01. WAVES

LONG ANSWER QUESTIONS (8 MARKS)

01. Explain the formation of stationary waves in stretched strings and hence deduce the laws of transverse waves in stretched strings ? **TS May 16, 18, Mar 19; AP May 16, 18**

02. Explain the formation of stationary waves in an air column enclosed in open pipe. Derive the equations for the frequencies of the harmonics produced.

TS May 17, Mar 16, 20; AP Mar 16, 17, 18, May 14, 17

03. How are the stationary waves formed in a closed pipe ? Explain the various modes of vibrations in a closed pipe and establish the relation between their frequencies.

TS Mar 15, 19, May 15; AP Mar 15, June 15, May 16, 17

04. What are beats ? Obtain an expression for the beat frequency. Where and how are beats made use of ?

05. What is Doppler Effect ? Obtain an expression for the apparent frequency of sound heard when the source is in motion with respect to an observer at rest.

Mar 14; AP Mar 16, 20; TS Mar 17, 18

06. What is Doppler shift ? Obtain an expression for the apparent frequency of sound heard when the observer is in motion with respect to a source at rest. **AP June 15**

PROBLEMS

07. A steel wire $0.72\,m$ long has a mass of $5.0\times10^{-3}\,kg$. If the wire is under a tension of $60\,N$, what is the speed of transverse waves on the wire ? **AP Mar 19; EXAMPLE PROBLEM**

08. A stretched wire of length $0.6\,m$ is observed to vibrate with a frequency of $30\,Hz$ in the fundamental mode. If the string has a linear mass of $0.05\,kg\,m^{-1}$, find

a) the velocity of propagation of transverse waves in the string,

b) the tension in the string. **TS May 16; AP May 18; SOLVED PROBLEM**

09. A steel cable of diameter $3\,cm$ is kept under a tension of $10\,KN$. The density of steel is $7.8\,g\,cm^{-3}$. With what speed would transverse waves propagate along the cable ?

10. A pipe $30.0\,cm$ long is open at both ends. Which harmonic mode of the pipe resonates a $1.1\,kHz$ source ? Will resonance with the same source be observed if one end of the pipe is closed ? Take the speed of sound in air as $330\,ms^{-1}$. **TS Mar 15; EXAMPLE PROBLEM**

11. A closed organ pipe $70\,cm$ long is sounded. If the velocity of sound is $331\,ms^{-1}$, what is the fundamental frequency of vibration of the air column ?

Mar 14; AP Mar 17, 18, May 17; TS Mar 19; SOLVED PROBLEM

12. A pipe 30 cm long is open at both ends. Find the fundamental frequency ? Velocity of sound in air is $330\,ms^{-1}$. **TS Mar 15, 20**

13. A open organ pipe 85 cm long is sounded. If the velocity of sound of $340\,ms^{-1}$, what is the fundamental frequency of vibration of the air column ? **TS Mar 16, 20**

14. Two organ pipes of lengths $65\,cm$ and $70\,cm$ respectively are sounded simultaneously. How many beats per second will be produced between the fundamental frequencies of the two pipes ? (Velocity of sound $= 330\,ms^{-1}$) **TS Mar 20, SOLVED PROBLEM**

15. A rocket is moving at a speed of $200\ ms^{-1}$ towards a stationary target. While moving, it emits a wave of frequency $1000\ Hz$. Some of the sound reaching the target gets reflected back to the rocket as an echo. Calculate

a) the frequency of the sound as detected by the target and

b) the frequency of the echo as detected by the rocket. **AP Mar 16; EXAMPLE PROBLEM**

02. RAY OPTICS & OPTICAL INSTRUMENTS

SHORT ANSWER QUESTIONS (4 MARKS)

01. Define focal length of a concave mirror. Prove that the radius of curvature of a concave mirror is double its focal length. **AP Mar 17, 19, May 16, 18**

02. Define critical angle. Explain total internal refection using a neat diagram. **May 14; AP Mar 15; TS Mar 15, 18, May 17**

03. Explain the formation of a mirage. **TS Mar 19, May 18; AP Mar 16**

04. Explain the formation of a rainbow. **AP May 15, Mar 15, 20; TS Mar 20**

05. Why does the setting sun appear red ? **Mar 14; AP June 15; TS May 15, Mar 17**

06. With a neat labelled diagram explain the formation of image in a simple microscope. **AP Mar & June 15, May 16, Mar 18; TS Mar & May 16**

PROBLEMS

07. Two lenses of power $-1.750\ D$ and $+2.250\ D$ respectively, are placed in contact. Calculate the focal length of combination ? **AP Mar 20; SOLVED PROBLEM**

08. What focal length should the reading spectacles have a person for whom the least distance of distinct vision is 50 cm ? **TS Mar 19, EXAMPLE PROBLEM**

VERY SHORT ANSWER QUESTIONS (2 MARKS)

09. What are the laws of reflection through curved mirrors ?

10. A concave mirror of focal length 10 cm is placed at a distance 35 cm from a wall. How far from the wall should an object be placed so that its real image is formed on the wall ? **TS May 19**

11. A concave mirror produces an image of a long vertical pin, placed 40 cm from the mirror, at the position of the object. Find the focal length of the mirror. **TS Mar 17, 20**

12. What do you understand by the terms 'focus' and 'principal focus' in the context of lenses ?

13. Define focal length and radius of curvature of a concave lens ?

14. Define 'power' of a convex lens. What is its unit ? **AP May 16; Mar 17; TS Mar & May 16**

15. The focal length of a concave lens is 30 cm. Where should an object be placed so that its image is $\frac{1}{10}$ of its size ?

16. A small angled prism of 4° deviates a ray through 2.48°. Find the refractive index of the prism. **AP June 15, Mar 18, 19**

17. What is dispersion ? Which colour gets relatively more dispersed ? **Mar & May 14**

18. What is myopia ? How can it be corrected ? **TS Mar 15, 17, May 17, June 15; AP Mar & June 15**

19. What is hypermetropia ? How can it be corrected ? AP Mar 16, May 17; TS Mar 18

20. What is optical density and how is it different from mass density ? AP & TS 17

03. WAVE OPTICS

SHORT ANSWER QUESTIONS (4 MARKS)

01. Explain Doppler effect in light. Distinguish between Red shift and Blue shift.
TS May 15, Mar 16, 19; AP June 15, Mar 16, May 18

02. Derive the expression for the intensity at a point where interference of light occurs. Arrive at the conditions for maximum and zero intensity. AP Mar 15, 16, 18; TS Mar 15, May 18

03. Does the principle of conservation of energy hold for interference and diffraction phenomena ? Explain briefly. May 14; AP May 16, Mar 17, 20

04. How do you determine the resolving power of your eye ?
May 14; AP Mar 17, 19; TS Mar 18, 20

05. Discuss the intensity of transmitted light when a polaroid sheet is rotated between two crossed polaroids ?

PROBLEMS

06. Two slits are made one millimeter apart and the screen is placed one meter away. What is the fringe separation when blue-green light of wave length 500 nm is used ?
AP June 15; EXAMPLE PROBLEM

VERY SHORT ANSWER QUESTIONS (2 MARKS)

07. Explain Brewster's law ? AP June 15; TS May 16

08. What is Malus law ? TS May 17

04. ELECTRIC CHARGES AND FIELDS

SHORT ANSWER QUESTIONS (4 MARKS)

01. State and explain Coulomb's inverse square law in electricity.
Mar 14; AP May 17, 18; TS Mar 17

02. Define intensity of electric field at a point. Derive an expression for the intensity due to a point charge. AP Mar 16

03. Derive an expression for the intensity of electric field at a point on the axial line of a dipole.
AP May 16, Mar 16, 17, 18, 19; TS Mar & May 16

04. Derive an expression for the intensity of the electric field at a point on the equatorial plane of an electric dipole. AP Mar 15; TS Mar 20

05. Derive an equation for the couple acting on a electric dipole in a uniform electric field.
May 14; TS May 18, Mar 19; AP May 16

06. State Gauss's law in electrostatics and its importance. AP Mar 15, June 15; TS Mar 15, 18, May 17

05. ELECTROSTATIC POTENTIAL & CAPACITANCE

LONG ANSWER QUESTIONS (8 MARKS)

01. Explain series and parallel combination of capacitors. Derive the formula for equivalent capacitance in each combination. **AP Mar & June15, May 16; TS Mar 15, 17, 19**

02. Derive expression for the energy stored in a capacitor. What is the energy stored when the space between the plates is filled with a dielectric
    a) with charging battery disconnected b) with charging battery connected ?
    AP Mar 05, 06, 07, 09; May 06

SHORT ANSWER QUESTIONS (4 MARKS)

03. Derive an expression for the electric potential due to point charge. **AP Mar 16, 19, TS Mar 16**

04. Derive the expression for the electrostatic potential energy of a system of two point charges and find its relation with electric potential of a charge.

05. Derive an expression for the potential energy of an electric dipole placed in a uniform electric field.

06. Derive an expression for the capacitance of a parallel plate capacitor.
    AP Mar 16, 18, 20, May 16, 17; TS Mar 18, 20, May 16, 18

07. Explain behaviour of dielectrics in an electric field. **AP Mar 19**

08. Derive the formula for equivalent capacitance when the capacitors are connected in series.
    AP 15, TS 15, 19, 22

09. Derive the formula for equivalent capacitance when the capacitors are connected in parallel.
    AP 16, TS 17

PROBLEMS

10. Three capacitors each of capacitance 9 pF are connected in series
    a) What is the total capacitance of the combination ?
    b) What is the potential difference across each capacitor if the combination is connected to a 120 V supply ? **May 14; EXERCISE PROBLEM**

11. Three capacitors of capacitances 2 pF, 3 pF and 4 pF are connected in parallel.
    a) What is the total capacitance of the combination ?
    b) Determine the charge on each capacitor if the combination is connected to a 100 V supply.
    AP Mar 17; EXERCISE PROBLEM

12. A 12 pF capacitor is connected to a 50 V battery. How much electrostatic energy is stored in the capacitor ? **EXERCISE PROBLEM**

06. CURRENT ELECTRICITY

HORT ANSWER QUESTIONS (4 MARKS)

01. State Kirchhoff's laws for electrical network. Using these laws, deduce the condition for balancing in a Wheatstone bridge.
    May 14; AP Mar 14, 18, 19, 20, May 16; TS June 15, Mar 16, 18, May 18

02. State the working principle of potentiometer. Explain with the help of circuit diagram how the emf of two primary cells is compared by using the potentiometer.

AP June 15, Mar 16, 17, May 17; TS May 16, Mar 19

03. State the working principle of potentiometer and explain with the help of circuit diagram. How the potentiometer is used to determine the internal resistance of the given primary cell ?

AP Mar 15, May 18; TS Mar 15, 17, 20, May 17

04. Three identical resistors are connected in parallel and the total resistance of the circuit is $R/3$. Fxind the value of each resistance. **AP May 14**

05. A battery of emf 10 V and internal resistance $3\,\Omega$, is connected to a resistor 'R'

i) If the current in the circuit is 0.5 A, then calculate the value of 'R' ?

ii) What is the terminal voltage of the battery when the circuit is closed. **TS Mar 15**

06. 'm' cells each of emf 'E' and internal resistance 'r' are connected in parallel. What is the total emf and internal resistance ? Under what conditions the current drawn from mixed grouping of cells is maximum ?

PROBLEMS

07. How many electrons flow through a wire when 1A current passes for one milli second ?

AP Mar 10

08. A wire carries a current of 1A, then a) How much charge flows through the wire in 5 minutes. b) How much electrons will cross over a particular point in the conductor during this period. **AP May 12**

09. Find the resistivity of a conductor which carries a current of density of $2.5\times10^{6}\,Am^{-2}$ when an electric field of $15\,Vm^{-1}$ is applied across it. **AP Mar 15; SOLVED PROBLEM**

10. A wire of resistance 4R is bent in the form of a circle. What is the effective resistance between the ends of the diameter ? **S Mar 16; SOLVED PROBLEM**

11. a) Three resistors $2\,\Omega$, $4\,\Omega$ and $5\,\Omega$ are combined in parallel. What is the total resistance of the combination ?

b) If the combination is connected to a battery of emf 20V and negligible internal resistance, determine the current through each resistor and the total current drawn from the battery.

TS Mar 18; EXERCISE PROBLEM

12. A battery of emf 2.5 V and internal resistance r is connected in series with a resistor of 45 ohm through an ammeter of resistance 1 ohm. The ammeter reads a current of 50 mA. Draw the circuit diagram and calculate the value of 'r' ? **TS Mar 17; SOLVED PROBLEM**

13. The four resistors $20\,\Omega$, $40\,\Omega$, $(20+x)\Omega$, $80\,\Omega$ respectively form a Wheatstone bridge. Find the value of 'x' ? **AP Mar 20; SOLVED PROBLEM**

14. Two unknown resistance P an Q are connected in the left and right gaps of a meter bridge and balancing point is obtained at 60 cm from the left. When a $20\,\Omega$ resistance is connected in parallel to 'P' the balance point is at $5\,\Omega$ calculate 'P' and 'Q' ? **AP May 09**

15. Find the balance length in a metre bridge, if the resistance in the left and right gaps are in the ratio of $2:3$. **AP Mar 07**

16. A potentiometer wire is 5 m long and a potential difference of 6V is maintained between its ends. Find the emf of a cell which balances against a length of 180 cm of the potentiometer wire. **TS May 16; AP June 15, Mar 16, 17; SOLVED PROBLEM**

17. In a potentiometer arrangement, a cell of emf 1.25 V gives a balance point 35.0 cm length of the wire. If the cell is replaced by another cell and the balance point shifts to 63.0 cm, what is the emf of the second cell ? **AP Mar 15; TS Mar 20; EXERCISE PROBLEM**

07. MOVING CHARGES AND MAGNETISM

SHORT ANSWER QUESTIONS (4 MARKS)

01. What are the basic components of cyclotron ? Mention its uses ? **AP May 16**
02. State and explain Biot-Savart law. **May 14; AP Mar 16, 17, 18; TS Mar 16, 17, 20**
03. Derive an expression for the magnetic induction at the centre of a current carrying circular coil using Biot-Savart law.
04. Derive an expression for the magnetic induction at a point on the axis of a current carrying circular coil using Biot-Savart law. **TS Mar 16**
05. State and explain Ampere's law. **AP Mar 20; TS Mar 18**
06. Find the magnetic induction due to a long current carrying conductor ?
07. Derive an expression for the magnetic dipole moment of a revolving electron. **AP Mar 16**

PROBLEMS

08. A circular coil of wire consisting of 100 turns, each of radius 8.0 cm carries a current of 0.40 A. What is the magnitude of the magnetic field B at the centre of the coil ? **TS May 18; EXERCISE PROBLEM**
09. A long straight wire carries a current of 35A. What is the magnitude of the field B at a point 20cm from the wire ? **TS June 15; EXERCISE PROBLEM**
10. A current of 10A passes through two very long wires held parallel to each other and separated by a distance of 1m. What is the force per unit length between them ? **TS Mar 15, 19; AP Mar 15; SOLVED PROBLEM**
11. A 100 turn closely wound circular coil of radius 10cm carries a current of 3.2 A. What is the field at the centre of the coil ? **AP Mar 19**

VERY SHORT ANSWER QUESTIONS (2 MARKS)

12. What is the importance of Oersted's experiment ? **May 14; AP Mar 20, May 18; TS Mar 17**
13. What is the principle of a moving coil galvanometer ? **TS May 16**
14. What is the smallest value of current that can be measured with a moving coil galvanometer, tangent galvanometer ?
15. How do you convert a moving coil galvanometer into an ammeter ? **AP June 15, May 18, Mar 19; TS Mar & May 18**
16. How do you convert a moving coil galvanometer into a voltmeter ? **TS Mar 15, 16; AP Mar 15, 16, May 18**
17. Distinguish between ammeter and voltmeter. **AP Mar 15, 17, 18, May 16, 17; TS June 15, Mar 20**
18. State Ampere's law and Biot-Savart Law. **TS 19**
19. A circular coil of radius 'r' having 'N' turns carries a current 'i'. What is its magnetic moment? **TS 17**
20. What is the force on a conductor of length 'L' carrying current 'i' placed in a magnetic field of induction B ? When does it becomes maximum.

08. MAGNETISM AND MATTER

PROBLEMS

01. A bar magnet of length 0.1 m and with a magnetic moment of $5\ Am^2$ is placed in a uniform magnetic field of intensity 0.4 T, with its axis making an angle of $60°$ with the field. What is the torque on the magnet ? **Mar 14; SOLVED PROBLEM**

02. The earth's magnetic field at the equator is approximately 0.4 G. Estimate the earth's dipole moment. AP Sep 21; EXAMPLE PROBLEM

VERY SHORT ANSWER QUESTIONS (2 MARKS)

03. A magnetic dipole placed in a magnetic field experiences a net force. What can you say about the nature of the magnetic field ?

04. What is the magnetic moment associated with a solenoid ? TS Mar 18, 20

05. Magnetic lines form continuous closed loops. Why ? AP Mar 16, 19, May 18; TS Mar 17, May 18

06. State Gauss's law in magnetism. TS Mar 19

07. Define magnetic declination. Mar 14; AP May 16, 17, Mar 18; TS May 16, 17, 18, Mar 18, 20

08. Define magnetic inclination (or) angle of dip. AP Mar 15, 17, 20; TS Mar 15

09. What happens to compass needle at the Earth's poles ? May 14; TS Mar 17, 19

10. To what direction, compass needle points at poles ? Which needle is to be used at poles. TS Mar 19

11. What do you understand by the "magnetisation" of sample ? AP Mar 16

12. What are the S.I units of magnetic moment, magnetic induction and magnetic field ? TS Mar 16; AP Mar 16, May 16, 17

13. Define magnetic susceptibility of a material. AP Mar 15

14. Classify the following materials with regard to magnetism: AP Mar 15, 16, 17, 18, 19, 20; TS Mar 15, 16

i) Manganese ii) Cobalt iii) Nickel iv) Bismuth
v) Oxygen vi) Copper

15. The earth's magnetic field at the equator is approximately 0.4 G. Estimate the earth's dipole moment. AP Sep 21; EXAMPLE PROBLEM

16. In the magnetic meridian of a certain place, the horizontal component of the earth's magnetic field is 0.26 G and the dip angle is 60°. What is the magnetic field of the earth at this location. EXAMPLE PROBLEM

09. ELECTROMAGNETIC INDUCTION

SHORT ANSWER QUESTIONS (4 MARKS)

01. Obtain an expression for the emf induced across a conductor which is moved in a uniform magnetic field which is perpendicular to the plane of motion. TS May 16

02. Describe the ways in which eddy currents are used to advantage. AP Mar 15, 16, 17, 18, 19, May 16, 17, 18; TS Mar 15, 18, May 17

mutual inductance of two long coaxial solenoids. AP Mar 20

04. Obtain an expression for the magnetic energy stored in a solenoid in terms of the magnetic field, area and length of the solenoid. TS Mar 20

PROBLEMS

05. Current in a circuit falls from 5.0A to 0.0 A in 0.1 s. If an average emf of 200 V induced, give as estimate of the self-inductance of the circuit. 14; TS Mar 16; EXERCISE PROBLEM

06. A pair of adjacent coils has a mutual inductance of 1.5 H. If the current in one coil changes from 0 to 20A in 0.5s, what is the change of flux linkage with the other coil ? TS Mar 17, May 18; EXERCISE PROBLEM

07. The current in a coil changes from 5A to 10A in 10^{-2} sec then the emf of 50 milli volts is induced in a coil near it. Calculate the mutual inductance of a coil ?

VERY SHORT ANSWER QUESTIONS (2 MARKS)

08. State Lenz's law. **TS June 15, Mar 19**

09. What are Eddy currents ? **AP June 15, TS Mar 19**

10. Define Inductance ? **AP & TS June 15**

10. ALTERNATING CURRENT

VERY SHORT ANSWER QUESTIONS (2 MARKS)

01. Write the expression for the reactance of i) an inductor and ii) a capacitor.
TS May 16, Mar 18

02. What is the phase difference between AC emf and current in the following: Pure resistor, pure inductor and pure capacitor. **TS Mar 15**

03. When does an LCR series circuit have minimum impedance ?

04. Define power factor. On which factors does power factor depend ?

05. What is the phase difference between voltage and current when the power factor in LCR series circuit is unity ?

06. What is meant by wattless component of current ? **TS Mar 17**

07. What is the phenomenon involved in the working of a transformer ?
Mar 14; TS Mar 19; AP June 15, Mar 16, May 16, 17, 18

08. What is transformer ratio ? **AP Mar 20; TS May 18**

09. What type of transformer is used in a 6V bed lamp ? **AP Mar 17**

10. A transformer converts 200 V ac into 2000 V AC. Calculate the number of turns in the secondary if the primary has 10 turns. **AP Mar 18, 19; TS Mar 16**

11. What is transformer ratio ? **AP Mar 20; TS May 18**

11. ELECTROMAGNETIC WAVES

VERY SHORT ANSWER QUESTIONS (2 MARKS)

01. The charging current for a capacitor is 0.6A. What is the displacement current across its plates ? **AP Mar 20**

02. What is the principle of production of electromagnetic waves ?

03. What is the relation between the amplitude of the electric and magnetic fields in free space for an electromagnetic wave ?

04. If the wavelength of electromagnetic radiation is doubled what happens to the energy of photon ? **TS June 15, Mar 16**

05. What is the average wave length of x-rays ?

06. Give two uses of infrared rays ? **May 14; AP Mar 16, 19; TS Mar 17**

07. Write any one of use of infrared rays. Which animal can detect infrared rays ?
TS Mar 19; AP May 17, 18

08. How are microwaves produced ? AP Mar 15

09. What are the applications of microwaves ?
AP Mar 15, 17, 18, May 15, 16, 18, June 15; TS Mar 15, 17, 18, 20, May 18

10. Microwaves are used in radars. Why ? Mar 14

12. DUAL NATURE OF RADIATION AND MATTER

SHORT ANSWER QUESTIONS (4 MARKS)

01. What is the effect of i) Intensity of light ii) Potential on photoelectric current ?
TS June 15, Mar 19

PROBLEMS

02. The work function of caesium in 2.14 eV . Find
a) the threshold frequency for caesium and
b) the wavelength of the incident light, if the photocurrent is brought to zero by a stopping potential of 0.60 V . AP Mar 16; EXAMPLE PROBLEM

03. The work function of Caesium metal is 2.14 eV . When light of frequency 6×10^{14} Hz is incident on the metal surface, photoemission of electrons occurs. What is the maximum speed of the emitted photoelectrons ? AP Mar 16; SOLVED PROBLEM

04. What is the de-Broglie wavelength associated with an electron, accelerated through a potential difference of 100 volts ? AP Mar 20, Sep 21; EXAMPLE PROBLEM

VERY SHORT ANSWER QUESTIONS (2 MARKS)

05. What are 'cathode rays' ? AP Mar 17

06. What is 'Work function' ? AP May 16, Mar 19; TS Mar 15, 17, 18

07. What important fact did Millikan's experiment establish ?

08. What is 'Photo electric effect'? May 14; AP Mar 15, 17, 18, 20; TS Mar 16, 18, May 17

09. Give examples of 'Photo sensitive substances'. Why they are called so? AP May 16, Sep 21

10. Write down Einstein's photo electric equation ? Mar 15, 19, May 17; TS May 16, 18

11. Write down De Broglie's relation and explain the terms there in.
AP Mar 16, 18; TS Mar 16, 18, May 17

12. State Heisenberg's uncertainty principle. Mar 14; TS Mar 17, 20

13. An electron, an α-particle and a proton have the same kinetic energy. Which of these particles has the shortest de Broglie wavelength ? EXAMPLE PROBLEM, TS Mar 15

14. What is the de-Broglie wavelength associated with an electron, accelerated through a potential difference of 100 volts ? EXAMPLE PROBLEM; AP Mar 15, 20, Sep 21; TS May 16

13. ATOMIC PHYSICS

SHORT ANSWER QUESTIONS (4 MARKS)

01. What is impact parameter and angle of scattering ? How are they related to each other ?

02. Explain distance of closest approach and impact parameter.

03. Describe Rutherford atom model. What are the drawbacks of this model ? **TS Mar 18**

04. Derive an expression for potential energy and kinetic energy of an electron in any orbit of a hydrogen atom according to Bohr's atomic model. How does PE change with increasing 'n'. **TS Mar & June 15**

05. What are the limitations of Bohr's theory of hydrogen atom ? **Mar 14; AP Mar & May 17; TS May 17, 18, Mar 20**

06. State the basic postulates of Bohr's theory of atomic spectra. **AP Mar 16**

07. Explain different types of spectral lines. **AP June 15, Mar 15, 19, May 16, 18; TS Mar & May 16**

08. Write a short note on De-Broglie's explanation of Bohr's second postulate of quantization. **TS Mar 17**

PROBLEMS

09. The wavelength of first member of Balmer series is 6563Å . Calculate the wavelength of second member of Lyman series. **AP Mar 20; SOLVED PROBLEM**

10. The Lyman series of hydrogen spectrum lies in the ultraviolet region. Why ? **[AP Mar 15]**

14. NUCLEAR PHYSICS

LONG ANSWER QUESTIONS (8 MARKS)

01. Define mass defect and binding energy. How does binding energy per nucleon vary with mass number. What is its significance ?

02. What is radioactivity ? State the law of radioactive decay. Show that radioactive decay is exponential in nature. **TS Mar 16, May 16, 18**

03. Explain the principle and working of a nuclear reactor with the help of a labelled diagram. **AP Mar 15, 16, 17, 18, 19, 20, May 16, 17, 18, June 15; TS Mar 15. 17, 18, 19, 20, May 17**

04. Explain the source of stellar energy. Explain the carbon-nitrogen cycle and proton-proton cycle occurring in stars ? **TS June 15**

SHORT ANSWER QUESTIONS (4 MARKS)

05. Distinguish between nuclear fission and nuclear fusion.

PROBLEMS

06. Compare the radii of two nuclei with mass numbers 27 & 64. **AP Mar 20; SOLVED PROBLEM**

07. Calculate the energy equivalent of 1g of substance. **EXAMPLE PROBLEM**

08. The half life of radium is 1600 years. How much time does 1 g of radium takes to reduce to 0.125 g. **May 16, 18; SOLVED PROBLEM**

09. If one microgram of $^{235}_{92}U$ is completely destroyed in an atom bomb, how much energy will be released ? **AP Mar 19; SOLVED PROBLEM**

10. How much ^{235}U is consumed in a day in an atomic power house operating at 400 MW, provided the whole of mass ^{235}U is converted into energy. **SOLVED PROBLEM; AP Mar 11**

15. SEMICONDUCTOR ELECTRONICS, MATERIALS, DEVICES & SIMPLE CIRCUIES

SHORT ANSWER QUESTIONS (4 MARKS)

01. Draw and explain the current-voltage (I-V) characteristic curves of a junction diode in forward and reverse bias.

02. Distinguish between zener breakdown and avalanche Breakdown. **AP Mar 09**

03. Describe how a semiconductor diode is used as a half wave rectifier.
Mar 14; AP Mar 16; TS Mar 16, May 18

04. What is rectification ? Explain the working of a full wave rectifier.
May 14; AP Mar 15, 18, May 17; TS Mar 15, 19, May 17

05. Distinguish between half-wave and full-wave rectifiers.
AP May 16, Mar 17, 19; TS Mar 18, 20, May 18

06. What is a photodiode ? Explain its working with a circuit diagram and draw its I-V characteristics.

07. Explain the working of LED and what are its advantages over conventional incandescent low power lamps.

08. Explain the working of a solar cell and draw its I-V characteristics.

09. What is a Zener diode? Explain how it is used as voltage regulator ? **TS May 16**

10. Explain the operation of a NOT gate and give its truth table. **TS June 15**

11. Define NAND and NOR gates. Give their truth table. **June 15, Mar 20 ; TS Mar 17**

VERY SHORT ANSWER QUESTIONS (2 MARKS)

12. What are intrinsic and extrinsic semiconductors ? **AP Mar 15, June 15, May 18**

13. What is a p-type semiconductor ? What are the majority and minority charge carriers in it ?
AP Mar 17; TS Mar 17, May 18

14. What is an n-type semiconductor ? What are the majority and minority charge carriers in it ?

15. What is a p-n junction diode ? Define depletion layer. **TS May 16, Mar 19**

16. How is a battery connected to a junction diode in i) forward and ii) reverse bias ?
AP May 12

17. What happens to the width of the depletion layer in a p-n junction diode when it is i) forward biased and ii) reverse biased ?

18. What is zener voltage (V_z) and how will a zener diode be connected in circuits generally?

19. In which bias can a zener diode be used as voltage regulator ? **AP Mar 16, 20; TS June 15**

20. Draw the circuit symbols for p-n-p and n-p-n transistors.
Mar 14; AP May 16, 17, Mar 18; TS Mar 16, 18, May 17

21. Which gates are called universal gates ? **TS Mar 15, 20**

22. Write the truth table of NAND gate. How does it differ from AND gate ?

16. COMMUNICATION SYSTEM

VERY SHORT ANSWER QUESTIONS (2 MARKS)

01. What are the basic blocks of a communication system ? **TS June 15**

02. Mention the frequency range of speech signals. **AP Mar 20**

03. What is sky wave propagation ? **AP June 15, May 16**

04. Which type of communication is employed in mobile phones ?

AP Mar 15, May 18; TS Mar 20

05. Mention the various parts of the ionosphere ? **TS May 16**

06. Name an appropriate communication channel needed to send a signal of band-width 100 kHz over a distance of 8 km. **CBSE 05**

07. Define modulation. Why is it necessary ?

Mar 14; AP Mar 16, 17, 18, May 17; TS Mar 15, 16, 19, May 17, 18

08. Mention the basic methods of modulation ? **AP Mar 16, 19; TS Mar 15, 17, 18**

09. What is 'World Wide Web' (WWW) ?

***** THE END*****