



PHYSICS HSSC-II

SECTION - A (Marks 17)

22

Time allowed: 25 Minutes

Version Number 4 0 8 3

Note: Section - A is compulsory. All parts of this section are to be answered on the separately provided OMR Answer Sheet which should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

Q. 1 Choose the correct answer A / B / C / D by filling the relevant bubble for each question on the OMR Answer Sheet according to the instructions given there. Each part carries one mark.

- 1) The value of Rydberg constant is:
A. $1.0974 \times 10^{-7} m^{-1}$ B. $2.01974 \times 10^{-7} m^{-1}$
C. $10.0974 m^{-1}$ D. $1.0974 \times 10^7 m^{-1}$
- 2) Radioactivity was discovered by:
A. Henri Becquerel B. Einstein C. Maxwell D. Max Plank
- 3) The relative permittivity for rubber is:
A. 2.94 B. 2.1 C. 2.284 D. 3.40
- 4) Electric potential energy per unit charge is:
A. Electric flux B. Electric potential
C. Electric field D. Electric intensity
- 5) In an electrolyte the charge carriers are:
A. Positive ions and electrons B. Electrons
C. Positive and negative ions D. Protons
- 6) The unit of conductivity is:
A. $mho m^{-1}$ B. $Ohm m^{-1}$ C. Siemen D. mho
- 7) A galvanometer can be made more sensitive if C/BAN is made:
A. Large B. Infinite C. Zero D. Small
- 8) In CRO the number of electrons are controlled by:
A. Grid B. Anode C. Filament D. Cathode
- 9) Lenz's law deals with the:
A. Magnitude of current B. Direction of induced current
C. Magnitude of emf D. Direction of emf
- 10) The self-induced emf is sometimes called:
A. Back emf B. Constant emf C. Motional emf D. Variable emf
- 11) Peak to peak value of voltage is:
A. $\frac{V_0}{\sqrt{2}}$ B. $\frac{V_0}{2}$ C. $\sqrt{2}V_0$ D. $2V_0$
- 12) The frequencies of AM transmission range between:
A. 450KHz to 1600KHz B. 88MHz to 108MHz
C. 450KHz to 1400KHz D. 500KHz to 1500KHz
- 13) A substance which undergoes plastic deformation is called:
A. Brittle B. Ceramic C. Ductile D. Plastic
- 14) The curie temperature for iron is about:
A. $750^\circ C$ B. $1000^\circ C$ C. $400^\circ C$ D. $570^\circ C$
- 15) The current gain of a transistor is given as:
A. $\frac{I_B}{I_E}$ B. $\frac{I_C}{I_B}$ C. $\frac{I_E}{I_C}$ D. $\frac{I_C}{I_E}$
- 16) The quantity $\sqrt{1 - \frac{v^2}{c^2}}$ is always:
A. Less than one B. Greater than one C. Zero D. Equal to one
- 17) The dimensions of factor $\frac{h}{m_0 c}$ is same as that of:
A. Mass B. Momentum C. Length D. Time



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PHYSICS HSSC-II

Time allowed: 2:35 Hours

Total Marks Sections B, C and D: 68

NOTE: Answer any Seven parts each from Section 'B' and 'C' and any two questions from Section 'D' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet-B if required. Write your answers neatly and legibly.

SECTION – B (Marks 21) (Chapter 12 – 16)

Q. 2 Answer any SEVEN parts. All questions carry equal marks. (7 x 3 = 21)

- (i) In the expression $F = K \frac{q_1 q_2}{r^2}$, briefly discuss K and the factors on which it depends.
- (ii) What are electric lines of force? Why two electric lines of force never cross each other?
- (iii) What is source of current? Discuss briefly.
- (iv) Do bends in a wire affect electrical resistance? Discuss.
- (v) Define one Tesla and show that $1Wbm^{-2} = 1$ Tesla.
- (vi) Why do the picture on TV screen become distorted when a magnet is brought near the screen?
- (vii) Does the induced emf always act to decrease the magnetic flux through a circuit? Discuss briefly.
- (viii) Show that ϵ and $\frac{\Delta\phi}{\Delta t}$ have the same unit.
- (ix) A sinusoidal current have rms value of $10A$. What is the peak value?
- (x) How does the doubling of frequency affect the reactance of a) an inductor b) a capacitor?

SECTION – C (Marks 21) (Chapter 17 – 21)

Q. 3 Answer any SEVEN parts. All questions carry equal marks. (7 x 3 = 21)

- (i) Distinguish between Crystalline, Amorphous and Polymeric solids.
- (ii) What is meant by strain energy? How can it be determined from the force extension graph?
- (iii) What is principle of virtual ground? Apply it to find the gain of an inverting amplifier.
- (iv) Why a photodiode is operated in reverse biased state? Discuss briefly.
- (v) Is it possible to create a single electron from energy? Discuss briefly.
- (vi) What advantages does an electron microscope has over an optical microscope?
- (vii) Prove that electron can exist in the atom but outside the nucleus.
- (viii) Define population inversion. Why population inversion is necessary for laser action?
- (ix) Why are heavy nuclei unstable? Discuss briefly.
- (x) What is fusion reaction? What factors make this reaction difficult to achieve?

SECTION – D (Marks 26)

Note: Attempt any TWO questions. All questions carry equal marks. (2 x 13 = 26)

- Q. 4**
- a. What is R.C series circuit? Discuss its behaviour with AC. Calculate the impedance and phase angle of R.C series circuit. (1+2+2+2)
 - b. How fast must a proton move in a magnetic field of $2.50 \times 10^{-3} T$ such that magnetic force is equal to its weight? (4)
 - c. What are super conductors? Discuss briefly. (2)

- Q. 5**
- a. State and prove Gauss's law. Derive an expression for electric intensity due to an infinite sheet of charge. (1+2+3)
 - b. Find the equivalent resistance and total current drawn from the source. Also find current through each resistance for given circuit. (5)

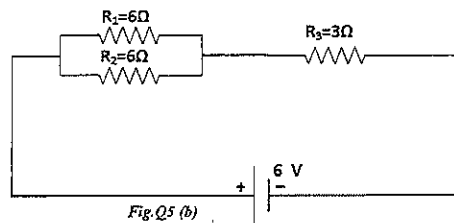


Fig.Q5 (b)

- c. Briefly discuss back emf effect in motor. (2)
- Q. 6**
- a. What is photoelectric effect? Discuss its results and explain this effect on the basis of Quantum theory. (1+3+3)
 - b. Calculate the longest wavelength of radiation for Paschen series. (4)
 - c. What is background radiation/ State its sources. (2)



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SECTION – A (Marks 17)

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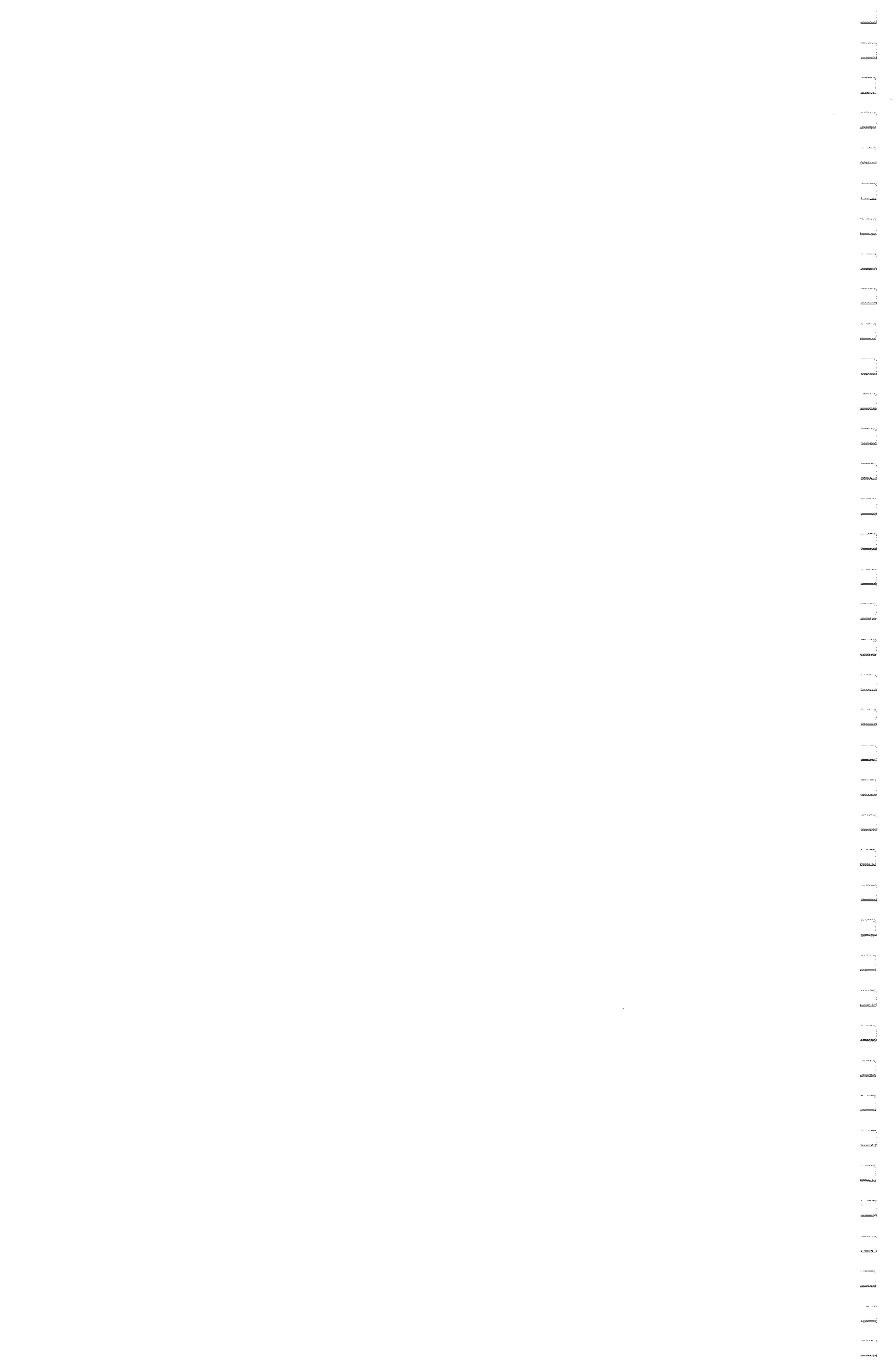
Time allowed: 25 Minutes

Version Number 4 0 8 6

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Q. 1 Choose the correct answer A / B / C / D by filling the relevant bubble for each question on the OMR Answer Sheet according to the instructions given there. Each part carries one mark.

- 1) The SI unit of equivalent dose is:
A. Curie B. Gray C. Rad D. Sievert
- 2) The relative permittivity for Benzene is:
A. 2.284 B. 2.1 C. 2.94 D. 7.5
- 3) One Joule is equal to:
A. $6.25 \times 10^{-18} eV$ B. $1.6 \times 10^{-19} eV$ C. $1.6 \times 10^{19} eV$ D. $6.25 \times 10^{18} eV$
- 4) Kirchhoff's point rule is a manifestation of law of conservation of:
A. Momentum B. Mass C. Charge D. Energy
- 5) The drift velocity of electrons in a metallic conductor is of the order of:
A. $10^{-5} ms^{-1}$ B. $10^{-2} ms^{-1}$ C. $10^{-4} ms^{-1}$ D. $10^{-3} ms^{-1}$
- 6) The unit of magnetic flux is:
A. $Nm^{-1}A$ B. NmA^{-1} C. Nm^2A^{-1} D. $Nm^{-1}A^{-1}$
- 7) The magnetic induction is also called:
A. Magnetization B. Magnetic flux
C. Magnetic Intensity D. Flux density
- 8) An induced emf in a coil is produced due to:
A. Change of momentum B. Change of electric flux
C. Change of magnetic flux D. Change of energy
- 9) The self-inductance of a coil is expressed as:
A. $\frac{-\Delta t / \Delta I}{\epsilon_L}$ B. $\frac{-\epsilon_L}{\Delta I / \Delta t}$ C. $\frac{-\epsilon_L}{\Delta t / \Delta I}$ D. $\frac{-\Delta I / \Delta t}{\epsilon_L}$
- 10) The most common source of alternating voltage is:
A. DC motor B. DC generator C. AC generator D. Transformer
- 11) The range of F.M transmission frequencies is:
A. 88KHz to 108KHz B. 540KHz to 1600KHz
C. 540MHz to 1600MHz D. 88MHz to 108MHz
- 12) The conductivity of a semiconductor in $(\Omega m)^{-1}$ is:
A. 10^{-6} to 10^{-4} B. 10^2 to 10^7 C. 10^4 to 10^7 D. 10^{-20} to 10^{-10}
- 13) The ratio of stress to strain is called:
A. Young's Modulus B. Modulus of Elasticity
C. Modulus of Rigidity D. Shear Modulus
- 14) A device which can convert various physical quantities into electric voltage is called:
A. Sensor B. Transistor C. Amplifier D. Rectifier
- 15) The Earth's orbital speed is:
A. $0.3kms^{-1}$ B. $3000kms^{-1}$ C. $300kms^{-1}$ D. $30kms^{-1}$
- 16) de. Broglie's relation is given as:
A. $\lambda = \frac{mv}{h}$ B. $h = mv\lambda$ C. $v = \frac{h}{m\lambda}$ D. $\lambda = \frac{h}{mv}$
- 17) A transmitter consists of:
A. One electrode B. Two electrodes
C. Three electrodes D. Four electrodes





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NOTE: Answer any Seven parts each from Section 'B' and 'C' and any two questions from Section 'D' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet-B if required. Write your answers neatly and legibly.

SECTION – B (Marks 21) (Chapter 12 – 16)

Q. 2 Answer any SEVEN parts. All questions carry equal marks.

(7 x 3 = 21)

- (i) By using $K = \frac{1}{4\pi\epsilon_0}$, show that $\epsilon_0 = 8.85 \times 10^{-12} C^2 N^{-1} m^{-2}$
- (ii) How can you identify that which plate of a Capacitor is positively charged? Discuss briefly.
- (iii) Name the charge carriers in metals, electrolytes and gases.
- (iv) Why does the terminal potential difference of a battery decreases when the current drawn from it is increased? Explain briefly.
- (v) What is sensitive galvanometer? How can a galvanometer be made more sensitive? Discuss briefly.
- (vi) How can you use a magnetic field to separate isotopes of chemical element?
- (vii) Define efficiency of a transformer. How can one improve the efficiency of a transformer? Discuss briefly.
- (viii) Can a DC motor be turned into a DC generator? If yes, what changes are required to be done?
- (ix) What is phase of A.C? Discuss briefly.
- (x) At what frequency will an inductor of $1H$ have reactance of 500Ω ?

SECTION – C (Marks 21) (Chapter 17 – 21)

Q. 3 Answer any SEVEN parts. All questions carry equal marks.

(7 x 3 = 21)

- (i) Define 'Proportional limit' 'UTS' and 'Plasticity'.
- (ii) For Hysteresis loop define the terms saturation, retativity and coercivity.
- (iii) Briefly discuss the characteristics of op-amp.
- (iv) Why is the base current in a transistor very small? Discuss briefly.
- (v) When a solid is heated why does it first appear red? Discuss briefly.
- (vi) A particle of mass $5.0mg$ moves with speed of $8.0ms^{-1}$. Calculate its de-Broglie wavelength.
- (vii) Is energy conserved when an atom emits a photon of light? Discuss briefly.
- (viii) What are the advantages of laser over ordinary light?
- (ix) A particle which produces more ionization is less penetrating. Why?
- (x) Give a brief account of interaction of radiations with matter.

SECTION – D (Marks 26)

Note: Attempt any TWO questions. All questions carry equal marks.

(2 x 13 = 26)

- Q. 4**
- a. State Kirchoff's rules. Explain Kirchoff's second rule in detail. (2+4)
 - b. Find the radius of an orbit of an electron moving at the rate of $2.0 \times 10^7 ms^{-1}$ in a uniform magnetic field of $1.20 \times 10^{-3} T$. (4)
 - c. In an R-L circuit will the current lag or lead? Discuss by a vector diagram. (3)
- Q. 5**
- a. What do you mean by electromagnetic induction? Describe any three methods of producing induced emf. (1+6)
 - b. Determine the electric field at the position $r = (4\hat{i} + 3\hat{j})m$ caused by a point charge $q = 5.0 \times 10^{-6} C$ placed at origin. (4)
 - c. The inputs of a gate are 1 and 0. Identify the gate if its output is: a) 0, b) 1 (2)
- Q. 6**
- a. State postulates of Bohr's theory of Hydrogen atom. Derive an expression for a radius of quantized orbit. (2+4)
 - b. What is the maximum wavelength of two photons produced when a positron annihilates an electron? The rest mass energy of each is $0.51MeV$. (5)
 - c. Define mass defect and binding energy. (2)



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