CLASS: 12 UNIT: 6 RAY OPTICS – I MARKS: 30

TIME: 1.15 HR PART – A 8 X 1 = 8

1. The speed of light in an isotropic medium depends on

a) intensity b) wavelength c) nature of propagation d) the motion of the source w.r.t.medium

2. For light incident from air on a slab of refractive index 2, the maximum possible refraction angle is

a) 30^0 b) 45^0 c) 60^0 d) 90^0

3. Stars twinkle due to a) reflection b) T.I.R. c) refraction d) polarisation

4. The speed of light through pure water having refractive index 1.33 is ..... $m\ s^{-1}$

a) 2.62×10^8 b) 3×10^8 c) 2.5×10^8 d) 2.26×10^8

5. Lateral magnification in spherical mirror is represented by

a) m = f – v / f b) m = f-u / f c) $m = h / h^1$ d) m = f – v / v

6. The relation between angle of deviation and angle of incidence is

a) 90-2i b) 180 – i c) 180 – 2i d) 180-2α

7. If the refractive index for glass is 1.5, then the critical angle for glass-air interface is

a) 43.3^0 b) 41.8^0 c) 48.6^0 d) 24.7^0

8. The minimum height required to view the full image of an object is ..... the height of plane mirror.

a) ¼ b) ½ c) ¾ d) 1/3

PART – B 3 X 2 = 6

9. State the laws of reflection 10. Write any three characteristics of the image by plane mirror

11. What are paraxial and marginal rays? 12. Define lateral magnification in spherical mirrors.

13. State Snell's law. 14. What are the conditions for total internal reflection to take place?

15. Light travelling through transparent oil enters into glass of R.I. 1.5. If the R.I. of glass w.r.to the oil is 1.25, what is the refractive index of the oil?

PART – C 2 X 3 = 6

16. Show that the angle of deviation produced is twice the glancing angle.

17. Derive the relation between radius of curvature and focal length.

18. What is optical path? Derive an expression for the same.

19. Define critical angle. Derive the relation between critical angle and refractive index.

20. Light travels from air into a glass slab of thickness 50 cm and refractive index 1.5.

a) Find the speed of light in the glass slab b) Find the time taken by the light to travel through the glass slab c) Find the optical path of the glass slab.

PART – D 2 X 5 = 10

21. Derive the mirror equation or Describe the Fizeau's method to determine the speed of light.

22. Obtain the expression for apparent depth or

Obtain the equation for lateral displacement of light passing through a glass slab.

CLASS: 12 UNIT: 6 RAY OPTICS – II MARKS: 30

TIME: 1.15 HR PART – A 8 X 1 = 8

1. The radius of curvature of curved surface at a thin planoconvex lens is 10 cm and R.I. is 1.5. If the plane surface is silvered, then the focal length is a) 5 cm b) 10 cm c) 15 cm d) 20 cm
2. When a biconvex lens of glass having R.I. 1.47 is dipped in a liquid, it acts a plane sheet of glass. This implies that the liquid must have R.I. a) < 1 b) < glass c) > glass d) = glass
3. The magnification is always positive and less than one for
   a) concave lens b) convex lens c) plane mirror d) concave mirror
4. Angle of deviation for a monochromatic light does not depend on
   a) R.I b) angle of incidence c) angle of the prism d) angle of refraction
5. At minimum deviation a) $r_1 > r_2$ b) $r_1 < r_2$ c) $r_1 = r_2 = r$ d) $i_1 < i_2$
6. The refractive indices for violet and red colour are …… and …….respectively.
   a) high and low b) low and high c) high and medium d) low and medium
7. When light entering the raindrop undergoes two total internal reflections, the rainbow formed is
   a) secondary b) primary c) both primary and secondary d) blurred
8. The dispersive power of a prism depends only on
   a) angle of the prism b) angle of refraction c) angle of emergence d) nature of material

PART – B 3 X 2 = 6

9. What is dispersion? 10. How are rainbows formed? 11. What is Rayleigh's scattering?
12. Why does sky appear blue? 13. Why do clouds appear white?
14. What is the reason for reddish appearance of sky during sunset and sunrise?
15. Find the dispersive power of a prism if the R.I. of flint glass for red, green and violet colours are 1.613, 1.620 and 1.632 respectively. 16. Distinguish primary rainbow from secondary rainbow.

PART – C 2 X 3 = 6

17. Derive an expression for the effective focal length of lenses in contact.
18. A monochromatic light is incident on an equilateral prism at an angle 30^0 and is emergent at an angle of 75^0. What is the angle of deviation produced by the prism?
19. The angle of minimum deviation for an equilateral prism is 37^0. Find the R.I. of the material of prism.
20. What is non - Rayleigh scattering? Why sky appears dark for the astronauts?

PART – D 2 X 5 = 10

21. Obtain lens formula and lens maker's formula or Obtain the equation for dispersive power
22. Derive the equation for refractive index of the material of the prism or
    Derive the equation for refraction at single spherical surface.

BELIEVE YOU CAN AND YOR'RE HALFWAY THERE – T.ROOSEVELT

CLASS: 12 UNIT: 7 WAVE OPTICS MARKS: 30

TIME: 1.15 HR PART – A 8 X 1 = 8

1. A plane glass is placed over a various coloured letters (violet, green, yellow, red). The letter Which appears to be raised more is a) red b) yellow c) green d) violet
2. Two coherent monochromatic light beams of intensities I and 4I are superposed. The max and min possible intensities in the resulting beam are a) 5I and I b) 5 I and 3 I c) 9 I and I d) 9I and 3I
3. First diffraction min due to single slit of width 1×10^{-5} cm is at 30^0. The wavelength of light used is
   a) 400 Å b) 500 Å c) 600 Å d) 700 Å
4. The transverse nature of light is shown in
   a) interference b) diffraction c) scattering d) polarisation
5. Polarisation can't be explained by ..... theory
   a) corpuscular b) wave c) electromagnetic d) quantum
6. Soap bubbles exhibit brilliant colours due to
   a) Polarisation b) diffraction c) refraction d) interference
7. If the intensity of light varies between maximum and minimum, then it is called ..... light.
   a) unpolarised b) plane polarised c) partially polarised d) none
8. Angular resolution can be represented by the formula θ =
   a) $1.22 / \lambda a$ b) $1.22 \lambda / a$ c) 1.22λ d) $1.22 \lambda f / a$

PART – B 3 X 2 = 6

9. State Huygens principle. 10. What are coherent sources? 11. What are Airy's discs?
12. Two light sources have intensity of light as I_0. What is the resultant intensity at a point where the two light waves have a phase difference of $\pi / 3$? 13. What is Rayleigh's criterion?
14. Find the polarizing angles for (i) glass of refractive index 1.5 (ii) water of refractive index 1.33
15. List the uses of polaroids. 16. What are near point and normal focussing?

PART – C 2 X 3 = 6

17. State and prove Malus law 18. State and prove Brewster's law.
19. Briefly explain the function of reflecting telescope.
20. The wavelength of a light is 450 nm. How much phase it will differ for a path of 3 mm?
21. Explain any one of the techniques of obtaining coherent sources.
22. Obtain the relation between phase and path difference. 23. Explain pile of plates.

PART – D 2 X 5 = 10

24. Prove law of reflection using Huygen's principle. or
    Obtain the equation for bandwidth in Young's double slit experiment.
25. Discuss about the simple microscope and obtain equations for near point and normal focussing.
    Or Explain about compound microscope and obtain the equation for the magnification.

CLASS: 12 UNIT: 8 DUAL NATURE OF RADIATION AND MATTER MARKS: 30

TIME: 1.15 HR PART – A 8 X 1 = 8

1. In an electron microscope, the electrons are accelerated by a voltage of 14 kV. If the voltage is Changed to 224 kV, then the de Broglie wavelength associated with the electrons would

a) inc by 2 times b) dec by 2 times c) dec by 4 times d) inc by 4 times

2. The threshold wavelength for a metal surface whose photoelectric work function is 3.313 eV is. T

a) 4125 Å b) 3750 Å c) 6000 Å d) 2062.5 Å

3. Emission of electrons by absorption of heat energy is …….emission

a) photoelectric b) field c) thermionic d) secondary

4. The work functions of metals A, B and C are 1.92 eV, 2.0 eV and 5.0 eV respectively. The metals which will emit photoelectrons for 4100 Å are a) A b) both A & B c) all three d) none

5. The resistance of semiconductor changes in accordance with radiant energy in…… cell

a) Daniel b) photo emissive c) photoconductive d) photo voltaic

6. The work function of Caesium is 1.8 eV. Its threshold frequency is

a) 4.36×10^{14} Hz b) 1.42×10^{14} Hz c) 8×10^{14} Hz d) 1.1×10^{15} Hz

7. The de Broglie wavelength of electron of kinetic energy 120 eV is

a) 11.21 Å b) 24.35×10^{-9} m c) 1.121 Å d) 14.5 nm

8. The energy of photon is E = hν and its momentum is h/λ. Then the velocity of light is expressed as

a) $(E / p)^2$ b) E / p c) Ep d) $(E p)^{1/2}$ q

PART – B 3 X 2 = 6

9. Define work function and give its unit. 10. Define threshold frequency.

11. Why do we not see the wave properties of a baseball? 12. Define stopping potential.

13. Give the quantum definition of intensity of light.

14. A proton and an electron have same K.E. Which has greater de Broglie wavelength. Justify.

15. A radiation of wavelength 300 nm is incident on a silver surface. Will photoelectrons be observed?

PART – C 2 X 3 = 6

16. Give the characteristics of photons. 17. Derive the de Broglie wavelength of electron.

18. A proton and an electron have same de Broglie wavelength. Which of them moves faster and which possesses more K.E.? 19. Explain the characteristic X- ray spectra?

20. Calculate the cut off wavelength and cut off frequency of x – rays from an x-ray tube of accelerating potential 20 kV? 21. What is Bremstrahlung? State Duane – Hunt formula. Write 2 uses of x – rays.

PART – D 2 X 5 = 10

22. Explain the effect of P.D. on photoelectric current or Derive Einstein's photoelectric equation.

23. Briefly explain the principle and working of electron microscope or

Describe briefly Davisson – Germer experiment which demonstrated the wave nature of electrons.

CLASS: 12 UNIT: 9 ATOMIC PHYSICS MARKS: 30

TIME: 1.15 HR PART – A 8 X 1 = 8

1. In a hydrogen atom, the electron revolving in the fourth orbit, has angular momentum equal to

a) h b) h / π c) 4 h / π d) 2 h / π

2. The charge on cathode ray is a) positive b) negative c) neutral d) not defined

3. The ratio between the first three orbits of hydrogen atom is

a) 1:2:3 b) 2:4:6 c) 1:4:9 d) 1:3:5

4. Atomic number of H-like atom with ionization potential 122.4 V for n = 1 is

a) 1 b) 2 c) 3 d) 4

5. The value of e / m of proton is ..... C kg^{-1}

a) 1.7592×10^{11} b) 1.6×10^{-19} c) 9.58×10^{7} d) 9.58×10^{-7}

6. The radius of the 5^{th} orbit of hydrogen atom is ..... Å a) 2.65 b) 5.3 c) 0.106 d) 13.25

7. The energy of the electron in the first orbit of hydrogen atom is -13.6 eV. Its potential energy is

a) -13.6 e V b) 13.6 e V c) -27.2 e V d) 27.2 e V

8. A charged oil drop is balanced in a field of 3×10^{4} V m^{-1}, if its mass is 9.75×10^{-12} g, find charge

a) 3.185×10^{-18} C b) 3.185×10^{-20} C c) 3.185×10^{18} C d) 31.85×10^{-18} C

PART – B 3 X 2 = 6

9. Write any 4 properties of cathode rays. 10. What is meant by excitation energy?

11. Define impact parameter. 12. Write down the drawbacks of Bohr atom model.

13. Give the results of Rutherford alpha scattering experiment.

14. Define ionization energy. 15. Define ionization potential.

16. Write any one draw back Rutherford atom model.

PART – C 2 X 3 = 6

17. Find the angular momentum and velocity of the electron revolving in the 5^{th} orbit of hydrogen atom.

18. Explain the spectral series of hydrogen atom.

19. Derive an expression for energy of the electron in nth orbit of hydrogen atom.

20. Define distance of closest approach and hence derive an expression for it.

21. How will you determine specific charge of an electron with the help of potential difference formula?

PART – D 2 X 5 = 10

22. How will you determine e/m of an electron only due to uniform electric field? or

Explain Millikan's oil drop experiment of determining the charge of an electron.

23. Derive an expression for the radius of the electron in the nth orbit of hydrogen atom or

According to Bohr, nucleus is stationary and electrons are in revolving motion. By assuming that the nucleus is also in motion, calculate the energy of the new system.

CLASS: 12 UNIT: 9 NUCLEAR PHYSICS MARKS: 30

TIME: 1.15 HR PART – A 8 X 1 = 8

1. If the nuclear radius of ^{27}Al is 3.6 F, the approximate nuclear radius of ^{64}Cu in F is

a) 2.4 b) 1.2 c) 4.8 d) 3.6

2. 7/8 part of the radioactive substance decays in 45 days. The half life period is

a) 45 days b) 25.7 days c) 30 days d) 15 days

3. Tritium has a half life of 12.5 years. What fraction of the sample will be left over after 25 years?

a) ¼ b) 1 / 8 c) 1 / 16 d) ½

4. A nuclear force exists between a) p - e b) e – n c) n – n d) e – e

5. In the reaction $_{90}Th^{234} \rightarrow {}_{91}Pa^{234} + X$, the particle emitted is a) α b) β c) γ d) proton

6. Activity of 1 g of radium is equal to a) 1 R b) 1 Curie c) 1 henry d) 1 second

7. The nucleus is approximately spherical in shape. Then the surface area of nucleus having mass number A varies as a) $A^{2/3}$ b) $A^{4/3}$ c) $A^{1/3}$ d) $A^{5/3}$

8. A radioactive element has N_0 number of nuclei at t =0. The number of nuclei remaining after half of a half life (i.e., t = ½ $T_{1/2}$)

a) $N_0 / 2$ b) $N_0 / \sqrt{2}$ c) $N_0 / 4$ d) $N_0 / 8$

PART – B 3 X 2 = 6

9. Define amu (u) 10. What is mass defect? 11. What is binding energy?

12. Write the properties of neutrino 13. Define Curie

14. What is meant by activity or decay rate? Give its unit.

15. What is mean life? Give its expression.

16. Give the symbolic representation of α, β decay and γ emission.

PART – C 2 X 3 = 6

17. Write a note on p – p cycle. 18. Calculate the density of the nucleus with mass number A.

19. Discuss about the features of average BE / A curve.

20. Explain alpha decay with example. 21. Explain beta decay with example.

22. Calculate the time required for 60% of a sample of radon undergo decay. ($T_{1/2}$ = 3.8 days)

PART – D 2 X 5 = 10

23. Obtain the law of radio activity. or Define half life. Derive an expression for half life period.

24. Describe the working of nuclear reactor. or

(i) What is nuclear fission? (ii) Calculate the amount of energy released when 1 kg of Uranium - 235 undergoes fission reaction.

CLASS: 12 UNIT: 10 ELECTRONICS AND COMMUNICATION MARKS: 30

TIME: 1.15 HR PART – A 8 X 1 = 8

1. The barrier potential of silicon diode is a) 0.7 V b) 0.3 V c) 2 V d) 2.2 V
2. If a positive half wave rectified voltage is fed to a load resistor, for which part of a cycle there will be current flow through the load?
   a) $0^0 - 90^0$ b) $90^0 - 180^0$ c) $0^0 - 180^0$ d) $0^0 - 360^0$
3. The Zener diode is primarily used as
   a) rectifier b) amplifier c) oscillator d) voltage regulator
4. In an N – type semiconductor, there are
   a) immobile -ve ions b) no minority carriers c) immobile +ve ions d) majority holes
5. Avalanche breakdown is primarily dependent on the phenomenon of
   a) collision b) ionization c) doping d) recombination
6. The output impedance of a CE mode transistor is
   a) zero b) low c) high d) infinity
7. An example for acceptor atom is a) Cl b) Bi c) B d) As
8. In a transistor with $\beta = 40$, the base current is 25 μ A. The collector current is
   a) 100 μ A b) 1000 m A c) 1 m A d) 0.1 m A

PART – B 3 X 2 = 6

9. What is forbidden energy gap? 10. What do you mean by doping?
11. Why is temperature coefficient of resistance negative for semiconductor?
12. Distinguish between avalanche and Zener breakdown. 13. What is rectification?
14. What is modulation? 15. Draw the output waveforms of full wave rectifier.
16. Define centre or resting frequency.

PART – C 2 X 3 = 6

17. State and prove De Morgan's theorems.
18. Distinguish between intrinsic and extrinsic semiconductors.
    Why is diode called a unidirectional device?
19. Write the advantages and disadvantages of frequency modulation.
20. Explain the input characteristics of a transistor in CE mode.
21. Draw the circuit symbol of (i) CB mode (ii) CE mode (iii) CC mode

PART – D 2 X 5 = 10

22. Explain the construction and working of half wave rectifier or
    Explain the construction and working of full wave rectifier
23. Explain the output characteristics of a transistor in CE mode. or
    What is amplitude modulation? Explain amplitude modulation in detail.