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PLUS TWO PHYSICS VOLUME-I (QUESTION BANK)

LESSON- 1 ELECTROSTATICS

Short Answer Questions (Book Back):

1. What is meant by quantisation of charges? (Pg- 4)
2. Write down Coulomb's law in vector form and mention what each term represents.(Pg-4)
3. What are the differences between Coulomb force and gravitational force? (Pg-5)
4. Write a short note on superposition principle. (Pg-9)
5. Define 'Electric field'. (Pg-12)
6. What is mean by 'Electric field lines'? (Pg-18)
7. The electric field lines never intersect. Justify. (Pg-20)
8. Define 'Electric dipole'. (Pg-21)
9. What is the general definition of electric dipole moment? (Pg-22)
10. Define 'electrostatic potential". (Pg-28)
11. What is an equipotential surface? (Pg-32)
12. What are the properties of an equipotential surface? (Pg-33)
13. Give the relation between electric field and electric potential. (Pg-33)
14. Define 'electrostatic potential energy'. (Pg-34)
15. Define 'electric flux'. (Pg-38)
16. What is meant by electrostatic energy density? (Pg-58)
17. Write a short note on 'electrostatic shielding'. (Pg-50)
18. What is Polarisation? (Pg-54)
19. What is dielectric strength? (Pg-55)
20. Define 'capacitance'. Give its unit. (Pg-56)
21. What is corona discharge? (Pg-67)

Additional Questions:

1. What is Electrostatics? (Pg-02)
2. What is called tribo-electric charging? (Pg-03)
3. Like charges repels. Unlike charges attracts. Prove. (Pg-02)
4. State conservation of electric charges. (Pg-03)
5. Define relative permittivity. (Pg-05)
6. State Coulomb's law in electrostatics. (Pg-04)
7. Define potential difference. Give its unit. (Pg-27)
8. Define linear charge density. (Pg-17)
9. Define surface charge density. (Pg-17)
10. Define volume charge density. (Pg-17)
11. Write a note on microwave oven. (Pg-26)
12. Define one coulomb. (Pg-05)
13. State Gauss law. (Pg-41)
14. What is electrostatic equilibrium? (Pg-48)

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15. During lightning, it is safer to sit inside bus than in an open ground or under tree. Why? (Pg-51)
16. Define electrostatic induction. (Pg-51)
17. Define dielectrics or insulators. (Pg-53)
18. What are called non-polar molecules. Give examples. (Pg-53)
19. What are called polar molecules. Give examples. (Pg-53)
20. Define dielectric polarization. (Pg-54)
21. Define electric susceptibility. (Pg-54)
22. Define dielectric breakdown. (Pg-55)
23. What is called a capacitor? (Pg-55)
24. Define energy density of a capacitor. (Pg-58)

Long Answer questions (Book Back):

1. Discuss the basic properties of electric charges. (Pg-03)
2. Explain in detail Coulomb's law and its various aspects. (Pg-04)
3. Define 'Electric field' and discuss its various aspects. (Pg-12)
4. How do we determine the electric field due to a continuous charge distribution? Explain. (Pg-16)
5. Calculate the electric field due to a dipole on its axial line and equatorial plane. (Pg-23,24)
6. Derive an expression for the torque experienced by a dipole due to a uniform electric field. (Pg-25)
7. Derive an expression for electrostatic potential due to a point charge. (Pg-28)
8. Derive an expression for electrostatic potential due to an electric dipole. (Pg-30)
9. Obtain an expression for potential energy due to a collection of three point charges which are separated by finite distances. (Pg-34)
10. Derive an expression for electrostatic potential energy of the dipole in a uniform electric field.(Pg-36)
11. Obtain Gauss law from Coulomb's law. (Pg-40)
12. Obtain the expression for electric field due to an infinitely long charged wire. (Pg-43)
13. Obtain the expression for electric field due to an charged infinite plane sheet. (Pg-44)
14. Obtain the expression for electric field due to an uniformly charged spherical shell. (Pg-46)
15. Discuss the various properties of conductors in electrostatic equilibrium. (Pg-48)
16. Explain the process of electrostatic induction. (Pg-51)
17. Explain dielectrics in detail and how an electric field is induced inside a dielectric. (Pg-54)
18. Obtain the expression for capacitance for a parallel plate capacitor. (Pg-56)
19. Obtain the expression for energy stored in the parallel plate capacitor. (Pg-58)
20. Explain in detail the effect of a dielectric placed in a parallel plate capacitor. (Pg-59)
21. Derive the expression for resultant capacitance, when capacitors are connected in series and in parallel. (Pg-62,63)
22. Explain in detail how charges are distributed in a conductor, and the principle behind the lightning conductor. (Pg-65,67)
23. Explain in detail the construction and working of a Van de Graaff generator. (Pg-68)

Additional Questions:

1. Explain Electric field due to the system of point charges. (Pg-15)
2. Give the applications and disadvantage of capacitors. (Pg-58)
3. List the properties of electric field lines. (Pg-18)
4. Explain Electrostatic potential energy due to a point charge. (Pg-27)

LESSON- 2 CURRENT ELECTRICITY

Short Answer Questions (Book Back):

1. Why current is a scalar? (Pg-88)
2. Distinguish between drift velocity and mobility. (Pg-85,86)
3. State microscopic form of Ohm's law. (Pg-87)
4. State macroscopic form of Ohm's law. (Pg-89)
5. What are ohmic and non-ohmic devices? (Pg-89)
6. Define electrical resistivity. (Pg-90)
7. Define temperature coefficient of resistance. (Pg- 97)
8. What is superconductivity? (Pg-99)
9. What is electric power and electric energy? (Pg-100)
10. Define current density. (Pg-87)
11. Derive the expression for power P=VI in electrical circuit. (Pg- 99,100)
12. Write down the various forms of expression for power in electrical circuit. (Pg-100)
13. State Kirchhoff's current rule. (Pg-107)
14. State Kirchhoff's voltage rule. (Pg-108)
15. State the principle of potentiometer. (Pg-113)
16. What do you mean by internal resistance of a cell? (Pg-103)
17. State Joule's law of heating. (Pg- 115)
18. What is Seebeck effect? (Pg-117)
19. What is Thomson effect? (Pg-118)
20. What is Peltier effect? (Pg- 118)
21. State the applications of Seebeck effect. (Pg-117)

Additional Questions:

1. Define current electricity.(Pg-82)
2. Define electric current. (Pg-84)
3. Define one ampere (1 A) (Pg-84)
4. What is called conventional current? (Pg-84)
5. What are called free electrons and positive ions? (Pg-83)
6. What is carbon resistors? (Pg-96)
7. Define resistance of the conductor. (Pg-89)
8. What are the factors that the resistance depend on? (Pg-90)
9. Define conductivity of the material. (Pg-90)
10. Repairing the electrical connection with the wet skin is always dangerous.Why? (Pg-91)
11. What is called electric cell (battery)? (Pg-102)
12. Define electromotive force. (Pg-103)
13. Give the sign convention followed by the Kirchoff's current rule. (Pg-107)
14. Give the sign convention followed by the Kirchoff's voltage rule. (Pg-108)

15. What is called Galvanometer. (Pg-110)
16. What is called Joule's heating effect of current? (Pg-114)
17. What are the properties of the substance used as heating element. (Pg-115)
18. Write a note on electric fuses. (Pg-116)
19. Write a note on circuit breakers (trippers). (Pg-116)
20. Write a note on electric bulb or lamp. (Pg-117)
21. What is thermo electric effect? (Pg-117)
22. Why Nichrome used as heating device? (Pg-115)
23. What is called thermistor? (Pg-98)
24. Define critical or transition temperature. (Pg-99)
25. How the resistivity of materials are related to number density(n) and τ? (Pg-99)
26. Write a note on multimeter. (Pg-97)
27. Distinguish between Peltier effect and Joule's effect. (Pg-118*)
28. What is called positive Thomson effect? (Pg-118)
29. What is called negative Thomson effect? (Pg-118)
30. Why copper wire is not used in potentiometer? (Pg-112*)

Long Answer Questions (Book Back):

1. Describe the microscopic model of current and obtain general form of Ohm's law.(Pg-87)
2. Obtain the macroscopic form of Ohm's law from its microscopic form and discuss its limitation. (Pg-88,89)
3. Explain the equivalent resistance of a series and parallel resistor network. (Pg-92,93)
4. Explain the determination of the internal resistance of a cell using voltmeter. (Pg-103)
5. State and explain Kirchhoff's rules. (Pg-107)
6. Obtain the condition for bridge balance in Wheatstone's bridge. (Pg-109)
7. Explain the determination of unknown resistance using meter bridge. (Pg-111)
8. How the emf of two cells are compared using potentiometer? (Pg-113)

Additional Questions:

1. Obtain an expression for drift velocity. How it is related with the mobility?(Pg-85,86)
2. Derive the relation between the drift velocity and the current. (Pg-87)
3. Explain the equivalent emf of electric cells in series. (Pg-104)
4. Explain the equivalent emf of electric cells in parallel. (Pg-106)
5. Explain the principle of potentiometer. (Pg-112)
6. Explain the temperature dependence of resistivity. (Pg-97)
7. Explain Seebeck effect. Give its applications. (Pg-117)
8. Explain Peltier effect. (Pg-118)
9. Explain Thomson effect. (Pg-118)
10. Explain the method of measurement of internal resistance of a cell using potentiometer.(Pg-114)

LESSON-3 MAGNETISM AND MAGNETIC EFFECTS OF ELECTRIC CURRENT

Short Answer Questions (Book Back):

1. What is meant by magnetic induction? (Pg-150)
2. Define magnetic flux. (Pg-136)
3. Define magnetic dipole moment. (Pg-132)
4. State Coulomb's inverse law. (Pg-140)
5. What is magnetic susceptibility? (Pg-151)
6. State Biot-Savart's law. (Pg-162)
7. What is magnetic permeability? (Pg-149)
8. State Ampere's circuital law. (Pg-169)
9. Compare dia, para and ferro-magnetism. (Pg-156)
10. What is meant by hysteresis? (Pg-157)

Additional Questions:

1. Define magnetism. Give its applications.(Pg-129)
2. Define Geomagnetism or Terrestrial magnetism. (Pg-130)
3. What are the elements of the Earth's magnetic field? (Pg-130)
4. Define geographic meridian and magnetic meridian. (Pg-131)
5. Define magnetic declination. (Pg-131)
6. For Chennai, the magnetic declination angle is $-\mathbf{1}°8'$. Why it is negative? (Pg-131)
7. Define horizontal component of Earth's magnetic field. (Pg-131)
8. Calculate the tangent of magnetic inclination or angle of dip. (Pg-131)
9. Define pol strength of the magnet. (Pg-132)
10. Define magnetic field. (Pg-133)
11. What are the types of magnet? (Pg-134)
12. Define magnetic flux density. (Pg-137)
13. Distinguish between uniform and non-uniform magnetic field. (Pg-138)
14. Discuss the types of force between two magnetic pole strength. (Pg-139)
15. What happens when a bar magnet is freely suspended in uniform and non-uniform magnetic field? (Pg-144)
16. State tangent law. (Pg-147)
17. Define magnetizing field. (Pg-149)
18. Define magnetic permeability. (Pg-149)
19. Define relative permeability. (Pg-149)
20. Define intensity of magnetization. (Pg-150)
21. Define magnetic induction or total magnetic field. (Pg-150)
22. What are the classification of magnetic materials? (Pg-152)
23. Define Meissner effect. (Pg-152)
24. Define Curie's law. (Pg-153)
25. Define curie temperature. (Pg-155)
26. State Curie - Weiss law. (Pg-155)
27. What are the types of ferromagnetic materials? (Pg-157)
28. State right hand thumb rule for current carrying conductor. (Pg-161)
29. State Maxwell's right hand cork screw rule. (Pg-161)

30. Define magnetic dipole moment of current loop. (Pg-167)
31. State right hand thumb rule for direction of magnetic moment in a current loop. (Pg-167)
32. Define gyro-magnetic ratio. (Pg-168)
33. Define Bohr magneton. (Pg-169)
34. Define Lorentz force. (Pg-175)
35. Define one tesla. (Pg-175)
36. What are the limitations of cyclotron? (Pg-183)
37. Write a note on fast-neutron cancer therapy. (Pg-183)
38. State Flemming's left hand rule (FLHR). (Pg-184)
39. Define one ampere. (Pg-186)
40. Define figure of merit of a galvanometer. (Pg-192)
41. Define current sensitivity of a galvanometer. (Pg-192)
42. How the current sensitivity of galvanometer can be increased? (Pg-192)
43. Why Phosphor - bronze is used as suspension wire? (Pg-192)
44. Define voltage sensitivity of the galvanometer. (Pg-192)
45. How galvanometer can be converted in to ammeter? (Pg-193)
46. How galvanometer can be converted in to voltmeter? (Pg-195)
47. Why ammeter should always connected in series to the circuit? (Pg-194)
48. Why voltmeter should always connected in parallel to the circuit? (Pg-194)
49. Define geographic equator and magnetic equator. (Pg-131)
50. What is called reduction factor? (Pg-149)
51. Define saturation magnetization. (Pg-156)
52. What is called retentivity? (Pg-157)
53. What is called coercivity? (Pg-157)
54. Write a note on soft and hard magnetic materials. (Pg-158)
55. Mention the similarities between Coulomb's law and Biot-Savart's law. (Pg-162)
56. Define End rule. (Pg-167)
57. What is meant by solenoid?(Pg-170)
58. Write a note on MRI. (Pg-173)
59. What is called Toroid? (Pg-173)
60. State the principle of Cyclotron. (Pg-181)
61. What is the principle of moving coil galvanometer? (Pg-190)
62. What is meant by sensitivity of a galvanometer? (Pg-192)

Long Answer Questions (Book Back):

1. Discuss Earth's magnetic field in detail. (Pg-130)
2. Deduce the relation for the magnetic induction at a point due to an infinitely long straight conductor carrying current. (Pg-164)
3. Obtain a relation for the magnetic induction at a point along the axis of a circular coil carrying current. (Pg-166)
4. Compute the torque experienced by a magnetic needle in a uniform magnetic field. (Pg-143)
5. Calculate the magnetic induction at a point on the axial line of a bar magnet. (Pg- 140)
6. Obtain the magnetic induction at a point on the equatorial line of a bar magnet. (Pg-141)
7. Find the magnetic induction due to a long straight conductor using Ampere's circuital law. (Pg-169)
8. Discuss the working of cyclotron in detail. (Pg-181)
9. What is tangent law? Discuss in detail. (Pg-146)

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10. Explain the principle and working of a moving coil galvanometer. (Pg- 190)
11. Discuss the conversion of galvanometer into an ammeter and also a voltmeter. (Pg-193,194)
12. Calculate the magnetic field inside and outside of the long solenoid using Ampere's circuital law. (Pg- 171)

Additional Questions:

1. What are the properties of bar magnet? (Pg-134)
2. Give the properties of magnetic field lines. (Pg-136)
3. Explain Coulomb's inverse square law in magnetism. (Pg-139)
4. Obtain an expression for potential energy of a bar magnet placed in an uniform magnetic field. (Pg-145)
5. Calculate the torque acting on a bar magnet in uniform magnetic field. (Pg-143)
6. What are the precausions taken wile using tangent galvanometer (TG). (Pg-147)
7. Explain dia magnetism. (Pg-152)
8. Explain paramagnetism. (Pg-153)
9. Explain ferro magnetism. (Pg-154)
10. List the properties of Diamagnetic materials. (Pg152
11. List the properties of paramagnetic materials. (Pg-153)
12. List the properties of ferromagnetic materials. (Pg-155)
13. Explain the applications of hysteresis loop. (Pg-158)
14. Explain the magnetic field around a straight current carrying conductor. (Pg-160)
15. Explain the magnetic field around the current carrying circular loop. (Pg-160)
16. State and explain Biot-Savart law. (Pg-162)
17. Give the difference between Coulomb's law and Biot-Savart's law. (Pg-163)
18. Explain current carrying solenoid behaves like a bar magnet. (Pg-170)
19. Define Lorentz force. Give the properties of Lorentz magnetic force. (Pg-175)
20. Write a note on velocity selector. (Pg-181)
21. Differentiate Scalar, Vector and Tensor. (Pg-150)
22. Define Hysterisis. Explain it with help of diagram. (Pg-157)
23. Compute the magnetic dipole moment of revolving electron. And hence define Bohr magneton. (Pg-168)
24. Obtain the magnetic fields at various points on the toroid. (Pg-173)
25. Obtain the expression for force on a moving charge in a magnetic field. (Pg-177)
26. Obtain an expression for the force on a current carrying conductor placed in a magnetic field. (Pg-183)
27. Obtain a force between two long parallel current carrying conductors. Hence define ampere. (Pg-185)
28. Deduce an expression for torque on a current loop placed in magnetic field when unit vector $\hat{\boldsymbol{n}}$ is perpendicular to magnetic field. (Pg-187)
29. Deduce an expression for torque on a current loop placed in magnetic field when unit vector $\hat{\boldsymbol{n}}$ is at an angle θ with the magnetic field. (Pg-188)
30. Explain the motion of a charged particle under crossed electric and magnetic field. (Pg-180)
31. Explain current loop behaves like a magnetic dipole.(Pg-167)
32. Write the difference between soft and hard ferromagnetic materials.(Pg-158)

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LESSON-4 ELECTROMAGNETIC INDUCTION AND ALTERNATING CURRENT

Short Answer Questions (Book Back):

1. What is meant by electromagnetic induction? (Pg-210)
2. State Faraday's laws of electromagnetic induction. (Pg-212)
3. State Lenz's law. (Pg-214)
4. State Fleming's right hand rule. (Pg-216)
5. How is Eddy current produced? How do they flow in a conductor? (Pg-221)
6. Mention the ways of producing induced emf. (Pg-233)
7. What for an inductor is used? Give some examples. (Pg-225)
8. What do you mean by self-induction? (Pg-225)
9. What is meant by mutual induction? (Pg-229)
10. Give the principle of AC generator. (Pg-237)
11. List out the advantages of stationary armature-rotating field system of AC generator. (Pg-240)
12. What are step-up and step-down transformers? (Pg-244)
13. Define average value of an alternating current. (Pg-250)
14. How will you define RMS value of an alternating current? (Pg-250)
15. What are phasors? (Pg-252)
16. Define electric resonance. (Pg-261)
17. What do you mean by resonant frequency? (Pg-261)
18. How will you define Q-factor? (Pg-263)
19. What is meant by wattles current? (Pg-265)
20. What are called active and reactive component in RLC circuit?(Pg-265)
21. Give any one definition of power factor. (Pg-266)
22. What are LC oscillations? (Pg-267)
23. What is meant by undamped oscillations? (Pg-269)
24. Tabulate energy in two oscillatory systems (i) LC oscillator (ii) spring-mass system.(Pg-270)

Additional Questions:

1. Define magnetic flux. (Pg-207)
2. What is the importance of electromagnetic induction? (Pg-212)
3. What are called Eddy currents (Foucault currents)? (Pg-221)
4. A spherical stone and a spherical metallic ball of same size and mass are dropped from the same height. Which one will reach earth's surface first? Justify your answer. (Pg-223)
5. Define self inductance or coefficient of self induction. (Pg-226)
6. Define the unit of self inductance (one henry). (Pg-226)
7. Define mutual inductance or coefficient of mutual induction. (Pg-230)
8. How an emf is induced by changing the magnetic field? (Pg-233)
9. What is called AC generator or alternator? (Pg-237)
10. State single phase AC generator. (Pg-240)

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11. State three phase AC generators. (Pg-242)
12. What are the advantages of three phase AC generators? (Pg-243)
13. What is called transformer? (Pg-243)
14. Distinguish between step up and step down transformer. (Pg-245)
15. State the principle of transformer. (Pg-244)
16. Define the efficiency of the transformer. (Pg-245)
17. Define Sinusoidal alternating voltage. (Pg-249)
18. Define mean value or average value of AC. (Pg-250)
19. Define effective value of alternating current. (Pg-251)
20. The common house hold appliances, the voltage rating is specified as 230 V, 50 Hz. What is The meaning of it? (Pg-252)
21. Define phasor and phasor diagram. (Pg-252,253)
22. Draw the phasor diagram for an alternating voltage $v = V_m \sin \omega t$. (Pg-253)
23. Define inductive reactance. (Pg-255)
24. An inductor blocks AC but it allows DC. Why? (Pg-256*)
25. Define capacitive reactance. (Pg-257)
26. A capacitor blocks DC but it allows AC. Why? (Pg-259*)
27. What are the applications of series RLC resonant circuit? (Pg-262)
28. Resonance will occur only in LC circuits. Why? (Pg-262)
29. Define power in an AC circuits. (Pg-264)
30. Define power factor. (Pg-266)
31. Define wattless and wattful current. (Pg-265)
32. Define Flux linkage. (Pg-226)
33. Define impedance of RLC circuit. (Pg-260)
34. What is called motional emf ? (Pg-218)
35. What is alternating current? (Pg-248)

Long Answer Questions (Book Back):

1. Establish the fact that the relative motion between the coil and the magnet induces an emf in the coil of a closed circuit. (Pg-208)
2. Give an illustration of determining direction of induced current by using Lenz's law. (Pg- 214)
3. Show that Lenz's law is in accordance with the law of conservation of energy. (Pg-219)
4. Obtain an expression for motional emf from Lorentz force. (Pg-217)
5. Using Faraday's law of electromagnetic induction, derive an equation for motional emf.(Pg-218)
6. Give the uses of Foucault current. (Pg-223)
7. Define self-inductance of a coil interms of (i) magnetic flux and (ii) induced emf. (Pg-226)
8. How will you define the unit of inductance? (Pg-226)
9. What do you understand by self-inductance of a coil? Give its physical significance. (Pg-226)
10. Assuming that the length of the solenoid is large when compared to its diameter, find the equation for its inductance. (Pg-227)
11. An inductor of inductance L carries an electric current i. How much energy is stored while establishing the current in it? (Pg-228)
12. Show that the mutual inductance between a pair of coils is same ($M_{12} = M_{21}$). (Pg-229,230)
13. How will you induce an emf by changing the area enclosed by the coil? (Pg-233)
14. Show mathematically that the rotation of a coil in a magnetic field over one rotation induces an alternating emf of one cycle. (Pg-235)

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15. Elaborate the standard construction details of AC generator. (Pg-237)
16. Explain the working of a single-phase AC generator with necessary diagram. (Pg-240)
17. How are the three different emfs generated in a three-phase AC generator? Show the graphical representation of these three emfs. (Pg-242)
18. Explain the construction and working of transformer. (Pg-243)
19. Mention the various energy losses in a transformer. (Pg-245)
20. Give the advantage of AC in long distance power transmission with an example. (Pg-246)
21. Find out the phase relationship between voltage and current in a pure inductive circuit. (Pg-255)
22. Derive an expression for phase angle between the applied voltage and current in a series RLC circuit. (Pg-260)
23. Define inductive and capacitive reactance. Give their units. (Pg-255,257)
24. Obtain an expression for average power of AC over a cycle. Discuss its special cases. (Pg-264)
25. Show that the total energy is conserved during LC oscillations. (Pg-269)
26. Prove that energy is conserved during electromagnetic induction. (Pg-215)
27. Compare the electromagnetic oscillations of LC circuit with the mechanical oscillations of block-spring system to find the expression for angular frequency of LC oscillators mathematically.(Pg-269)

Additional Questions:

1. Prove that experimentally if the current in a one closed circuit changes, an emf is induced in another circuit. (Pg-211)
2. How we understood the conclusions obtained from Faraday's experiment. (Pg-210)
3. Explain energy conservation. (Pg-215)
4. Define eddy currents. Demonstrate the production of eddy currents. (Pg-221)
5. What are the drawbacks of Eddy currents. How it is minimized? (Pg-222)
6. Explain mutual induction. Define coefficient of mutual induction on the basis of (i) magnetic flux and (ii) induced emf. (Pg-229,230)
7. Discuss the advantages of AC in long distance power transmission. (Pg-246)
8. Obtain the expression for average value of alternating current. (Pg-250)
9. Obtain an expression for RMS value of alternating current. (Pg-250,251)
10. Draw the phasor diagram and wave diagram for that current 'i' leads the voltage 'V' by phase angle of 'ϕ'. (Pg-253)
11. Find out the phase relationship between voltage and current in a pure resistive circuit.(Pg-254)
12. Find out the phase relationship between voltage and current in a pure capacitive circuit. (Pg-256)
13. Explain resonance in series RLC circuit. (Pg-261)
14. Define quality factor. Obtain an expression for it. (Pg-262)
15. Write a note on wattful current and wattles current. (Pg-265)
16. Define power factor in various ways. Give some examples for power factor. (Pg-266)
17. What are the advantages and disadvantages of AC over DC? (Pg-266)
18. Explain the applications of eddy currents (or) Foucault currents. (Pg-223)
19. What are called LC oscillations? Explain the generation of LC oscillations. (Pg-267)
20. Explain the effects of series resonant circuit. (Pg-262)

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LESSON-5 ELECTROMAGNETIC WAVES

Short answer Questions (Book Back):

1. What is displacement current? (Pg-286)
2. What are electromagnetic waves? (Pg-288)
3. Write down the integral form of modified Ampere's circuital law. (Pg-286)
4. Explain the concept of intensity of electromagnetic waves. (Pg-290)
5. What is meant by Fraunhofer lines? (Pg-296)

Additional Questions:

1. Define radiation pressure. (Pg-291)
2. What is called pointing vector? Give its unit. (Pg-291)
3. Define electromagnetic spectrum. (Pg-292)
4. Define dispersion. (Pg-295)
5. Define emission spectra. (Pg-295)
6. Define absorption spectra. (Pg-296)
7. What are the uses of Fraunhofer lines? (Pg-296)
8. Why electromagnetic waves are transverse in nature? (Pg-289)
9. Write a note on Infrared radiation. (Pg-293)
10. Write a note on UV-rays. (Pg-293)
11. Write a note on X-rays. (Pg-294)

Long answer Questions (Book Back):

1. Write down Maxwell equations in integral form. (Pg-287)
2. Write short notes on (a) microwave (b) X-ray (c) radio waves (d) visible spectrum (Pg-292)
3. Discuss briefly the experiment conducted by Hertz to produce and detect electromagnetic spectrum. (Pg-288)
4. Explain the Maxwell's modification of Ampere's circuital law. (Pg-284)
5. Write down the properties of electromagnetic waves. (Pg-289)
6. Discuss the source of electromagnetic waves. (Pg-291)
7. What is emission spectra? Give their types. (Pg-295)
8. What is absorption spectra? Give their types. (Pg-296)

Additional Questions:

1. Explain in detail the emission spectra and absorption spectra. (Pg-295)
2. Explain electromagnetic spectrum. (Pg-292)

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PLUS TWO PHYSICS VOLUME-II (QUESTION BANK)

UNIT-6 OPTICS

Short Answer Questions (Book Back):

1. State the laws of reflection. (Pg-2)
2. What is angle of deviation due to reflection? (Pg-2)
3. Give the characteristics of image formed by a plane mirror. (Pg-4)
4. Derive the relation between f and R for a spherical mirror. (Pg-7)
5. What are the Cartesian sign conventions for a spherical mirror? (Pg-8)
6. What is optical path? Obtain the equation for optical path of a medium of thickness d and refractive index n. (Pg-14)
7. State the laws of refraction. (Pg-15)
8. What is angle of deviation due to refraction? (Pg-16)
9. What is principle of reversibility? (Pg-17)
10. What is relative refractive index? (Pg-18)
11. Obtain the equation for apparent depth. (Pg-18)
12. Why do stars twinkle? (Pg-20)
13. What is critical angle and total internal reflection? (Pg-20)
14. Obtain the equation for critical angle. (Pg-20)
15. Explain the reason for glittering of diamond. (Pg-21)
16. What are mirage and looming? (Pg-22)
17. Write a short notes on the prisms making use of total internal reflection. (Pg-22)
18. What is Snell's window or Radius of illumination? (Pg-23)
19. Write a note on optical fibre. (Pg-25)
20. Explain the working of an endoscope. (Pg-27)
21. What are primary focus and secondary focus of convex and concave lens? (Pg-32)
22. What are the sign conventions followed for lenses? (Pg-32)
23. Arrive at lens equation from lens maker's formula. (Pg-32)
24. Obtain the equation for lateral magnification for thin lens. (Pg-33)
25. What is power of a lens? (Pg-36)
26. Derive the equation for effective focal length for lenses in contact. (Pg-36)
27. What is angle of minimum deviation? (Pg-42)
28. What is dispersion? (Pg-43)
29. How are rainbows formed? (Pg-46)
30. What is Rayleigh's scattering? (Pg-46)
31. Why does sky appear blue? (Pg-46)
32. What is the reason for reddish appearance of sky during sunset and sunrise? (Pg-46)
33. Why do clouds appear white? (Pg-47)
34. What are the salient features of corpuscular theory of light? (Pg-47)
35. What is wave theory of light? (Pg-48)
36. What is electromagnetic wave theory of light? (Pg-48)
37. Write a short note on quantum theory of light. (Pg-48)
38. What is a wavefront? (Pg-49)
39. What is Huygen's Principle? (Pg-49)
40. What is interference of light? (Pg-52)
41. What is phase of a wave? (Pg-54)

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42. Obtain the relation between phase difference and path difference. (Pg-54)
43. What are coherent sources? (Pg-55)
44. What is intensity division or amplitude division.? (Pg-55)
45. How does wavefront division provide coherent sources? (Pg-56)
46. How do source and images behave as coherent sources? (Pg-56)
47. What is bandwidth of interference pattern? (Pg-59)
48. What is diffraction? (Pg-63)
49. Differentiate between Fresnel and Fraunhofer diffraction. (Pg-63)
50. Discuss the special cases on first minimum in Fraunhofer diffraction. (Pg-67)
51. What is Fresnel's distance? Obtain the equation for Fresnel's distance. (Pg-67)
52. Mention the differences between interference and diffraction. (Pg-68)
53. What is a diffraction grating? (Pg-68)
54. What are resolution and resolving power?(Pg-71,72)
55. What is Rayleigh's criterion? (Pg-72)
56. What is polarisation? (Pg-73)
57. Differentiate between polarised and unpolarised Light (Pg-74)
58. Discuss polarisation by selective absorption.(Pg-74)
59. What are polariser and analyser? (Pg-75)
60. What are plane polarised, unpolarised and partially polarised light? (Pg-73,75)
61. State and obtain Malus' law. (Pg-76)
62. List the uses of polaroids. (Pg-78)
63. State Brewster's law. (Pg-78)
64. What is angle of polarisation and obtain the equation for angle of polarisation. (Pg-78,79)
65. Discuss about pile of plates. (Pg-79)
66. What is double refraction? (Pg-80)
67. Mention the types of optically active crystals with example. (Pg-80)
68. Discuss about Nicol prism. (Pg-81)
69. How is polarisation of light obtained by scattering of light? (Pg-81)
70. Discuss about simple microscope and obtain the equations for magnification for near point focusing and normal focusing. (Pg-82)
71. What are near point and normal focusing? (Pg-82)
72. Why is oil immersed objective preferred in a microscope? (Pg-84)
73. What are the advantages and disadvantages of using a reflecting telescope? (Pg-87)
74. What is the use of an erecting lens in a terrestrial telescope? (Pg-87)
75. What is the use of collimator? (Pg-87)
76. What are the uses of spectrometer? (Pg-87)
77. What is myopia? What is its remedy? (Pg-90)
78. What is hypermetropia? What is its remedy? (Pg-91)
79. What is presbyopia? (Pg-91)
80. What is astigmatism? (Pg-92)

Additional Questions:

1. Write a note on Ray optics and Wave optics. (Pg-1)
2. Define reflection. (Pg-1)
3. Write a note on real and virtual images formed by a plane mirror. (Pg-4,5)
4. What are the conditions for nature of objects and images regarding plane mirror. (Pg-5)
5. Distinguish convex mirror and concave mirror? (Pg-6)

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6. Define (i) Centre of curvature, (ii) Radius of curvature (iii) pole, (iv) principal axis, (v) focus or focal point, (vi) focal length, (vii) focal plane (Pg-6)
7. Define paraxial rays and marginal rays. (Pg-7)
8. How we locate the image formation in spherical mirrors? (Pg-8)
9. Define lateral or transverse magnification. (Pg-10)
10. Define refractive index. (Pg-14)
11. What is called refraction? (Pg-15)
12. Write the characteristics of refraction. (Pg-16)
13. What is meant by simultaneous reflection or simultaneous refraction. (Pg-16)
14. What are the conditions to achieve total internal reflection? (Pg-20)
15. What is core and cladding or sleeving of optical fibres? (Pg-25)
16. What is acceptance angle in optical fibre? (Pg-25)
17. What is acceptance cone in optical fibre? (Pg-26)
18. What is numerical aperture (NA) of the optical fibre? (Pg-26)
19. Write a note on an endoscope. (Pg-27)
20. List out assumptions are made while considering refraction at spherical surfaces. (Pg-28)
21. Write a note on prism. (Pg-40)
22. What is angle of deviation (d) of the prism? (Pg-41)
23. What are the factors angle of deviation (d) of the prism depends? (Pg-41)
24. What is called spectrum? (Pg-43)
25. What is called angular dispersion? (Pg-45)
26. Define dispersive power. (Pg-45)
27. What is known as scattering of light. (Pg-46)
28. State Rayleigh's scattering law. (Pg-46)
29. Why sky appears dark for the astronauts who could see the sky from above the atmosphere? (Pg-47)
30. What is called corpuscles? (Pg-47)
31. How are rainbows formed? (Pg-46)
32. What is Dual nature of light ? (Pg-48)
33. Write a note on wave nature of light. (Pg-48)
34. What are the factors shape of the wavefront depends? (Pg-49)
35. List out the wavefronts produced based on shape of the source and distance? (Pg-49)
36. What happens if light of particular frequency travels through different media? (Pg-52)
37. What is meant by superposition of waves? (Pg-52)
38. Can two independent monochromatic sources acts as coherent sources? (Pg-55)
39. Give the methods to obtain coherent light waves. (Pg-55)
40. What are called constructive and destructive interference? (Pg-57)
41. What is called interference fringes or bands in young's double slit experiment. (Pg-57)
42. What are the conditions for obtaining clear and broad interference bands? (Pg-59)
43. Why the central fringe or 0^{th} fringe will always be bright and white in colour, when Interference with polychromatic light. (Pg-60)
44. Brilliant colours are exhibited by the surface of oil films and soap bubbles. Why? (Pg-61)
45. Give the condition for n^{th} order minimum in diffraction at single slit. (Pg-65)
46. Give the condition for n^{th} order maximum in diffraction at single slit. (Pg-65)
47. Define grating element and corresponding points. (Pg-68)
48. Give the condition for higher order maximum in diffraction in grating. (Pg-69)
49. Give the reason for colourful appearance of the compact disc. (Pg-70)

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50. What are called Airy's discs? (Pg-71,72)
51. Why Rayleigh's criterion is said to be limit of resolution? (Pg-72)
52. What is angular resolution ? Give its unit. (Pg-72)
53. What is spacial resolution ? (Pg-72)
54. What is resolving power of the instrument? (Pg-72)
55. What is meant by unpolarised light? (Pg-73)
56. What is meant by polarised or plane polarised light? (Pg-73)
57. Define plane of vibration and plane of polarization. (Pg-)(Pg-74)
58. How an unpolarized light can be polarized? (Pg-74)
59. Discuss polarization by selective absorption. (Pg-74)
60. Discuss how a plane polarized and partially polarized light will be analysed using analyser? (Pg-75)
61. Explain polarization by reflection. (Pg-78)
62. State and prove Brewster's law. (Pg-78,79)
63. What is birefringence? (Pg-80)
64. Distinguish between ordinary ray and extra ordinary ray. (Pg-80)
65. Define Optic axis. (Pg-80)
66. Explain polarization by double refraction. (Pg-80)
67. Define uniaxial crystal and biaxial crystal. (Pg-80)
68. What are the uses and drawbacks of Nicol prism? (Pg-81)
69. Write a note on Simple microscope. (Pg-82)
70. Define angular magnification of simple microscope. (Pg-83)
71. Write a note on Resolving power of microscope. (Pg-84)
72. Write a note on Astronomical telescope. (Pg-86)
73. What is called reflecting telescope? (Pg-87)
74. Explain angle of minimum deviation with angle of incidence. (Pg-42)
75. Explain Huygen's principle. (Pg-49,50)

Long Answer Questions (Book Back):

1. Derive the mirror equation and the equation for lateral magnification. (Pg-9)
2. Describe the Fizeau's method to determine speed of light. (Pg-12)
3. Obtain the equation for radius of illumination (or) Snell's window. (Pg-23)
4. Derive the equation for acceptance angle and numerical aperture, of optical fiber. (Pg-25)
5. Obtain the equation for lateral displacement of light passing through a glass slab. (Pg-27)
6. Derive the equation for refraction at single spherical surface. (Pg-28)
7. Obtain lens maker's formula and mention its significance. (Pg-32)
8. Derive the equation for thin lens and obtain its magnification. (Pg-33)
9. Derive the equation for effective focal length for lenses in out of contact. (Pg-37)
10. 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-40,41,43)
11. What is dispersion? Obtain the equation for dispersive power of a medium. (Pg-44,45)
12. Prove laws of reflection using Huygens principle. (Pg-50)
13. Prove laws of refraction using Huygens principle. (Pg-51)
14. Obtain the equation for resultant intensity due to interference of light. (Pg-52,53)
15. Explain the Young's double slit experimental setup and obtain the equation for path difference. (Pg-57,58)
16. Obtain the equation for bandwidth in Young's double slit experiment. (Pg-58,59)

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17. Obtain the equations for constructive and destructive interference for transmitted and reflected waves in thin films. (Pg-61,62)
18. Discuss diffraction at single slit and obtain the condition for n^{th} minimum. (Pg-64,65)
19. Discuss the diffraction at a grating and obtain the condition for the m^{th} maximum.(Pg-68)
20. Discuss the experiment to determine the wavelength of monochromatic light using diffraction grating. (Pg-70)
21. Discuss the experiment to determine the wavelength of different colours using diffraction grating (Pg-71)
22. Obtain the equation for resolving power of optical instrument. (Pg-71,72)
23. Discuss about simple microscope and obtain the equations for magnification for near point focusing and normal focusing. (Pg-82,83)
24. Explain about compound microscope and obtain the equation for magnification. (Pg-84)
25. Obtain the equation for resolving power of microscope. (Pg-84)
26. Discuss about astronomical telescope. (Pg-86)
27. Mention different parts of spectrometer and explain the preliminary adjustments. (Pg-88)
28. Explain the experimental determination of material of the prism using spectrometer.(Pg-88)

Additional Questions:

1. Discuss diffraction at single slit and obtain the condition for n^{th} maximum. (Pg-64,65)
2. Explain the focusing of normal eye. (Pg-89,90)

UNIT-7 DUAL NATURE OF RADIATION AND MATTER

Short Answer Questions (Book Back):

1. Why do metals have a large number of free electrons? (Pg-106)
2. Define work function of a metal. Give its unit. (Pg-106)
3. What is photoelectric effect? (Pg-109)
4. How does photocurrent vary with the intensity of the incident light? (Pg-111)
5. Give the definition of intensity of light and its unit. (Pg-116) Note
6. How will you define threshold frequency? (Pg-117)
7. What is a photo cell? Mention the different types of photocells. (Pg-118)
8. Write the expression for the de Broglie wavelength associated with a charged particle of charge q and mass m, when it is accelerated through a potential *V*. (Pg-122)
9. State de Broglie hypothesis. (Pg-121)
10. Why we do not see the wave properties of a baseball? (Pg-121*)
    - The de Broglie wavelength of matter is $\boldsymbol{\lambda = h/m\,v}$
    - Thus the de Broglie wavelength is inversely proportional to the mass.
    - Since the mass of base ball is too large as compared with the electron, the de Broglie wavelength of base ball is negligibly small. So we do not see the wave property of the baseball.
11. A proton and an electron have same kinetic energy. Which one has greater de Broglie wavelength. Justify. (Pg-122*)
    - de Broglei wavelength of proton ; $\boldsymbol{\lambda p = h/\sqrt{2\,m_p\,K}}$
    - de Broglei wavelength of electron ; $\boldsymbol{\lambda e = h/\sqrt{2\,m_e\,K}}$
    - Here the mass of the proton is greater than the mass of the electron ($\boldsymbol{m_P > m_e}$)
    - Hence the de Broglei wavelength of electron is greater than that of proton ($\boldsymbol{\lambda_e > \lambda_P}$)
12. Write the relationship of de Broglie wavelength λ associated with a particle of mass *m* in terms of its kinetic energy *K*. (Pg-122)

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13. Name an experiment which shows wave nature of the electron. Which phenomenon was observed in this experiment using an electron beam? (Pg-122)

The wave nature of electron (i.e) de Broglie hypothesis of matter waves was experimentally confirmed by Davisson and Germer experiment. Diffraction is the important property of waves. So in this experiment, diffraction of electron beam was observed when they fall on crystalline solids.

14. An electron and an alpha particle have same kinetic energy. How are the de Broglie wavelengths associated with them related? (Pg-122*)

Additional Questions:

1. Define surface barrier. (Pg-106)
2. Define electron emission. (Pg-106)
3. Define electron volt (eV) (Pg-106)
4. What is thermionic emission? (Pg-107)
5. What is photo electric emission? (Pg-108)
6. What are called photo sensitive materials? (Pg-110)
7. Define stopping potential. (Pg-112)
8. Explain Einstein's explanation for the particle nature (quanta) of light. (Pg-115)
9. What is the nature of light? (Pg-118)
10. Give the applications of photocells. (Pg-119)
11. What is called matter waves or de Broglie waves? (Pg-121)
12. Derive an expression for de Broglie wavelength of matter waves. (Pg-121)
12. What are called X - rays? Why are they so called? (Pg-126)
13. List the properties of X - rays. (Pg-126)
14. What factor does the quality and intensity of X - rays were depends? (Pg-126)
15. Write a note on the production of X - rays. (Pg-126)
16. What is X -ray spectra? Give its types. (Pg-127)
17. Write a note on continuous X - ray spectrum. (Pg-128)
18. What is called Bremsstrahlung or braking radiation. (Pg-128)
19. Obtain Duane – Hunt formula in continuous X-ray spectra. (Pg-128)
20. Write a note on characteristic X - ray spectra. (Pg-128,129)
21. Write the applications of X -rays. (Pg-129)

Long Answer Questions (Book Back):

1. What do you mean by electron emission? Explain briefly various methods of electron emission. (Pg-106,107,108)
2. Briefly discuss the observations of Hertz, Hallwachs and Lenard. (Pg-108,109)
3. Explain the effect of potential difference on photoelectric current. (Pg-111,112)
4. Explain how frequency of incident light varies with stopping potential. (Pg-112,113)
5. List out the laws of photoelectric effect. (Pg-113)
6. Explain why photoelectric effect cannot be explained on the basis of wave nature of light. (Pg-113,114)
7. Explain the quantum concept of light. (Pg-115)
8. Obtain Einstein's photoelectric equation with necessary explanation. (Pg-116,117)
9. Explain experimentally observed facts of photoelectric effect with the help of Einstein's explanation. (Pg-117,118)
10. Give the construction and working of photo emissive cell. (Pg-118)
11. Derive an expression for de Broglie wavelength of electrons. (Pg-121)

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12. Briefly explain the principle and working of electron microscope. (Pg-123,124)
13. Describe briefly Davisson – Germer experiment which demonstrated the wave nature of electrons. (Pg-122,123)

Additional Questions:

1. Explain the experimental set up for study of photo electric effect. (Pg-110)
2. Explain the particle nature of light. List the characteristics of photons. (Pg-115,116)
3. What are X-rays? Explain the production of X-rays. (Pg-126,127)
4. Explain X-ray spectrum with (i) Continuous x-ray spectra (ii) Characteristic x – ray Spectra. (Pg-127,128)

UNIT-8 ATOMIC AND NUCLEAR PHYSICS

Short Answer Questions (Book Back):

1. What are cathode rays? (Pg-140)
2. Write the properties of cathode rays. (Pg-140)
3. Give the results of Rutherford alpha scattering experiment. (Pg-146)
4. Write down the postulates of Bohr atom model.(Pg-148)
5. What is meant by excitation energy. (Pg-155)
6. Define the ionization energy and ionization potential. (Pg-155)
7. Write down the draw backs of Bohr atom model. (Pg-160)
8. What is distance of closest approach? (Pg-147)
9. Define impact parameter. (Pg-147)
10. Write a general notation of nucleus of element X. What each term denotes? (Pg-160)
11. What is isotope? Give an example. (Pg-161)
12. What is isotone? Give an example. (Pg-161)
13. What is isobar? Give an example. (Pg-161)
14. Define atomic mass unit u. (Pg-161)
15. Show that nuclear density is almost constant for nuclei with $Z > 10$. (Pg-162,163)
16. What is mass defect? (Pg-163)
17. What is binding energy of a nucleus? Give its expression. (Pg-163)
18. Calculate the energy equivalent of 1 atomic mass unit. (Pg-164) Note
19. Give the physical meaning of binding energy per nucleon. (Pg-164)
20. What is meant by radioactivity? (Pg-166)
21. Give the symbolic representation of alpha decay, beta decay and gamma decay. (Pg-166,168,170)
22. In alpha decay, why the unstable nucleus emits $_2He^4$ nucleus? Why it does not emit four separate nucleons? (Pg-167)
23. What is mean life of nucleus? Give the expression. (Pg-173)
24. What is half-life of nucleus? Give the expression. (Pg-172)
25. What is meant by activity or decay rate? Give its unit. (Pg-171,172)
26. Define curie. (Pg-172)
27. What are the constituent particles of neutron and proton? (Pg-182)

Additional Questions:

1. What is known as atom? (Pg-139)
2. What is known as gas discharge tube. (Pg-139)
3. What is known as positive column in a gas discharge tube. (Pg-140)
4. Define specific charge. (Pg-140)
5. Write the principle of Millikan's oil drop experiment. (Pg-143)
6. Write a note on Thomson's atom model. (Pg-145)

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7. Explain scattering of alpha particles experiment by Rutherford. (Pg-145)
8. What are the conclusion made by Rutherford from the results of alpha scattering experiments. (Pg-147)
9. What is distance of closest approach? Obtain expression for it. (Pg-147)
10. Explain impact parameter. (Pg-147)
11. What are the drawbacks of Rutherford atom model? (Pg-148)
12. What is angular momentum quantization condition. (Pg-149)
13. Explain de Broglie wave mechanical concept of atom? (Pg-149)
14. Deduce the relation between Velocity of the electron and principal quantum number based on Bohr theory. (Pg-151)
15. Draw the Energy levels of a hydrogen atom. (Pg-153)
16. Define excitation potential. (Pg-155)
17. What is hydrogen emission spectrum? (Pg-158)
18. Define Wave number? Give its unit. (Pg-159)
19. Define atomic number and mass number. (Pg-160)
20. What are called nucleons? (Pg-160)
21. What is the charge of nucleus? (Pg-161)
22. Why the isotopes of the same element are placed in the same location in the periodic table. (Pg-161)
23. Give the empirical formula for nuclear radius. (Pg-162)
24. Define nuclear density. (Pg-163)
25. Define average binding energy per nucleon? (Pg-164)
26. What is nuclear force? List out the characteristics of nuclear force. (Pg-165)
27. What is radioactive elements and radioisotopes? Give example. (Pg-166)
28. What is meant by disintegration energy (Q). (Pg-167)
29. What is meant by β^- decay and β^+ decay. (Pg-168)
30. Write a note on positron? (Pg-168)
31. Write a note on smoke detector. (Pg-169)
32. State the law of radioactive decay. (Pg-171)
33. Define one bequerel. (Pg-172)
34. Write a note on the discovery of neutrons. (Pg-176)
35. List the properties of neutrons. (Pg-176)
36. What is radio carbon dating? (Pg-174)
37. How will you classify neutrons based on their kinetic energy. (Pg-176)
38. What is meant by nuclear fission? (Pg-176)
39. Calculate the energy released per fission. (Pg-177)
40. What is called chain reaction. Give its types. (Pg-177)
41. Explain chain reaction in detail. (Pg-177,178)
42. What is called nuclear reactor? (Pg-179)
43. What is nuclear fusion? (Pg-181)
44. What is mean by thermo nuclear reactions? (Pg-181)
45. What is the source of stellar energy? (Pg-181)
46. Write a note on proton - proton cycle. (Pg-181)
47. Explain Energy generation in stars. (Pg-181)

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Long Answer Questions (Book Back):

1. Explain the J.J. Thomson experiment to determine the specific charge of electron.(Pg-140)
2. Discuss the Millikan's oil drop experiment to determine the charge of an electron.(Pg-143)
3. Derive the energy expression for hydrogen atom using Bohr atom model. (Pg-152)
4. Discuss the spectral series of hydrogen atom. (Pg-159)
5. Explain the variation of average binding energy with the mass number by graph and discuss its features. (Pg-164,165)
6. Explain in detail the nuclear force. (Pg-165)
7. Discuss the alpha decay process with example. (Pg-166)
8. Discuss the beta decay process with examples. (Pg-168)
9. Discuss the gamma decay process with example. (Pg-170)
10. Obtain the law of radioactivity. (Pg-170,171)
11. Discuss the properties of neutrino and its role in beta decay. (Pg-170)
12. Explain the idea of carbon dating. (Pg-174)
13. Discuss the process of nuclear fission and its properties. (Pg-176-178)
14. Discuss the process of nuclear fusion and how energy is generated in stars? (Pg-181)
15. Describe the working of nuclear reactor with a block diagram. (Pg-179,180)
16. Explain in detail the four fundamental forces. (Pg-182)
17. Briefly explain the elementary particles of nature. (Pg-181,182)

Additional Questions:

1. Derive the expression for Radius of the n^{th} orbit of the electron based on Bohr theory. (Pg-148-151)

UNIT-9 SEMICONDUCTOR ELECTRONICS

Short Answer Questions (Book Back):

1. Define electron motion in a semiconductor. (Pg-*)

   The hole in the absence of an elecltron in the valence band due to P-type doping. It has localized positive charge. To move the hole in a given direction, the valence electros move in the opposite direction. An N-type semiconductor with electrons moving left to right through the crystal lattice.
2. Distinguish between intrinsic and extrinsic semiconductors. (Pg-195,197*)
3. What do you mean by doping? (Pg-197)
4. How electron-hole pairs are created in a semiconductor material? (Pg-196)
5. A diode is called as a unidirectional device. Explain? (Pg-204*) Note
6. What do you mean by leakage current in a diode? (Pg-203)
7. Draw the output waveform of a full wave rectifier. (Pg-205)
8. Distinguish between avalanche and zener breakdown. (Pg-206,207)
9. Discuss the biasing polarities in an NPN and PNP transistors. (Pg-213)
10. Explain the current flow in a NPN transistor. (Pg-214,215)
11. What is the phase relationship between the AC input and output voltages in a common emitter amplifier? What is the reason for the phase reversal? (Pg-221)
12. Explain the need for a feedback circuit in a transistor oscillator. (Pg-222)
13. Give circuit symbol, logical operation, truth table,and Boolean expression of AND, OR, NOT,NAND, NOR, and EX-OR gates(Pg-224-226)
14. State De Morgan's first and second theorems. (Pg-228)

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Additional Questions:

1. What is called electronics? (Pg-193)
2. What are passive components and active components? (Pg-193)
3. What is energy band? (Pg-194)
4. What is valance band, conduction band and forbidden energy gap? (Pg-194)
5. Write a note on insulators. (Pg-195)
6. Write a note on conductors. (Pg-195)
7. Write a note on semiconductors. (Pg-195)
8. What is called intrinsic semiconductor? (Pg-195)
9. What is extrinsic semiconductors? (Pg-197*)
10. Define hole. (Pg-197)
11. What is called P-type semiconductor? (Pg-198*)
12. What is N-type semiconductor? (Pg-197)
13. What is called donor energy level. (Pg-197,198)
14. What is called acceptor energy level. (Pg-198,199)
15. What is called depletion region. (Pg-200)
16. Define junction potential or barrier potential. (Pg-200)
17. What is P-N junction diode? Give its symbol. (Pg-200)
18. What is called biasing? Give its types. (Pg-201)
19. Differentiate forward bias and reverse bias. (Pg-201)
20. Define reverse saturation current. (Pg-202)
21. What is called the forward V-I characteristics of the p-n junction diode. (Pg-202)
22. What is known as threshold voltage or cut-in voltage or knee voltage (V_{th}). (Pg-202)
23. What is called the reverse V-I characteristics of the p-n junction diode. (Pg-203)
24. What is meant by rectification? (Pg-204)
25. Define rectifier efficiency? (Pg-205)
26. Write a note on centre tap transformer. (Pg-206)
27. What is mean by break down voltage? (Pg-206)
28. Write a note on Zener breakdown. (Pg-206)
29. What is known as internal field emission or field ionization. (Pg-207)
30. Write a note on avalanche break down. (Pg-206)
31. What is called Zener diode? Give its circuit symbol. (Pg-207)
32. What is called Zener dynamic impedance. (Pg-208)
33. What is called Peak inverse voltage. (Pg-208)
34. Give the applications of Zener diode. (Pg-208)
35. What is Opto electronic devices? (Pg-209)
36. What is light emitting diode (LED)? (Pg-209)
37. Give the applications of LEDs. (Pg-210)
38. What is photo diode? Give its circuit symbol. (Pg-210)
39. What is meant by dark current in a photo diode? (Pg-211)
40. Give the applications of photo diode. (Pg-211)
41. What is photovoltaic effect? (Pg-211)
42. What are called solar cells? (Pg-211)
43. Give the applications of solar cells. (Pg-212)
44. Write a note on bipolar junction transistor(BJT). (Pg-212)
45. Write a note on emitter, base and collector of a transistor. (Pg-212,213)

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46. What is transistor biasing? (Pg-213)
47. What should be the polarity given to PNP and NPN transistors. (Pg-213) Note
48. Draw the circuit diagram of common base configurations of NPN transistor. (Pg-213)
49. Draw the circuit diagram of common emitter configurations of NPN transistor. (Pg-214)
50. Draw the circuit diagram of common emitter configurations of NPN transistor. (Pg-214)
51. Write a note on direction of conventional current in transistors? (Pg-215)
52. What is called the forward current gain (α_{dc}) of a transistor. (Pg-215)
53. Define input resistance of transistor. Give its unit. (Pg-217)
54. Define output resistance of transistor. (Pg-218)
55. Write a note on (i) Saturation region (ii) Cut-off region (iii) Active region (iv) Breakdown region output characteristics curve of NPN transistor.
56. Define forward current gain. (Pg-218)
57. Give the relation between $\boldsymbol{\alpha}$ and $\boldsymbol{\beta}$. (Pg-218)
58. What is known as Q points or quiescent points of output characteristics curve of NPN transistor. (Pg-219)
59. What is called transistor amplifier? (Pg-220)
60. What is called transistor oscillator? (Pg-222)
61. Give the types of an oscillator. (Pg-)
62. What is meant by damped and undamped oscillations. (Pg-222)
63. Draw the block diagram of an oscillator. (Pg-)
64. Give the Barkhausen conditions for sustained oscillations. (Pg-223)
65. Give the applications of oscillator. (Pg-223)
66. Write a note on tank circuit? (Pg-222)
67. Write a note on digital electronics? (Pg-223)
68. Distinguish between analog and digital signal. (Pg-223)
69. Distinguish between positive and negative logic. (Pg-224)
70. Why digital signals are preferred than analog signals? (Pg-223)
71. What are called logic gates? (Pg-224)
72. What is called truth table in logic gates? (Pg-224)
73. Give the circuit symbol, Boolean expression, logical operation and truth table of AND gate.(Pg-224)
74. Give the circuit symbol, Boolean expression, logical operation and truth table of OR gate.(Pg-225)
75. Give the circuit symbol, Boolean expression, logical operation and truth table of NOT gate.(Pg-225)
76. Give the circuit symbol, Boolean expression, logical operation and truth table of NAND gate.(Pg-225)
77. Give the circuit symbol, Boolean expression, logical operation and truth table of NOR gate.(Pg-226)
78. Give the circuit symbol, Boolean expression, logical operation and truth table of EX-OR gate. (Pg-226)
79. Write a note on Boolean algebra? (Pg-227)
80. Explain the laws of Boolean algebra? (Pg-227)
81. State De Morgan's theorems. (Pg-228)
82. What is an integrated circuit? (Pg-229)
83. What are the application of integrated circuits (ICs). (Pg-229,230)
84. Distinguish between digital IC and analog IC. (Pg-230)

Long Answer Questions (Book Back):

1. Elucidate the formation of a N-type and P-type semiconductors. (Pg-197,198)
2. Explain the formation of PN junction diode. Discuss its V–I characteristics. (Pg-199,200,201,203)
3. Draw the circuit diagram of a half wave rectifier and explain its working. (Pg-204)
4. Explain the construction and working of a full wave rectifier. (Pg-205)

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5. What is an LED? Give the principle of operation with a diagram. (Pg-209)
6. Write notes on Photodiode. (Pg-210,211)
7. Explain the working principle of a solar cell. Mention its applications. (Pg-211,212)
8. Sketch the static characteristics of a common emitter transistor and bring out the essence of input and output characteristics. (Pg-216,217)
9. Describe the function of a transistor as an amplifier with the neat circuit diagram. Sketch the input and output wave form. (Pg-220,221)
10. Transistor functions as a switch.Explain. (Pg-219)
11. State Boolean laws. Elucidate how they are used to simplify Boolean expressions with suitable example. (Pg-227)
12. State and prove De Morgan's First and Second theorems. (Pg-228)

Additional Questions:

1. Explain the classification of solids on the basis of energy band theory. (Pg-195)
2. Explain in detail the intrinsic semiconductor. (Pg-195,196)
3. Write a note on Zener diode. Explain the V-I characteristics of Zener diode. (Pg-207)
4. Explain the working of Zener diode as a voltage regulator. (Pg-208)
5. What is meant by light emitting diode? Explain its working principle with diagram. (Pg-209)
6. Explain in detail about the photo diode. (Pg-210)
7. Explain transistor action in common base configuration. (Pg-214)
8. Explain the action transistor as an oscillator. (Pg-221)

UNIT-10 COMMUNICATION SYSTEMS

Short Answer Questions (Book Back):

1. Give the factors that are responsible for transmission impairments. (Pg-243)
   The three different causes of impairment are attenuation, distortion, and noise.
2. Distinguish between wireline and wireless communication? Specify the range of electromagnetic waves in which it is used. (Pg-243)
3. Explain centre frequency or resting frequency in frequency modulation. (Pg-240)
4. What does RADAR stand for? (Pg-249)
5. What do you mean by Internet of Things? (Pg-250)

Additional Questions:

1. What is the necessity of modulation. (Pg-238,239*)
2. Define modulation. (Pg-239)
3. Define amplitude modulation. (Pg-239)
4. Give the advantages and limitations of amplitude modulation. (Pg-239)
5. Define frequency modulation. (Pg-240)
6. Give the advantages and limitations of frequency modulation. (Pg-240)
7. Define phase modulation and give its advantages. (Pg-240,241)
8. Write comparison between FM and PM. (Pg-241)
9. Define bandwidth. (Pg-243)
10. Define channel width or bandwidth of the transmission system. (Pg-244)
11. Write a note on antenna size. (Pg-244)
12. What are the different modes of propagation EM waves? (Pg-245)
12. Define Ground wave propagation (or) surface wave propagation. (Pg-245)
13. Mention the uses of Ground wave propagation (or) surface wave propagation. (Pg-246)
14. Define Sky wave propagation (or) Ionospheric Propagation. (Pg-246)
15. Define skip distance. (Pg-246)

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16. Define skip zone or skip area. (Pg-246)
17. Define Space wave propagation. (Pg-247)
18. What is fiber optic communication. (Pg-248)
19. Write the applications of Satellite communication. (Pg-248)
20. Give the merits and demerits of fibre optics communication. (Pg-249)
21. Write a note on RADAR. (Pg-249)
22. Write the applications of INTERNET. (Pg-251)
23. Mention the applications of RADAR. (Pg-249,250)
24. Write the applications of mobile communication. (Pg-250)

Long Answer Questions (Book Back):

1. What is modulation? Explain the types of modulation with necessary diagrams. (Pg-238-241)
2. Elaborate on the basic elements of communication system with the necessary block diagram. (Pg-241-243)
3. Explain the three modes of propagation of electromagnetic waves through space. (Pg-244-247)
4. What do you know about GPS? Write a few applications of GPS. (Pg-251)
5. Give the applications of ICT in mining and agriculture sectors. (Pg-251,252)
6. Modulation helps to reduce the antenna size in wireless communication –Explain.(Pg-244)
7. Fiber optic communication is gaining popularity among the various transmission media – justify. (Pg-248)

Additional Questions:

1. Explain Satellite communication also give its applications. (Pg-248)
2. Explain fibre optic communication also write the merits and demerits. (Pg-248)
3. Explain Mobile communication also give its applications. (Pg-250)
4. Give the applications of ICT in Fisheries, mining and agriculture sectors. (Pg-251,252)

UNIT-11 RECENT DEVELOPMENTS IN PHYSICS

Short Answer Questions (Book Back):

1. Distinguish between Nanoscience and Nanotechnology. (Pg-258)
2. What is the difference between Nano materials and Bulk materials? (Pg-258)
3. Give any two examples for "Nano" in nature. (Pg-259,260)
4. Mention any two advantages and disadvantages of Robotics. (Pg-270)
5. Why steel is preferred in making Robots? (Pg-270)
6. What are black holes? (Pg-279)
7. What are sub atomic particles? (Pg-278*)

Additional Questions:

1. What is nanoparticles? (Pg-258)
2. Mention the Interdisciplinary nature of Nanotechnology. (Pg-258)
3. Explain the way of preparing the Nanomaterials. (Pg-262)
4. What is the Mimic in laboratories for the (i) single strand DNA (ii) morpho butterfly (iii) Peacock feathers (iv) Parrot fish and (v) Lotus leaf surface (Pg-259,260)
5. What is Robotics? (Pg-266)
6. List out different types of industrial Robots. (Pg-266)
7. Write a note on Artificial Intelligence of Robots. (Pg-266)
8. Mentions the applications of Robots. (Pg-267)
9. Write a note on Nano robots. (Pg-267)
10. Mention the advantages and disadvantages of Robots. (Pg-268)

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11. Write a note on the recent advancement in medical technology includes
    (i) Virtual reality (ii) Precision medicine (iii) Health wearables (iv) Artificial organs (v) 3D printing (vi) Wireless brain sensors (vii) Robotic surgery (viii) Smart inhalers (Pg- 274-277)
12. What is particle physics? (Pg-278)
13. What is Cosmology? (Pg-279)
14. Write a note on Gravitational waves. (Pg-279)
15. What is Sagittarius A*? (Pg-279)

Long Answer Questions (Book Back):

1. Discuss the applications of Nanomaterials in various fields. (Pg-263)
2. What are the possible harmful effects of usage of Nanoparticles? Why? (Pg-264)
3. Discuss the functions of key components in Robots? (Pg-267)
4. Elaborate any two types of Robots with relevant examples. (Pg-268)
5. Comment on the recent advancement in medical diagnosis and therapy. (Pg-273-277)

Additional Questions:

1. Explain Nanoscale structures existed in nature long before scientists began studying them in laboratories. (Pg-259,260)
2. Explain Particle physics and Cosmology. (Pg-278,279)

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PLUS ONE PHYSICS VOLUME-2 (QUESTION BANK)

IMPORTANT FIVE MARKS

UNIT-6 GRAVITATION

1. State and explain Kepler's law. (Pg-2,3)
2. Discuss the important features of the law of gravitation. (Pg-5,6)
3. Derive the expression for gravitational potential energy. (Pg-13)
4. Prove that at points near the surface of the Earth, the gravitational potential energy of the object is U = mgh (Pg-15)
5. Explain the variation of g with latitude, altitude, depth from the Earth's surface. (Pg-19-21)
6. Derive an expression for escape speed. (Pg-22)
7. Derive the time period of satellite orbiting the Earth. (Pg-24)
8. Derive an expression for energy of satellite. (Pg-25)
9. Discuss the apparent weight of man standing inside the elevators. (Pg-28)
10. Explain how geocentric theory is replaced by heliocentric theory using the idea of retrograde motion of planets. (Pg-31)
11. Describe the measurement of Earth's shadow (umbra) radius during total lunar eclipse. (Pg-35)

UNIT-7 PROPERTIES OF MATTER

1. State Hooke's law and verify it with the help of an experiment. (Pg-54)
2. Explain the different types of modulus of elasticity. (Pg-55,57)
3. Derive an expression for the elastic energy stored per unit volume of a wire. (Pg-59)
4. Derive the expression for the terminal velocity of a sphere moving in a high viscous fluid using stokes force. (Pg-69)
5. Derive Poiseuille's formula for the volume of a liquid flowing per second through a pipe under streamlined flow. (Pg-70)
6. What is capillarity? Obtain an expression for the surface tension of a liquid by capillary rise method. (Pg-80)
7. State and prove Bernoulli's theorem for a flow of incompressible, non-viscous, and streamlined flow of fluid. (Pg-83)

UNIT-8 HEAT AND THERMODYNAMICS

1. Explain in detail the thermal expansion. (Pg-102)
2. Explain Calorimetry and derive an expression for final temperature when two thermodynamic systems are mixed. (Pg-106)
3. Discuss various modes of heat transfer. (Pg-107)
4. Explain in detail Newton's law of cooling. (Pg-109)
5. Derive the work done in an isothermal process. (Pg-126)
6. Derive the work done in an adiabatic process. (Pg-130)
7. Explain in detail Carnot heat engine. (Pg-144)
8. Explain in detail the working of a refrigerator. (Pg-150)

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UNIT-9 KINETIC THEORY OF GASES

1. Derive the expression of pressure exerted by the gas on the walls of the container. (Pg-165)
2. Describe the total degrees of freedom for monoatomic molecule, diatomic molecule and triatomic molecule. (Pg-174)
3. Explain in detail the Maxwell Boltzmann distribution function. (Pg-172)
4. Derive the expression for mean free path of the gas. (Pg-177)

UNIT-10 OSCILLATIONS

1. Discuss the simple pendulum in detail. (Pg-207)
2. Describe the vertical oscillations of a spring. (Pg-201)
3. Discuss in detail the energy in simple harmonic motion. (Pg-210)

UNIT-11 WAVES

1. Show that the velocity of a travelling wave produced in a string is $v = \sqrt{\frac{T}{\mu}}$ (Pg-232)
2. Derive an expression for Velocity of longitudinal waves in an elastic medium. (Pg-233)
3. Discuss the Factors affecting speed of sound in gases.
   (a) Effect of pressure (b) Effect of temperature (c) Effect of density
   (d) Effect of moisture (humidity) (e) Effect of wind (Pg-237)
4. Obtain the equations for constructive and destructive interference for sound waves. (Pg-248)
5. Explain how overtones are produced in a (a) Closed organ pipe (b) Open organ pipe (Pg-261)
6. What is meant by Doppler effect? Discuss the following cases
   (1) Source in motion and Observer at rest
   (a) Source moves towards observer (b) Source moves away from the observer
   (2) Observer in motion and Source at rest.
   (a) Observer moves towards Source (b) Observer resides away from the Source
   (3) Both are in motion (a) Source and Observer approach each other (b) Source and Observer resides from each other (c) Source chases Observer (d) Observer chases Source (Pg-267)

IMPORTANT THREE MARKS

UNIT-6 GRAVITATION

1. Explain how Newton arrived at his law of gravitation from Kepler's third law or Newton's inverse square law? (Pg-6)
2. Explain how Newton verified his law of gravitation. (Pg-*)
3. Explain in detail the idea of weightlessness using lift as an example. (Pg-29)
4. Explain the variation of g with latitude. (Pg-21)
5. Explain the variation of g with altitude. (Pg-19)
6. Explain the variation of g with depth from the Earth's surface. (Pg-20)
7. Derive an expression for orbital velocity of satellite. (Pg-24)
8. Derive the time period of satellite orbiting the Earth. (Pg-24)
9. Derive an expression for energy of satellite. (Pg-25)
10. Explain in detail the geostationary and polar satellites. (Pg-26)
11. Explain in detail the Eratosthenes method of finding the radius of Earth. (Pg-34)
12. Describe the measurement of Earth's shadow (umbra) radius during total lunar eclipse (Pg-35)

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UNIT-7 PROPERTIES OF MATTER

1. State Hooke's law and verify it with the help of an experiment. (Pg-54)
2. Derive an equation for the total pressure at a depth 'h' below the liquid surface. (Pg-61)
3. State and prove Pascal's law in fluids. (Pg-63)
4. State and prove Archimedes principle. (Pg-64)
5. Explain coefficient of viscosity. (Pg-66)
6. Write stoke's law and its applications. (Pg-70)
7. How is surface tension related to surface energy? (Pg-75)
8. Distinguish between cohesive and adhesive forces. (Pg-72)
9. Obtain an expression for the excess of pressure inside a i) liquid drop ii) liquid bubble iii) air bubble. (Pg-77)
10. Obtain an equation of continuity for a flow of fluid on the basis of conservation of mass.(Pg-82)
11. Explain the applications of Bernoulli's theorem. (Pg-84)
12. Describe the construction and working of venturimeter and obtain an equation for the volume of liquid flowing per second through a wider entry of the tube. (Pg-85)

UNIT-8 HEAT AND THERMODYNAMICS

1. Explain Joule's Experiment of the mechanical equivalent of heat. (Pg-117)
2. Derive the expression for the work done in a volume change in a thermodynamic system.(Pg-121)
3. Derive Mayer's relation for an ideal gas. (Pg-124)
4. Explain in detail the isothermal process. (Pg-124)
5. Explain in detail an adiabatic process. (Pg-128)
6. Explain the isobaric process and derive the work done in this process. (Pg-132)
7. Explain in detail the isochoric process. (Pg-134)
8. What are the limitations of the first law of thermodynamics? (Pg-140)
9. Explain the heat engine and obtain its efficiency. (Pg-143)
10. Derive the expression for Carnot engine efficiency. (Pg-148)
11. Explain the second law of thermodynamics in terms of entropy. (Pg-149)

UNIT-9 KINETIC THEORY OF GASES

1. Write down the postulates of kinetic theory of gases. (Pg-164)
2. Explain in detail the kinetic interpretation of temperature. (Pg-167)
3. Explain rms speed, average speed and most probable speed of a gas molecule. (Pg-169)
4. Derive an expression for the relation between the average kinetic energy and pressure? (Pg-168)
5. State and Explain the law of equipartition of energy. (Pg-175)
6. Deduce Charles' law based on kinetic theory. (Pg-169)
7. Deduce Boyle's law based on kinetic theory. (Pg-169)
8. Deduce Avogadro's law based on kinetic theory. (Pg-169)
9. Derive the ratio of two specific heat capacities of monoatomic, diatomic and triatomic molecules. (Pg-176)
10. Describe the Brownian motion. (Pg-179)

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UNIT-10 OSCILLATIONS

1. What is meant by angular harmonic oscillation?. Compute the time period of angular harmonic oscillation. (Pg-198)
2. Write down the difference between simple harmonic motion and angular simple harmonic motion. (Pg-199)
3. Explain the horizontal oscillations of a spring. (Pg-200)
4. Explain (i) Springs connected in series (ii) Springs connected in parallel (Pg-203,205)
5. Write short notes on the oscillations of liquid column in U-tube. (Pg-210)
6. Explain in detail the four different types of oscillations. (Pg-213)

UNIT-11 WAVES

1. Discuss how ripples are formed in still water. (Pg-225)
2. Describe the formation of beats. (Pg-252)
3. What are stationary waves? Explain the formation of stationary waves and also write down the characteristics of stationary waves. (Pg-255)
4. Discuss the law of transverse vibrations in stretched strings. (Pg-259)
5. What is a sonometer ? Give its construction and working. Explain how to determine the frequency of tuning fork using sonometer. (Pg-256)
6. Explain intensity and loudness. (Pg-260)
7. Explain end correction in resonance air column apparatus? (Pg-265)
8. Briefly explain the difference between travelling waves and standing waves. (Pg-256)
9. Describe Newton's formula for velocity of sound waves in air and also discuss the Laplace's correction. (Pg-236)

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IMPORTANT TWO MARKS

UNIT-6 GRAVITATION

1. State Kepler's three laws. (Pg-2,3)
2. State Newton's Universal law of gravitation. (Pg-4)
3. Define the gravitational field. Give its unit. (Pg-10)
4. Define gravitational potential energy. (Pg-14)
5. Define gravitational potential. (Pg-16)
6. What is the difference between gravitational potential and gravitational potential energy? (Pg-14,16)
7. What is meant by escape speed in the case of the Earth? (Pg-22)
8. Why is the energy of a satellite (or any other planet) negative? (Pg-26)
9. What are geostationary and polar satellites? (Pg-26,27)
10. Define weight. (Pg-27)

Additional Questions:

11. Will the angular momentum of a planet be conserved? Justify your answer. (Pg-6)
12. What is meant by superposition of gravitational field? (Pg-12)
13. Is potential energy the property of a single object? Justify. (Pg-*)

Potential energy is a property of a system rational than of a single object due to its physical position. Because gravitational potential energy depends on relative position. So, a reference level at which to set the potential energy equal to zero.

14. Why is there no lunar eclipse and solar eclipse every month? (Pg-37)
15. How will you prove that Earth itself is spinning? (Pg-38)
16. What is acceleration due to gravity. (Pg-19)
17. What is called Geo-centric theory? (Pg-2)
18. What is Heliocentric theory? (Pg-2)
19. Define orbital velocity of a satellite. (Pg-24)
20. Define Time period of a satellite. (Pg-24)
21. Write a note on weightlessness? (Pg-29)
22. The astronauts in space ships experience weightlessness. Why? (Pg-29)
23. What is called "retrograde motion" of planets. (Pg-31)

UNIT-7 PROPERTIES OF MATTER

1. Define stress and strain. (Pg-52,53)
2. State Hooke's law of elasticity. (Pg-54)
3. Define Poisson's ratio. (Pg-58)
4. Which one of these is more elastic, steel or rubber? Why? (Pg-60)
5. State Pascal's law in fluids. (Pg-63)
6. State Archimedes principle. (Pg-64)
7. State the law of floatation. (Pg-64)
8. Define coefficient of viscosity of a liquid. (Pg-66)

The coefficient of viscosity is defined as the force of viscosity acting between two layers per unit area and unit velocity gradient of the liquid. Its unit is Nsm^{-2} and dimension is $[ML^{-1}T^{-1}]$.

9. Distinguish between streamlined flow and turbulent flow. (Pg-67)

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10. What is Reynold's number? Give its significance. (Pg-68)
11. Define terminal velocity. (Pg-69)
12. State Bernoulli's theorem. (Pg-83)
13. Two streamlines cannot cross each other. Why? (Pg-67)
14. Define surface tension of a liquid. Mention its S.I unit and dimension. (Pg-74)
15. Define viscosity. (Pg-65)
16. Define angle of contact for a given pair of solid and liquid. (Pg-76)
17. Distinguish between cohesive and adhesive forces. (Pg-72)
18. What are the factors affecting the surface tension of a liquid? (Pg-73,74)
19. What do you mean by capillarity or capillary action? (Pg-79)
20. What is called deforming force? (Pg-51)
21. Define elasticity. (Pg-51)
22. What is called restoring force? (Pg-52)
23. Define plasticity. (Pg-51)
24. Define elastic limit. (Pg-53)
25. Define modulus of elasticity. (Pg-55)
26. Define Young's modulus. (Pg-55)
27. Define Bulk modulus. (Pg-56)
28. Define Rigidity modulus. (Pg-57)
29. Define compressibility. (Pg-56)
30. Give the applications of elasticity. (Pg-59)
31. Define Relative density (specific gravity). (Pg-60)
32. Give the applications of viscosity. (Pg-71)
33. Give some examples for surface tension. (Pg-72,73)
34. Give the practical application of angle of contact. (Pg-76)
35. Give the practical applications of capillarity. (Pg-80)
36. Give the applications of surface tension. (Pg-81)

Additional Questions:

37. Define longitudinal stress. (Pg-52)
38. Define shearing stress. (Pg-52)
39. Define bulk stress or volume stress. (Pg-53)
40. Define longitudinal strain. Give its types. (Pg-53)
41. Define shearing strain. (Pg-53)
42. Define bulk strain or volume strain. (Pg-53)
43. What is the importance of Young's modulus. (Pg-56)
44. What is the importance of Bulk modulus. (Pg-56)
45. What is the importance of Rigidity modulus. (Pg-57)
46. What is called fluids. (Pg-60)
47. Define pressure of fluids. (Pg-60)
48. Define atmospheric pressure. (Pg-60)
49. Define density of fluids. (Pg-60)
50. Define sphere of influence. (Pg-72)

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51. Define capillarity. (Pg-79)
52. Why the roof of hut or house is blown off during wind storm? (Pg-84)
53. What is the principle involved in the Aerofoil lift. (Pg-85)
54. Write a note on Bunsen burner. (Pg-85)
55. What is called Venturimeter? (Pg-85)
56. Explain elasticity using intermolecular forces. (Pg-51)
57. A spring balance shows wrong readings after using for a long time. Why? (Pg-*)
    When the spring balances have been used for a long time they develop elastic fatigue in n them and therefore the reading shown by such balances will be wrong.
58. What is the effect of temperature on elasticity? (Pg-*)
    If the temperature of the substance increases, its elasticity decreases.
59. Write down the expression for the elastic potential energy of a stretched wire. (Pg-59)
60. What do you mean by upthrust or buoyancy? (Pg-64)
61. Write down the expression for the Stoke's force and explain the symbols involved in it. (Pg-70)
62. What are the energies possessed by a liquid? Write down their equations. (Pg-82)
63. What happens to the pressure inside a soap bubble when air is blown into it? (Pg-*)
    When air is blown in to the soap bubble, the radius of the bubble is increased. So that the excess pressure inside it decreases.
64. A drop of oil placed on the surface of water spreads out. But a drop of water place on oil contracts to a spherical shape. Why? (Pg-*)
    - A drop of oil placed on the surface of water spreads because the force of adhesion between water and oil molecules dominates the cohesive force of oil molecules.
    - On the other hand, cohesive force of water molecules dominates the adhesive force between water and oil molecules. So drop of water on oil contracts to a spherical shape.
65. State the principle and usage of Venturimeter. (Pg-85)

UNIT-8 HEAT AND THERMODYNAMICS

1. 'An object contains more heat'- is it a right statement? If not why? (Pg-96)
2. Obtain an ideal gas law from Boyle's and Charles' law. (Pg-97)
3. Define one mole. (Pg-98)
4. Define specific heat capacity and give its unit. (Pg-100)
5. Define molar specific heat capacity. (Pg-101)
6. What is a thermal expansion? (Pg-102)
7. Give the expressions for linear, area and volume thermal expansions. (Pg-103)
8. Define latent heat capacity. Give its unit. (Pg-105)
9. State Stefan-Boltzmann law. (Pg-111)
10. What is Wien's law? (Pg-111)
11. Define thermal conductivity. Give its unit. (Pg-107)
12. What is a black body? (Pg-*) A surface that absorbs all radiant energy falling on it.
    The term arises because incident visible light will be absorbed rather than reflected, and therefore the surface will appear black. The concept of such a perfect absorber of energy is extremely useful in the study of radiation phenomena.
13. What is a thermodynamic system? Give examples. (Pg-113)
14. What are the different types of thermodynamic systems? (Pg-113,114)
15. What is meant by 'thermal equilibrium'? (Pg-113)

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16. What is mean by state variable? Give example. (Pg-114)
17. What are intensive and extensive variables? Give examples. (Pg-114)
18. What is an equation of state? Give an example. (Pg-114)
19. State Zeroth law of thermodynamics. (Pg-115)
20. Define the internal energy of the system. (Pg-116)
21. Are internal energy and heat energy the same? Explain. (Pg-117) Note
22. Define one calorie. (Pg-118)
23. Did joule converted mechanical energy to heat energy? Explain. (Pg-118)
24. State the first law of thermodynamics. (Pg-119)
25. Can we measure the temperature of the object by touching it? (Pg-116) Activity
26. Give the sign convention for Q and W. (Pg-119)
27. Define the quasi-static process. (Pg-120)
28. Give the expression for work done by the gas. (Pg-121)
29. What is PV diagram? (Pg-122)
30. Explain why the specific heat capacity at constant pressure is greater than the specific heat capacity at constant volume. (Pg-123)
31. Give the equation of state for an isothermal process. (Pg-125)
32. Give an expression for work done in an isothermal process. (Pg-126)
33. Express the change in internal energy in terms of molar specific heat capacity. (Pg-124)
34. Apply first law for (a) an isothermal (b) adiabatic (c) isobaric processes. (Pg-125,128,135)
35. Give the equation of state for an adiabatic process. (Pg-129)
36. Give an equation state for an isochoric process. (Pg-135)
37. If the piston of a container is pushed fast inward. Will the ideal gas equation be valid in the intermediate stage? If not, why? (Pg-120*)
38. Draw the PV diagram for a) Isothermal process (Pg-125) b) Adiabatic process(Pg-129) c) isobaric process (Pg-132) d) Isochoric process (Pg-135)
39. What is a cyclic process? (Pg-138)
40. What is meant by a reversible and irreversible processes? (Pg-141)
41. State Clausius form of the second law of thermodynamics. (Pg-141)
42. State Kelvin-Planck statement of second law of thermodynamics. (Pg-144)
43. Define heat engine. (Pg-142)
44. What are processes involves in a Carnot engine? (Pg-145)
45. Can the given heat energy be completely converted to work in a cyclic process? If not, when can the heat can completely converted to work? (Pg-144) Note
46. State the second law of thermodynamics in terms of entropy. (Pg-150)
47. Why does heat flow from a hot object to a cold object? (Pg-150)
48. Define the coefficient of performance. (Pg-151)

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Additional Questions:

49. What is Thermodynamics. (Pg-95)
50. What is meant by heating. (Pg-95)
51. What is meant by work? Explain with example. (Pg-96)
52. What is meant by Temperature. Give its unit. (Pg-96)
53. Define Avogadro's number. (Pg-98)
54. Define heat capacity. (Pg-100)
55. What is anomalous expansion of water. (Pg-104)
56. Define Latent heat of fusion. (Pg-105)
57. Define Latent heat of vaporization. (Pg-105)
58. Define Latent heat of sublimation. (Pg-105)
59. Define triple point substance. (Pg-105)
60. What is Steady state? (Pg-108)
61. State Prevost theory of heat exchange. (Pg-111)
62. Define emissivity of surface. (Pg-111)

UNIT-9 KINETIC THEORY OF GASES

1. What is the microscopic origin of pressure? (Pg-165)
2. What is the microscopic origin of temperature? (Pg-168)
3. Why moon has no atmosphere? (Pg-170)
4. Write the expression for rms speed, average speed and most probable speed of a gas molecule. (Pg-169,171)
5. What is the relation between the average kinetic energy and pressure? (Pg-168)
6. Define the term degrees of freedom. (Pg-173)
7. State the law of equipartition of energy. (Pg-175)
8. Define mean free path and write down its expression. (Pg-177,178)
9. Deduce Charles' law based on kinetic theory. (Pg-169)
10. Deduce Boyle's law based on kinetic theory. (Pg-169)
11. Deduce Avogadro's law based on kinetic theory. (Pg-169)
12. List the factors affecting the mean free path. (Pg-178)
13. What is the reason for Brownian motion? (Pg-179)

Additional Questions:

14. Define root mean square speed. (Pg-169)
15. Define mean or average speed. (Pg-171)
16. Define most probable speed. (Pg-171)
17. Why there is no hydrogen in Earth's atmosphere? (Pg-170)
18. Define Brownian motion. (Pg-179)
19. List the factors affecting the Brownian motion? (Pg-179)

UNIT-10 OSCILLATIONS

1. What is meant by periodic and non-periodic motion? Give two examples,for each motion.(Pg-189)
2. What is meant by force constant of a spring? (Pg-190)
3. Define time period of simple harmonic motion. (Pg-196)
4. Define frequency of simple harmonic motion. (Pg-196)

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5. What is an epoch? (Pg-196)
6. Write short notes on two springs connected in series. (Pg-203)
7. Write short notes on two springs connected in parallel. (Pg-205)
8. Write down the time period of simple pendulum. (Pg-208)
9. State the laws of simple pendulum? (Pg-208)
10. Write down the equation of time period for linear harmonic oscillator. (Pg-201)
11. What is meant by free oscillation? (Pg-213)
12. Explain damped oscillation. Give an example. (Pg-213)
13. Define forced oscillation. Give an example. (Pg-214)
14. What is meant by maintained oscillation? Give an example. (Pg-214)
15. Explain resonance. Give an example. (Pg-214)

Additional Questions:

16. Define oscillatory motion. (Pg-188)
17. All the oscillatory motions are periodic, whereas all periodic motions need not be oscillatory. Explain. (Pg-189)
18. Define simple harmonic motion (SHM). (Pg-190)
19. Define displacement of the vibrating particle. (Pg-193)
20. Define amplitude of the vibrating particle. (Pg-194)
21. Define velocity. (Pg-194)
22. Define acceleration. (Pg-194)
23. Define angular frequency. Give its unit. (Pg-196)
24. Define phase. Give its unit. (Pg-196)
25. What is phase difference? (Pg-196)
26. If the spring is cut in to two pieces, what is the spring constant of that two species? (Pg-206)
27. Soldiers are not allowed to march on a hanging bridge. Why? (Pg-215)
28. Derive an expression for Pendulum length due to effect of temperature. (Pg-209)

UNIT-11 WAVES

1. What is meant by waves? (Pg-224)
2. Write down the types of waves. (Pg-227)
3. What are transverse waves?. Give one example. (Pg-227)
4. What are longitudinal waves?. Give one example. (Pg-227)
5. Define wavelength. (Pg-228)
6. Write down the relation between frequency, wavelength and velocity of a wave. (Pg-230)
7. What is meant by interference of waves? (Pg-249)
8. What is meant by the beats and beat frequency?. (Pg-252)
9. Define intensity of sound and loudness of sound. (Pg-260)
10. Define Doppler Effect. (Pg-267)
11. What is red shift and blue shift in Doppler Effect. (Pg-271)
12. What is meant by end correction in resonance air column apparatus? (Pg-265)
13. Sketch the function $y = x + a$. Explain your sketch. (Pg-244*) line shifts towards left side

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14. Write down the factors affecting velocity of sound in gases. (Pg-237,238)
15. What is meant by an echo? Explain. (Pg-242)

Additional Questions:

16. What are the properties of wave motion. (Pg-226)
17. Define time period. (Pg-229)
18. Define frequency. (Pg-229)
19. Define angular frequency. (Pg-230)
20. Define wave number. (Pg-230)
21. Define wave velocity. (Pg-230)
22. Define wave vector. (Pg-230)
23. Give the relation between velocity (v), angular velocity (ω) and wave number (k). (Pg-230)
24. Give the velocity of transverse waves in stretched string. (Pg-233)
25. Give the velocity of longitudinal waves in an elastic medium. (Pg-234)
26. How does the pressure affect the velocity of sound in air? (Pg-237)
27. How does the temperature affect the velocity of sound in air? (Pg-237)
28. How does the density affect the velocity of sound in air? (Pg-238)
29. How does the humidity affect the velocity of sound in air? (Pg-238)
30. How does the wind affect the velocity of sound? (Pg-238)
31. What is progressive wave (or) travelling wave? (Pg-243)
32. Define linear waves and non-linear waves. (Pg-248)
33. Define interference. (Pg-249)
34. What is called constructive interference? (Pg-249)
35. What is called destructive interference? (Pg-250)
36. Give the relation between phase difference and path difference. (Pg-251)
37. What are called stationary waves? (Pg-254)
38. Give the properties of stationary waves. (Pg-225)
39. Define intensity of sound. (Pg-259)
40. Define loudness of sound. (Pg-260)
41. Give the applications of Doppler Effect. (Pg-270)
42. Define harmonics and overtones. (Pg-258)
43. Define reverberation and reverberation time. (Pg-242)
44. Define Supersonic speed. (Pg-243)
45. Define Mach number. (Pg-243)
46. Define principle of superposition. (Pg-248)
47. Define inverse square law of sound intensity. (Pg-260)
48. Write a note on SONAR. (Pg-242)
49. Give the classification of sound waves. (Pg-242)
50. State Weber-Fechner's law. (Pg-261)
51. Define wave number. (Pg-230)
52. What is reflection of sound? State the laws of reflection of sound waves. (Pg-240)
53. Define specular reflection. (Pg-240)

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