf can be obtained using
(A) Multimeter (B) Voltmeter
(C) Voltmeter (D) Potentiometer
5. The magnetic dipole moment of a current loop is independent of
(A) Magnetic field in which it is lying
(B) Number of loops
(C) Area of the loop
(D) Current in the loop

6. Curie's law for paramagnetic substance can be written as
 (A) $\chi \propto (T-T_c)$ (B) $\chi \propto 1/(T-T_c)$ (C) $\chi \propto 1/T$ (D) $\chi \propto T$
7. Lenz's law is consequence of the law of conservation of
 (A) Charge (B) Momentum (C) Energy (D) Mass
8. Induction furnace makes use of
 (A) Self Induction (B) Eddy currents (C) Mutual Induction (D) Both (A) and (C)
9. In the case alternating voltage applied to series LCR circuit at resonance
 (A) $X_L = R$ (B) $X_C = R$ (C) $X_L = X_C$ (D) $X_L > X_C$
10. Electromagnetic waves are
 (A) Transverse in nature (B) Longitudinal in nature
 (C) May be longitudinal or transverse (D) None of these
11. Brilliance of diamond is due to
 (A) Reflection (B) Refraction
 (C) Scattering (D) Total Internal Reflection
12. Bright colours exhibited by spider's web exposed to sun light are due to
 (A) Interference (B) Dispersion
 (C) Polarization (D) Diffraction
13. The minimum energy required to remove an electron from the metal surface is called
 (A) Stopping Potential (B) Work function
 (C) Binding energy (D) Mechanical energy
14. The energy equivalent of mass 1amu is
 (A) 931 eV (B) 93.1 V (C) 931.5 MeV (D) 9.31 MeV
15. Which logic gate has only one input terminal?
 (A) AND (B) OR (C) NAND (D) NOT

II. Fill in the blanks choosing appropriate answer in the brackets for ALL the following questions. 5x1= 5

(Polaroids, magnetic declination, becquerel, solar cells, electric field)

16. The region in which the charged particles experience electrostatic force is called _____
17. The angle between the geographic meridian and the magnetic meridian is called _____
18. _____ are used as sunglasses.
19. _____ is the SI unit of activity.
20. The optoelectronic device used in artificial satellites as the source of energy is _____

PART - B

III. Answer any FIVE of the following questions:

5 x 2 = 10

21. Mention two applications of electrostatic shielding.
22. Write an expression for Lorentz force and explain the terms.
23. Which material is used in the core of transformer and why?
24. State and explain Faraday's law of electromagnetic Induction.
25. Mention the sources of energy loss in a transformer.
26. Write the expression for displacement current and explain the symbols.

27. State and explain Malus law of polarization.
28. Name any two spectral series of hydrogen atom.
29. Write any two properties of nuclear forces.

PART – C**IV. Answer any FIVE of the following questions:****5 x 3 = 15**

30. Mention three methods of charging a body.
31. Obtain the relation between current density and conductivity of a conductor.
32. With a circuit diagram, explain how a galvanometer can be converted into an ammeter and mention the expression for the resistance of the converted ammeter.
33. Write any three properties of magnetic field lines.
34. Derive the expression energy stored in an inductor.
35. Define Critical angle. Mention the conditions for Total Internal Reflection.
36. Write any three limitations of Bohr's theory.
37. Calculate the binding energy of a nitrogen nucleus ${}^7\text{N}^{14}$ from the following data and express it in MeV. Mass of proton = 1.00783 u. Mass of neutron = 1.00867 u. Mass of nitrogen nucleus = 14.00307 u.
38. Distinguish between p-type and n-type semiconductors.

PART – D**V. Answer any THREE of the following questions:****3 x 5 = 15**

39. Derive an expression for electric field due to an infinitely long straight uniformly charged wire by using Gauss's law.
40. Deduce the condition for balance of a Wheatstone's bridge using Kirchhoff's laws.
41. Derive an expression for magnetic field at any point on the axis of a circular current loop by applying Biot-Savart's law.
42. Derive the relation connecting n , u , v and R for refraction at a spherical surface, where the symbols have their usual meaning.
43. (i) What are matter waves? (1)
(ii) Mention the expression for de-Broglie wavelength in terms of Kinetic energy of the particle and explain the symbols. (2)
(iii) Name the scientist who confirmed wave nature of electrons. (1)
(iv) What is the value of the wavelength of the matter wave calculated by Davisson and Germer Experiment? (1)
44. (i) Mention any two uses of p-n junction. (2)
(ii) Explain the working of Zener diode as a voltage regulator with suitable circuit diagram. (3)

VI. Answer any TWO of the following questions**2 x 5 = 10**

45. ABC is a right angled triangle with $AB = 0.2$ m, $BC = 0.6$ m and $\hat{A}BC = 90^\circ$. A charge of 12 nC is placed at the corner B. Find the amount of work done in transferring a charge of 6 pC from C to A.
46. Three resistors of resistances 2Ω , 3Ω and 4Ω are combined in series. (a) What is the effective resistance of the combination? (b) If the combination is connected to a battery of emf 10 V and negligible internal resistance, obtain the potential difference across each resistor.

47. A sinusoidal voltage of peak value 285 V is applied to a series LCR circuit in which resistor of resistance 5Ω , pure inductor of inductance 28.5 m H and capacitor of capacitance $800 \mu\text{F}$ are connected. (a) Find the resonant frequency and (b) Calculate the impedance and current at resonance.
48. In Young's double slit experiment fringes of certain width are produced on the screen kept at a certain distance from the slits. When the screen is moved away from the slits by 0.1 m fringe width increases by 6×10^{-5} m, the separation between the slits is 1mm. Calculate the wavelength of the light used.

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II PUC - PHYSICS (33)

MODEL QUESTION PAPER – 12

TIME: 3 Hour 15 Min

Max marks: 70

General Instructions

- 1) All parts are compulsory.
- 2) Part - A questions has to be answered in the first two pages of the answer-booklet. For Part-A questions, first written answer will be considered for answering marks.
- 3) Answers without relevant diagram / figure / circuit wherever necessary will not carry any marks.
- 4) Direct answers to the numerical problems without detailed solutions will not carry any marks.

Part-A

I. A pick correct option among the four given options for ALL of the following questions: 15X1=15

1. The force per unit charge is known as
A) electric flux B) electric field C) electric potential D) electric current
2. Which of the following is correct about the property of equipotential surface
A) The electric field is always parallel to the potential surface.
B) An equipotential surface having variable voltage.
C) The electric field is always perpendicular to the potential surface.
D) None of the above.
3. How much work is done in moving a charge of 5 C across two points having the potential difference of 16 V?
A) 65 J B) 45 J C) 40 J D) 80 J
4. Electric current is a
A) scalar quantity B) vector quantity
C) both scalar and vector quantity D) none of the above
5. SI unit of magnetic field is
A) Dyne B) Ohm C) Tesla D) Volt
6. Magnetic susceptibility is positive for
A) Ferromagnetic material B) Paramagnetic material
C) Diamagnetic material D) Both A) and B)
7. Which of the following gives the polarity of the induced emf?
A) Biot-Savart's law B) Lenz's law
C) Ampere's law D) Fleming's right-hand rule
8. Which of the following factors is the induced charge in an electromagnetic induction independent of

- A) Time B) Resistance of the coil C) change of flux D) None of the above
9. What is the frequency of the AC mains in India?
 A) 60HZ B) 50 HZ C) 40 HZ D) 30 HZ
10. The velocity of electromagnetic radiation in a medium of permittivity ϵ_0 and permeability μ_0 is given by
 A) $\sqrt{\epsilon_0/\mu_0}$ B) $\sqrt{\epsilon_0\mu_0}$ C) $1/\sqrt{\epsilon_0\mu_0}$ D) $\sqrt{\epsilon_0/\mu_0}$
11. Which of the following lights deviate the most when it presses through a prism?
 A) Red light B) violet light
 C) Neither (a) nor (b) D) Both (a) and (b)
12. How can the fringe width increase in Young's double slit experiment?
 A) By decreasing the width of the slits B) By reducing the separation of slits
 C) By reducing the wavelength of the slits D) By decreasing the distance between slits and the screen
13. A photo electric cell is a device which
 A) Converts light energy in to electric energy
 B) Converts electrical energy in to light energy
 C) Stores light energy D) Stores electricity
14. Sun's radiant energy is due to
 A) Nuclear fusion B) Nuclear fission
 C) Photo electric effect D) Radioactive decay
15. For AND gate which of the following is correct output.
 A) $Y = A.B$ B) $Y = A + B$ C) $Y = \bar{A}.B$ D) $Y = \bar{A}$

II. Fill in the blanks by choosing appropriate answer given in the brackets for ALL the following questions: 5X1=5

(Transverse, C/m, Isobars, voltage regulator, Absolute temperature)

16. The S.I unit of linear charge density _____
17. The magnetic susceptibility of a paramagnetic substance is inversely proportional to its _____
18. The phenomenon of polarization shows that light has _____ nature.
19. The nuclei having same mass number but different atomic number are called _____
20. Zener diode are used as _____

Part-B

III. Answer any FIVE of the following questions: 5X2=10

21. What is capacitance of a capacitor? Write its SI unit.
22. State and explain Ampere circuital law.
23. Write two properties of paramagnetic substances.
24. What are the factors on which the mutual inductance between a pair of coils depends?
25. What is impedance of a LCR circuit? Write the expression for it.
26. What are electromagnetic waves? Give example.
27. What is interference of light?
28. Name the spectral series of hydrogen atom in the visible region and UV region of electromagnetic spectrum.
29. Define half-life and mean life of radioactive element.

Part-C**IV. Answer any FIVE of the following questions:****5X3=15**

30. Mention three basic properties of electric charges.
31. Define electrical resistivity of a conductor. Mention two factors on which the resistivity of a conductor depends.
32. With a circuit diagram, explain how a galvanometer converted into voltmeter?
33. Write three distinguishing properties of diamagnetic and ferromagnetic substances.
34. Derive the expression for self inductance of a long solenoid.
35. Obtain the expression for equivalent focal length of the combination of two thin convex lenses in contact.
36. State the postulates of Bohr's theory of the hydrogen atom.
37. Distinguish between nuclear fission and fusion.
38. With relevant circuit diagram explain the working of p-n junction diode as a full wave rectifier.

Part-D**V. Answer any THREE of the following questions:****3X5=15**

39. Derive the expression for the electric field of a dipole at a point on the equatorial plane of the dipole.
40. Obtain the condition for balance of a whetstone's network using Kirchhoff's laws.
41. Derive the expression for magnetic field at any point on the axis of a circular current loop by applying Biot-Savart's law.
42. Prove that the refractive index of a prism $n = \frac{\sin(\frac{A+D}{2})}{\sin(\frac{A}{2})}$, where A is angle of the prism and D is the angle of minimum deviation.
43. a) Write the de-Broglie equation and explain the symbols. (2)
b) Mention any three characteristics of photon. (3)
44. a) What is energy gap? (1)
b) When does p-n junction said to be forward biased and reverse biased (2)
c) Mention any two uses of photodiode. (2)

VI. Answer any TWO of the following questions:**2X5=10**

45. In a circular parallel plate capacitor radius of each plate is 5 cm and they are separated by a distance of 2 mm. Calculate the capacitance and the energy stored, when it is charged by connecting the battery of 200 V (permittivity of free space: $8.854 \times 10^{-12} \text{ Fm}^{-1}$).
46. Two identical cells either in series or in parallel combination, give the same current of 0.5 A through external resistance of 4 Ω . Find emf and internal resistance of each cell.
47. Calculate resonant frequency and Q-factor of a series LCR circuit containing a pure inductor of inductance 4H, Capacitor of capacitance 27 μF and resistor of resistance 8.4 Ω .
48. In young's double slit experiment fringes of certain width are produced on the screen kept at a certain distance from the slits. When the screen is moved away from the slits by 0.1 m, fringe width increases by $6 \times 10^{-5} \text{ m}$. The separation between the slits is 1 mm. Calculate the wavelength of the light used.

PHYSICS - KEY ANSWER

Model question paper - 1

Q1	D	Q6	B	Q11	B	Q16	Charge
Q2	D	Q7	D	Q12	B	Q17	Magnetic dip
Q3	A	Q8	D	Q13	B	Q18	Polarisation
Q4	A	Q9	D	Q14	C	Q19	Fe - 56
Q5	B	Q10	A	Q15	A	Q20	Trivalent

Model question paper - 2

Q1	D	Q6	B	Q11	B	Q16	Polar molecules
Q2	D	Q7	C	Q12	C	Q17	Magnetization
Q3	A	Q8	D	Q13	D	Q18	Large diameters
Q4	A	Q9	A	Q14	D	Q19	Ionisation energy
Q5	B	Q10	C	Q15	B	Q20	Electrical energy

Model question paper - 3

Q1	A	Q6	D	Q11	A	Q16	Insulating
Q2	C	Q7	B	Q12	B	Q17	Magnetic intensity
Q3	B	Q8	D	Q13	C	Q18	$\mu = \tan i_B$
Q4	B	Q9	C	Q14	A	Q19	Isotones
Q5	C	Q10	B	Q15	B	Q20	Rectification

Model question paper - 4

Q1	C	Q6	B	Q11	D	Q16	Electrification
Q2	A	Q7	C	Q12	C	Q17	Diamagnetic
Q3	D	Q8	C	Q13	A	Q18	Polaroid
Q4	B	Q9	C	Q14	A	Q19	Controlled chain reaction
Q5	A	Q10	C	Q15	C	Q20	One

Model question paper - 5

Q1	C	Q6	D	Q11	C	Q16	Newton-square meter/coulomb
Q2	D	Q7	D	Q12	B	Q17	Paramagnetic
Q3	B	Q8	D	Q13	A	Q18	Polarization of light
Q4	C	Q9	B	Q14	B	Q19	Greater than
Q5	A	Q10	A	Q15	C	Q20	Decreases

Model question paper - 6

Q1	A	Q6	A	Q11	D	Q16	Electric charge
Q2	D	Q7	B	Q12	B	Q17	Permanent magnet
Q3	C	Q8	D	Q13	B	Q18	Transverse
Q4	C	Q9	D	Q14	B	Q19	Radioactivity
Q5	A	Q10	D	Q15	D	Q20	Insulators

Model question paper - 7

Q1	D	Q6	C	Q11	A	Q16	Shape
Q2	A	Q7	C	Q12	C	Q17	Tesla
Q3	D	Q8	A	Q13	A	Q18	Wavelength
Q4	B	Q9	B	Q14	D	Q19	Deuterium
Q5	D	Q10	B	Q15	B	Q20	Trivalent

Model question paper - 8

Q1	A	Q6	A	Q11	C	Q16	Zero
Q2	C	Q7	B	Q12	D	Q17	Infinity
Q3	D	Q8	D	Q13	B	Q18	Perpendicular
Q4	B	Q9	A	Q14	B	Q19	Curie
Q5	D	Q10	A	Q15	B	Q20	Photodiode

Model question paper - 9

Q1	D	Q6	C	Q11	B	Q16	Positively
Q2	C	Q7	D	Q12	C	Q17	Gold
Q3	A	Q8	B	Q13	B	Q18	Microscope
Q4	C	Q9	A	Q14	B	Q19	Iron
Q5	B	Q10	C	Q15	A	Q20	Photodiode

Model question paper - 10

Q1	A	Q6	C	Q11	C	Q16	∞
Q2	B	Q7	C	Q12	D	Q17	Negative
Q3	A	Q8	D	Q13	A	Q18	0
Q4	D	Q9	B	Q14	B	Q19	Positively
Q5	B	Q10	A	Q15	C	Q20	1

Model question paper - 11

Q1	B	Q6	C	Q11	D	Q16	Electric field
Q2	C	Q7	C	Q12	D	Q17	Magnetic declination
Q3	A	Q8	B	Q13	B	Q18	Polaroids
Q4	D	Q9	B	Q14	C	Q19	Becquerel
Q5	A	Q10	A	Q15	D	Q20	Solar cells

Model question paper - 12

Q1	B	Q6	D	Q11	B	Q16	$C m^{-1}$
Q2	C	Q7	B	Q12	B	Q17	Temperature
Q3	D	Q8	A	Q13	A	Q18	Transverse
Q4	A	Q9	B	Q14	A	Q19	Isobars
Q5	C	Q10	C	Q15	A	Q20	Voltage regulator