

UNIT-6 RAY OPTICS

1. Derive the mirror equation and the equation for lateral magnification. (Pg-8,9)
2. Describe the Fizeau's method to determine speed of light. (Pg-11,12)
3. Explain total internal reflection in detail on the basis of wave theory. (Pg-19)
4. Derive the equation for refraction at single spherical surface. (Pg-27,28)
5. Obtain lens maker's formula and mention its significance. (Pg-30,31)
6. Derive the equation for angle of deviation produced by a prism and thus obtain the equation for refractive index of material of the prism. (Pg-38,39)
7. What is dispersion? Obtain the equation for dispersive power of a medium. (Pg-42,43)

UNIT-7 WAVE OPTICS

1. Obtain the equation for resultant intensity due to interference of light. (Pg-58,59)
2. Obtain the equation for bandwidth in Young's double slit experiment. (Pg-63-65)
3. Prove law of refraction using Huygens' principle. (Pg-56,57)
4. Discuss diffraction at single slit and obtain the condition for n^{th} minimum and maximum. (Pg-70)
5. Discuss about simple microscope and obtain the equations for magnification for near point focusing and normal focusing. (Pg-87,88)
6. Explain about compound microscope and obtain the equation for magnification. (Pg-90,91)

UNIT 8 Dual Nature of Radiation and Matter

1. Explain the effect of potential difference on photoelectric current. (Pg-114,115)
2. Explain how frequency of incident light varies with stopping potential. (Pg-115,116)
3. Obtain Einstein's photoelectric equation with necessary explanation. (Pg-119,120)
4. Briefly explain the principle and working of electron microscope. (Pg-126,127)
5. Describe briefly Davisson – Germer experiment which demonstrated the wave nature of electrons. (Pg-125)

UNIT 9 Atomic and Nuclear physics

1. Explain the J.J. Thomson experiment to determine the specific charge of electron. (Pg-143)
2. Discuss the Millikan's oil drop experiment to determine the charge of an electron. (Pg-145)
3. Derive an expression for Radius of the n^{th} orbit of the electron with Bohr postulates. (Pg-151,153)
4. Derive the energy expression for hydrogen atom using Bohr atom model. (Pg-155)
5. Discuss the spectral series of hydrogen atom. (Pg-162,163)
6. Obtain the law of radioactivity. (Pg-173,174)
7. Describe the working of nuclear reactor with a block diagram. (Pg-182,183)

UNIT 10 ELECTRONICS AND COMMUNICATION

1. Draw the circuit diagram of a half wave rectifier and explain its working. (Pg-207,208)
2. Explain the construction and working of a full wave rectifier. (Pg-208,209)
3. Explain the working of NPN Transistor action in the common base mode. (Pg-217,218)
4. What is modulation? Explain the types of modulation with necessary diagrams. (Pg-234-235)

UNIT 11 Recent Developments in Physics

1. Discuss the applications of Nanomaterials in various fields. (Pg-260)
2. Discuss the functions of key components in Robots. (Pg-264)

IMPORTANT THREE MARKS**UNIT- 1 ELECTROSTATICS**

1. List the properties of electric field lines. (Pg-17,18)
2. Derive an expression for electrostatic potential due to a point charge. (Pg-27)
3. Obtain the expression for capacitance for a parallel plate capacitor. (Pg-54,55)
4. Obtain the expression for energy stored in the parallel plate capacitor. (Pg-56)
5. Derive an expression for the torque experienced by a dipole due to a uniform electric field.(Pg-24)
6. Obtain relation between electric field and electric potential. (Pg-32)
7. Obtain the expression for electric field due to an uniformly charged spherical shell.(Pg-46)
8. What is an equipotential surface? Give the properties of an equipotential surface? (Pg-31,32)
9. Define 'Electric field' and discuss its various aspects. (Pg-12,13)
10. Obtain an expression for potential energy due to a collection of three (or two) point charges which are separated by finite distances. (Pg-33,34)
11. Derive an expression for electrostatic potential energy of the dipole in a uniform electric field.(Pg-35)

UNIT- 2 CURRENT ELECTRICITY

1. Obtain an expression for drift velocity. How it is related with the mobility?(Pg-83,84)
2. Explain the temperature dependence of resistivity. (Pg-95)
3. Derive the expression for power $P=VI$ in electrical circuit. (Pg- 97,98)
4. Write down the various forms of expression for power in electrical circuit. (Pg-98)
5. State and explain Kirchoff's rules. (Pg-104,105)
6. Derive the relation between the drift velocity and the current. (Pg-85)
7. Explain the equivalent resistance of a series and parallel resistor network. (Pg-90,91)
8. Explain the equivalent emf of electric cells in series and parallel. (Pg-102,103)

UNIT-3 MAGNETISM AND MAGNETIC EFFECTS OF ELECTRIC CURRENT

1. State and explain Biot-Savart law. (Pg-154)
2. Define Lorentz force. Give the properties of Lorentz magnetic force. (Pg-168)
3. What are the properties of bar magnet? (Pg-130)
4. Give the properties of magnetic field lines. (Pg-133)
5. Explain current loop behaves like a magnetic dipole.(Pg-160)
6. Give the difference between Coulomb's law and Biot-Savart's law. (Pg-154)

UNIT-4 ELECTROMAGNETIC INDUCTION AND ALTERNATING CURRENT

1. How will you induce an emf by changing the area enclosed by the coil? (Pg-219)
2. Obtain an expression for Self-inductance of a long solenoid. (Pg-213)
3. Mention the various energy losses in a transformer. (Pg-229)
4. Obtain an expression for Energy stored in an inductor. (Pg-214)
5. What are the advantages and disadvantages of AC over DC? (Pg-250)
6. Find out the phase relationship between voltage and current in a pure resistive circuit.(Pg-238)
7. Obtain the expression for mean or average value of alternating current. (Pg-234)
8. Obtain an expression for RMS value of alternating current. (Pg-235)
9. Define quality factor. Obtain an expression for it. (Pg-247)
10. Give the advantages of AC in long distance power transmission with an example. (Pg-230)

UNIT-5 ELECTROMAGNETIC WAVES

1. Discuss briefly the experiment conducted by Hertz to produce and detect electromagnetic spectrum.(Pg-272)
2. Write down the properties of electromagnetic waves. (Pg-272)
3. Write a note on Infrared radiation. (Pg-275)
4. Write a note on X-rays & UV-rays. (Pg-276)

UNIT-6 RAY OPTICS

1. Give the characteristics of image formed by a plane mirror. (Pg-4)
2. Derive the relation between f and R for a spherical mirror. (Pg-6,7)
3. Obtain the equation for lateral magnification in spherical mirrors. (Pg-9)
4. What is optical path? Obtain the equation for optical path. (Pg-13)
5. Obtain the equation for apparent depth. (Pg-17)
6. Explain refraction in a glass slab. (Pg-26)
7. Obtain the equation for lateral magnification for thin lens. (Pg-31)
8. Derive the equation for effective focal length for lenses in contact. (Pg-34)

UNIT-7 WAVE OPTICS

1. State and explain Brewster's law? (Pg-84)
2. Discuss about pile of plates. (Pg-85)
3. Prove laws of reflection using Huygens' principle. (Pg-56)
4. What is Fresnel's distance? Obtain the equation for Fresnel's distance. (Pg-73)
5. Mention the differences between interference and diffraction. (Pg-74)
6. Differentiate between polarised and unpolarised Light (Pg-80)

UNIT 8 Dual Nature of Radiation and Matter

1. Explain Effect of intensity of incident light on photoelectric current. (Pg-114)
2. Derive an expression for de Broglie wavelength of electrons. (Pg-124)
3. List out the laws of photoelectric effect. (Pg-116)
4. Explain Characteristic x – ray spectra. (Pg-131)
5. Give the construction and working of photo emissive cell. (Pg-122)
6. Derive an expression for de Broglie wavelength of matter waves. (Pg-124)

UNIT 9 Atomic and Nuclear physics

1. Write the properties of cathode rays. (Pg-143)
2. Write down the draw backs of Bohr atom model. (Pg-163)
3. Explain the variation of average binding energy with the mass number by graph and discuss its features. (Pg-167)
4. Explain in detail the nuclear force. (Pg-168)
5. Discuss the alpha decay process with example. (Pg-169)
6. Discuss the beta decay process with examples. (Pg-171)
7. Discuss the gamma decay process with example. (Pg-173)
8. Discuss the properties of neutrino and its role in beta decay. (Pg-172,173)
9. Explain the idea of carbon dating. (Pg-177)
10. Explain in detail chain reaction. (Pg-180)
12. Discuss the process of nuclear fusion and how energy is generated in stars? (Pg-184)
13. Explain distance of closest approach? (Pg-150)
14. Explain impact parameter. (Pg-150)
15. Explain Rutherford alpha scattering experiment. (Pg-148)

UNIT 10 ELECTRONICS AND COMMUNICATION

1. Draw the circuit diagram of a half wave rectifier and explain its working? (Pg-207)
2. Explain Zener diode as a voltage regulator. (Pg-211)
3. Transistor functions as a switch. Explain. (Pg-222)
4. State and prove De Morgan's First and Second theorems. (Pg-231,232)
5. Elucidate the formation of a N-type and P-type semiconductors. (Pg-200,201)

UNIT 11 Recent Developments in Physics

1. Mention advantages and disadvantages of Robotics. (Pg-267)
2. What are the possible harmful effects of usage of Nanoparticles? Why? (Pg-261)

IMPORTANT TWO MARKS**UNIT- 1 ELECTROSTATICS**

1. State Coulomb's law. Write in vector form. (Pg-4)
2. What are the differences between Coulomb force and gravitational force? (Pg-5)
3. Define 'Electric field'. (Pg-12)
4. Define 'Electric dipole'. (Pg-20)
5. What is electric dipole moment? Give its unit. (Pg-20)
6. Define electrostatic potential. (Pg-26)
7. What is meant by quantisation of charges? (Pg- 4)
8. What is an equipotential surface? (Pg-31)
9. Define 'electrostatic potential energy'. (Pg-33)
10. Define 'electric flux'. (Pg-36)
11. State Gauss law. (Pg- 40)
12. Define 'capacitance'. Give its unit. (Pg-54)
13. What is corona discharge? (Pg-65)
14. Write a note on microwave oven. (Pg-25)

UNIT- 2 CURRENT ELECTRICITY

1. Distinguish between drift velocity and mobility. (Pg-83,84)
2. State Ohm's law. (Pg-87*)
3. What are ohmic and non-ohmic devices? (Pg-87)
4. Define electrical resistivity or Specific resistance. (Pg-88)
5. Define temperature coefficient of resistance. (Pg- 95)
6. What is superconductivity? (Pg-96)
7. What is electric power and electric energy? (Pg-97,98)
8. Define current density. (Pg-85)
9. State Kirchhoff's current rule. (Pg-104)
10. State Kirchhoff's voltage rule. (Pg-105)
11. What do you mean by internal resistance of a cell? (Pg-100)
12. What is Seebeck effect? (Pg-114)
13. What is Thomson effect? (Pg-115)
14. What is Peltier effect? (Pg- 115)
15. Give the applications of Seebeck effect. (Pg-114)
16. Define electric current. (Pg-82)
17. Repairing the electrical connection with the wet skin is always dangerous. Why? (Pg-89)
18. Define Critical or transition temperature. (Pg-96)

UNIT-3 MAGNETISM AND MAGNETIC EFFECTS OF ELECTRIC CURRENT

1. State Fleming's left hand rule (FLHR). (Pg-177)
2. Define magnetic flux. (Pg-133)
3. Define magnetic dipole moment. (Pg-130)
4. State Coulomb's inverse law. (Pg-135)
5. State Biot-Savart's law. (Pg-154)
6. State Ampere's circuital law. (Pg-162)
9. How the current sensitivity of galvanometer can be increased? (Pg-182)
10. State right hand thumb rule to find direction magnetic moment associated with current loop. (Pg-160)
11. Define End rule. (Pg-160)
12. Define one ampere. (Pg-179)
13. Define magnetic field. (Pg-130)
14. Define magnetic flux density. (Pg-133)

UNIT-4 ELECTROMAGNETIC INDUCTION AND ALTERNATING CURRENT

1. Define magnetic flux. (Pg-196)
2. State Fleming's right hand rule. (Pg-204)
3. Mention the ways of producing induced emf. (Pg-219)
4. Define self inductance or coefficient of self induction. (Pg-211,212)
5. Define the unit of self inductance (one henry). (Pg-212)
6. Define mutual inductance or coefficient of mutual induction. (Pg-215)
7. Define the unit of mutual inductance (Pg-216)
7. Distinguish between step up and step down transformer. (Pg-228)
9. Define the efficiency of the transformer. (Pg-228)
10. Define mean value or average value of AC. (Pg-234)
11. Define RMS value of alternating current. (Pg-236)
12. What do you mean by resonant frequency? (Pg-245)
13. What are LC oscillations? (Pg-251)
14. How will you define Q-factor? (Pg-247)
15. Define phasor and phasor diagram. (Pg-237)
16. Define inductive reactance. (Pg-240)
17. An inductor blocks AC but it allows DC. Why? (Pg-240*)
18. Define capacitive reactance. (Pg-241)
19. A capacitor blocks DC but it allows AC. Why? (Pg-241*)
20. Define wattless and wattful current. (Pg-249)

UNIT-5 ELECTROMAGNETIC WAVES

1. What is displacement current? (Pg-269)
2. The relative magnetic permeability of the medium is 2.5 and the relative electrical permittivity of the medium is 2.25. Compute the refractive index of the medium. (Pg-274)
3. What is meant by Fraunhofer lines? (Pg-279)
4. Define emission spectra. (Pg-278)
5. Define absorption spectra. (Pg-279)

UNIT-6 RAY OPTICS

1. State the laws of reflection. (Pg-2)
2. State Snell's law/law of refraction. (Pg-14)
3. What is principle of reversibility? (Pg-16)
4. What is relative refractive index? (Pg-16)
5. What is critical angle and total internal reflection? (Pg-19)
6. What are conditions for total internal reflection take place? (Pg-19)
7. What is angle of minimum deviation? (Pg-40)
8. State Rayleigh's scattering law? (Pg-44)
9. Why does sky appear blue? (Pg-44)
10. What is the reason for reddish appearance of sky during sunset and sunrise? (Pg-44)
11. What is optical path? (Pg-13)
12. What is simultaneous reflection (or) refraction (Pg-15)
13. What is angle of deviation due to reflection? (Pg-2)
14. What is angle of deviation due to refraction? (Pg-15)
15. Why do stars twinkle? (Pg-18)
16. How does an endoscope work? (Pg-26)
17. What is dispersion? (Pg-41)
18. Define dispersive power. (Pg-43)
19. How are rainbows formed? (Pg-42)

UNIT-7 WAVE OPTICS

1. What are called corpuscles ? (Pg-53)
2. What is a wavefront? (Pg-54)
3. What are the shapes of wavefront for source at infinite, point source and line source? (Pg-55)
4. State Huygens' principle. (Pg-55)
5. Give the relation between phase difference and path difference. (Pg-60)
6. What are called coherent sources? (Pg-61)
7. Can two independent monochromatic sources acts as coherent sources? (Pg-61)
8. What are the conditions for obtaining clear and broad interference bands? (Pg-65)
9. What is bandwidth of interference pattern? (Pg-65)
10. What is diffraction? (Pg-69)
11. What is Fresnel's distance? (Pg-73)
12. What are polariser and analyser? (Pg-81)
13. State Brewster's law. (Pg-85)
14. List the uses of polaroids. (Pg-84)
15. What is astigmatism? (Pg-97)
16. What is Rayleigh's criterion? (Pg-78)
17. State Malus' law. (Pg-82)
18. What are the advantages and disadvantages of a reflecting telescope? (Pg-92)
19. What is interference of light? (Pg-58)

UNIT 8 Dual Nature of Radiation and Matter

1. Define work function of a metal. Give its unit. (Pg-109)
2. What is photoelectric effect? (Pg-112)
3. Define Stopping potential. (Pg-115)
4. How will you define threshold frequency? (Pg-116)
5. What is a photo cell? Mention the different types of photocells. (Pg-121)
6. State de Broglie hypothesis(or) matter waves. (Pg-124)
7. A proton and an electron have same kinetic energy. Which one has greater de Broglie wavelength. Justify. (Pg-129) *
 - de Broglie wavelength of proton ; $\lambda_p = h/\sqrt{2 m_p K}$
 - de Broglie wavelength of electron ; $\lambda_e = h/\sqrt{2 m_e K}$
 - Here the mass of the proton is greater than the mass of the electron ($m_p > m_e$)
 - Hence the de Broglie wavelength of electron is greater than that of proton ($\lambda_e > \lambda_p$)
8. An electron and an alpha particle have same kinetic energy. How are the de Broglie wavelengths associated with them related? (Pg-122)*
9. What are X-rays? (Pg-129)
10. Write the applications of X-rays. (Pg-132)
11. Mention the two features of x-ray spectra, not explained by classical electromagnetic theory. (Pg-130)

UNIT 9 Atomic and Nuclear physics

1. What are cathode rays? (Pg-143)
2. Give the results of Rutherford alpha scattering experiment. (Pg-149)
3. What is meant by excitation energy. (Pg-158)
4. Define the ionization energy and ionization potential. (Pg-158,159)
5. Define impact parameter. (Pg-150)
6. Define atomic mass unit u. (Pg-161)
7. Show that nuclear density is almost constant for nuclei with $Z > 10$. (Pg-166)
8. What is mass defect? (Pg-166)

9. What is binding energy of a nucleus? Give its expression. (Pg-167)
10. Calculate the energy equivalent of 1 atomic mass unit. (Pg-167)
11. State law of radioactivity. (Pg-174)
13. What is mean life and half-life of nucleus? Give the expression. (Pg-176)
14. What is meant by activity or decay rate? Give its unit. (Pg-174)
15. Define curie. (Pg-175)
16. How will you classify Neutrons based on their kinetic energy. (Pg-179)
17. Define Nuclear fission. (Pg-179)
18. Define Nuclear fusion. (Pg-184)
19. Define thermonuclear reaction. (Pg-184)
20. Write proton-proton cycle of fusion reaction. (Pg-184)

UNIT 10 ELECTRONICS AND COMMUNICATION

1. Distinguish between intrinsic and extrinsic semiconductors. (Pg-198,200)
2. What is called P-type semiconductor? (Pg-201)
3. What is called N-type semiconductor? (Pg-200)
4. What do you mean by doping? (Pg-200)
5. Define rectification and rectifier efficiency. (Pg-207,208)
6. What is Centre tap transformer? (Pg-209)
7. Distinguish between avalanche and zener breakdown. (Pg-209,210)
8. Draw the circuit diagram for NPN transistor in CB,CC,CE mode. (Pg-216,217)
9. Give the Relation between α and β . (Pg-221)
10. State De Morgan's first and second theorems. (Pg-231,232)
11. List out the advantages of IC's. (Pg-232)
11. Distinguish between Digital ICs and Analog ICs or linear ICs. (Pg-233)
13. Define modulation. (Pg-234)
14. Define amplitude modulation. (Pg-234)
15. Give the advantages and limitations of amplitude modulation. (Pg-234)
16. Define frequency modulation. (Pg-235)
17. Give the advantages and limitations of frequency modulation. (Pg-235)
18. Define phase modulation. (Pg-235)

UNIT 11 Recent Developments in Physics

1. Distinguish between Nano Science and Nanotechnology. (Pg-255)
2. Give any two examples for "Nano" in nature. (Pg-256,257)
3. Mention any two advantages and disadvantages of Robotics. (Pg-267)
4. Why steel is preferred in making Robots? (Pg-267)