

IMPORTANT QUESTIONS CL X

Q-1 Encircle the correct option only. Each question carries one mark.

1. The device used to store the electric charge is called_____.
(A) Resistor (B) Capacitor (C) Electroscopes (D) Ammeter
2. Half of the radius of curvature of spherical mirror is called:
(A) Pole (b) Focus (c) Focal length (d) Vertex
3. SI unit of resistance is:-
(A) Joule (B) Ampere (C) ohm (D) Volt
4. A galvanometer is converted into ammeter by connecting:-
(A) High resistance in series (B) High resistance in parallel
(C) Low resistance in series (D) Low resistance in parallel
5. A galvanometer is converted into voltmeter by connecting:-
(A) High resistance in series (B) High resistance in parallel
(C) Low resistance in series (D) Low resistance in parallel
6. $1\text{KWh} = \text{_____J}$
(A) 3.6 (B) 3.6K (C) 3.6M (D) 6.3M
7. Alpha particles are similar to _____.
(A) Electrons (B) Protons (C) Helium nucleus (D) Neutrons
8. Which of the following has highest penetrating power?
(A) Alpha rays (B) Beta rays (C) Gamma rays (D) Infrared rays
9. Splitting of a heavy nucleus into smaller nuclei with the release of energy is called:
(A) Fusion reaction (B) Fission reaction
(C) Electrostatic induction (D) Electromagnetic induction
10. The frequency of AC in Pakistan is _____ Hz.
(A) 0 (B) 50 (C) 100 (D) 500
11. Characteristic of sound by which a shrill and grave sound can be distinguished is called:
(A) Quality (B) Pitch (C) Loudness (D) Echo
12. Capacitance is defined as
(A) VC (B) Q/V (C) QV (D) V/Q
13. Transformer works on the principle of:
(A) Electrostatic induction (B) Mutual induction
(C) Commutator (D) Induction
14. Charge per unit volt is called:
(A) Current (B) Energy (C) Capacitance (D) Resistance
15. The output of a NAND gate is 0 when:
(A) Both of its inputs are 0 (B) Both of its inputs are 1
(C) Any of its input is zero (D) Any of its input is 1
16. When uranium ejects a beta particle, how many protons are left in the remaining nucleus?
(A) 89 (B) 90 (C) 92 (D) 93
17. If the current in a wire which is placed perpendicular to a magnetic field increases, force.
(A) Increases (B) Decreases
(C) Remains the same (D) will be zero
18. What is the direction of the magnetic field lines inside a bar magnet?
(A) From N-pole to S-pole (B) From S-pole to N-pole
(C) From side to side (D) There are no magnetic field lines
19. Five joules of work is needed to shift 10C of charge from one place to another place. The potential difference between the places is
(A) 0.5V (B) 2V (C) 5V (D) 10V
20. As the temperature of a conductor rises, its resistance:
(A) Increases (B) Decreases (C) Remains same (D) None of the above
21. Which of the following quantities is not changed during refraction of light?
(A) Direction (B) Speed (C) Frequency (D) Wave length
22. If the length of a simple pendulum is halved, its time period will be
(A) $T/2$ (B) $T/\sqrt{2}$ (C) $\sqrt{2} T$ (D) 2T

23. Reciprocal of focal length is called:
 (A) Image distance (B) Object distance (C) Power of lens (D) Vertex
24. If there are two resistances R_1 , R_2 connected parallel in a circuit then
 (A) $R_e = R_1 + R_2$ (B) $1/R_e = R_1 + R_2$ (C) $R_e = 1/R_1 + R_2$ (D) $1/R_e = 1/(R_1 + R_2)$
25. What is the power rating of a lamp connected to a 12V source when it carries 2.5A?
 (A) 4.8W (B) 30W (C) 14.5W (D) 60W
26. The charge of how many electrons would be equal to one coulomb.
 (A) 6.25×10^{-19} (B) 6.25×10^{18} (C) 1.6×10^{19} (D) 1.6×10^{-19}
27. Waves transfer:
 (A) Energy (B) frequency (C) wavelength (D) velocity
28. The Pitch of sound is most closely related to its:
 (A) frequency (B) period (C) wavelength (D) amplitude
29. Speed of electromagnetic waves is equal to speed of:-
 (A) Alpha particles (B) Beta Particles (C) Neutron (D) Light
30. The focal length of a mirror that forms an image 5.66 cm behind the mirror of an object placed 34.4 cm in front at the mirror is _____ cm:
 (A) 6.67 (B) -7.67 (C) -6.77 (D) 6.77
31. Half-life of lead is 10.6____:
 (A) sec (B) hours (C) days (D) years
32. Time period of a simple pendulum 1 m long is:
 (A) 2.99s (B) 1.99s (C) 1s (D) 2s
33. In nuclear fission _____ MeV of energy is released per fission.
 (A) 200 (B) 25.7 (C) 20 (D) 257
34. Which of the following characteristics of a wave is independent of the others?
 (A) Speed (B) frequency (C) amplitude (D) wavelength
35. The amount of energy supplied by the battery in pushing one coulomb of charge from its positive terminal to its negative terminal through the battery is known as:
 (A) e.m.f (B) Potential difference (C) Resistance (D) volt
36. According to ohm's law the graph between V and I is a:
 (A) Zig-zag line (B) Curved line (C) Straight line (D) Circular line
37. In series combination, the voltage across each resistance is:
 (A) Same (B) Different (C) Infinite (D) Zero
38. If a suitable resistance is connected in parallel with the galvanometer, it is converted into a (an):
 (A) Ammeter (B) Voltmeter (C) Avometer (D) Electroscop
39. If a current ' I ' ampere flows through a resistance ' R ' in time ' t ' seconds then the energy supplied will be:
 (A) $W = IRt$ (B) $W = I^2Rt$ (C) $W = IR^2t$ (D) $W = IRt^2$
40. The resistance of an electric bulb is 5000 Ω . When a potential of 250 V is applied across its ends the power consumed by it is:
 (A) 100 V (B) 50 V (C) 25 V (D) 12.5 V
41. When a current carrying conductor is placed parallel to the magnetic field, then the force acting on the conductor is:
 (A) Minimum (B) Maximum (C) Zero (D) Infinite
42. The energy coming from the sun and the stars is due to:
 (A) Fission reaction (B) Fusion reaction
 (C) Chemical reaction (D) None of these
43. Frequency is reciprocal of:
 (A) Speed (B) Time period (C) Time (D) Velocity
44. In radio, the messages are transmitted by _____ waves
 (A) Sound (B) Heat (C) Electromagnetic (D) Air
45. Which is an output device?
 (A) Printer (B) keyboard (C) Mouse (D) CPU
46. Image formed by camera is:
 (A) Real, Inverted (B) Virtual and inverted
 (C) Real and Upright (D) Virtual and upright
47. Which of the following is used to measure electric current?

- (A) Voltmeter (B) Galvanometer (C) Electroscope (D) Endoscope
48. Combined resistances of two identical resistors, connected in series is 8Ω . Their equivalent resistance in a parallel arrangement will be:
 (A) $1/2\Omega$ (B) 4Ω (C) 8Ω (D) 12Ω
49. Galvanometer is always connected in _____ combination in the circuit
 (A) Series (B) Parallel (C) Bridge (D) None of the above
50. Restoring force is directly proportional to:
 (A) Distance (B) Displacement (C) Speed (D) Velocity
51. In general, speed of sound in liquid is ----- times that in gases.
 (A) two (B) three (C) four (D) five
52. A radioactive sample contains 1600 nuclei. The number of nuclei left after four half lives will be:
 (A) 800 (B) 400 (C) 200 (D) 100
53. What happens to the atomic number of an element which emits an α -particle and two β -particles.
 (A) Increases by one (B) Stays the same
 (C) Decrease by two (D) Decreases by four
54. When we double the voltage in a circuit, we double the:-
 (A) Current (B) Power (C) Resistance (D) Both A & B
55. The speed of sound in air at 0°C is:
 (A) 386 m/sec (B) 346 m/sec (C) 331 m/sec (D) 431 m/sec
56. Intensity of 0 dB sound will be:
 (A) 10^{-3} Wm^{-2} (B) 10^{-6} Wm^{-2} (C) 10^{-9} Wm^{-2} (D) 10^{-12} Wm^{-2}
57. The unit of current is _____.
 (A) Meter (B) Newton (C) Weber (D) Ampere
58. Focal length of a convex lens is 2 m. Power of this lens will be:
 (A) 0.5 D (B) 1 D (C) 2 D (D) 4 D
59. SI unit power of lens is
 (A) Watt (B) Meter (C) Dioptre (D) ohm
60. Which of the following is true for an object (executing SHM) at mean position?
 (A) K.E is maximum (B) P.E is zero
 (C) Displacement is zero (D) All of these
61. If 1 mA current flows through a wire in 2 hours then charge flowing through this wire is:
 (A) 7.2 C (b) 7.3 C (c) 7.4 A (d) 7.5 A
62. Refractive index of crown glass is
 (A) 1.36 (B) 1.33 (C) 1.52 (D) 2.4
63. The loudness of sound is closely related to
 (A) frequency (B) Period (C) Wavelength (D) Amplitude
64. The Coulomb's law is valid for the charges which are
 (A) Moving & point charges (B) Moving & non-point charges
 (C) Stationary & point charges (D) Stationary & large size charges
65. What is the voltage across a 6 ohm resistor when 3 A current passes through it?
 (A) 2 V (B) 9 V (C) 18 V (D) 36 V
67. MRI stands for
 (A) Magnetic resonance induction (B) Magnetic resonance imaging
 (C) Mega Resonance Impact (D) Magnetic and Radioactive Imaging
68. The total force on armature coil in a motor can be increased by increasing
 (A) Current (B) strength of magnetic field (C) Area of the coil (D) All of above
69. The presence of magnetic field can be detected by
 (A) Stationary negative charge (B) Stationary positive charge
 (C) Magnetic compass (D) Small mass
70. If $F = 8\text{N}$ and $x = 400\text{cm}$, then value of k is:
 A. 4Nm^{-1} B. 0.2Nm^{-1} C. 8Nm^{-1} D. 2Nm^{-1}
71. Direction of induced emf can be determined by:
 A. Joule's law B. Ohm's law C. Lenz law D. Faraday's law
72. The SI unit of intensity of sound is:
 A. Wm B. Wm^{-1} C. Wm^3 D. Wm^{-2}
73. The inner part of Fiber Optics is called:

74. A. Metal jacket B. Boundary C. Core D. Cladding
The SI unit of electromotive force is:
75. A. Joule B. Newton C. Volt D. Coulomb
The particles emitted from a hot cathode surface are called
76. A. Positive ions B. Negative ions C. Electrons D. Protons
Optical fibre works on the principle of:
77. A. Dispersion B. Refraction
C. Reflection D. Total internal reflection
Which one is OHMIC in nature?
78. A. Fixed resistor B. Filament Lamp C. Thermistor D. Insulator
The colored portion of human eye that controls the amount of light reaching the retina is called:
79. A. Pupil B. Iris C. Cornea D. None of these
The relation between focal length f and radius of curvature R is:
81. A. $f = R$ B. $R = f/2$ C. $R = 2f$ D. $R = 4f$
The distance between optical center and principle focus is called:
82. A. Principal Axis B. Optical center C. Principal Focus D. Focal Length
In Cathode Ray Oscilloscope electrons are deflected in:
83. A. Filament B. Anode C. Electron Gun D. Electric & Magnetic Field
Which of the following is used for diagnosis of brain tumor?
84. (A) iodide-131 (B) phosphorous-32
(C) cobalt-60 (D) carbon-14
Which of the following is used to monitor the thyroid functioning?
85. (A) iodide-131 (B) phosphorous-32
(C) cobalt-60 (D) carbon-14
What happens to the atomic number of an element which emits one alpha particle & one beta particle?
86. (A) increases by 1 (B) remain same (C) decrease by 2 (D) decrease by 1
SI unit of spring constant is:
87. (A) N (B) Nm (C) N/m (D) m/N
In simple harmonic motion, acceleration is directly proportional to:
88. (A) Distance (B) Velocity (C) Speed (D) Displacement
Speed of a wave is the product of frequency and -----
89. (A) Wavelength (B) Time period (C) Distance (D) Amplitude
Which of the following is used to study characteristics of waves?
90. (A) Electroscope (B) Ripple tank (C) DC motor (D) Telescope
Pitch of the sound depends upon:
91. (A) Wavelength (B) Time period (C) Frequency (D) Amplitude
Intensity level of faintest audible sound is:
92. (A) 0 dB (B) 1 dB (C) 10 dB (D) 100 dB
Audible frequency range of human ear is between 20 Hz and -----
93. (A) 100 Hz (B) 1000 Hz (C) 2000 Hz (D) 20,000 Hz
Which of the following produce more ionization in the material?
94. (A) Alpha rays (C) Beta rays (D) Gamma rays (D) Neutrons
Ratio of speed of light in air to the speed of light in medium is called:
95. (A) Refraction (B) Reflection (C) Refractive index (D) Dispersion
Variation of focal length of eye lens to form a sharp image on retina is called:
96. (A) Nearsightedness (B) Farsightedness
(C) Accommodation (D) Far Point
An electroscope is used to detect:
97. (A) Current (B) Voltage (C) Charge (D) Resistance
SI unit of electric field intensity is:
98. (A) N.C (B) N/C (C) N/m (D) C/N
Capacitance of a capacitor is measured in unit of
99. (A) ohm (B) ampere (C) coulomb (D) farad
ohm-meter is the unit of
- (A) Resistance (B) Specific resistance (C) Voltage (D) Electrical energy

100. Kilowatt-hour is the unit of
(A) Resistance (B) Electrical power (C) Voltage (D) Electrical energy

Q-2

Fill in the blanks.

1. In simple harmonic motion, _____ energy is maximum at extreme position.
2. The motion of ball in a bowl is an example of _____.
3. If length of simple pendulum is halved, its time period will be _____.
4. Time required to completed one cycle is called _____.
5. Waves which do not require medium are called _____.
6. In simple harmonic motion, acceleration is directly proportional to ----- from ----- position.
7. Shock absorbers damp vibrations and convert their energy into _____ energy of oil.
8. Spring constant is equal to force per unit -----.
9. In reflection, angle of incidence is _____ angle of reflection.
10. Earthquake produces waves through the body of the earth in form of _____ waves.
11. _____ is an apparatus used to study the properties of waves.
12. In Ripple Tank, crest and troughs appear _____ lines.
13. Time period of simple harmonic motion of a mass attached to spring is given as $T =$ _____.
14. A spider detects its prey due to _____ produced in the web.
15. Due to _____ the mass does not stop at the mean position but continues its motion.
16. The intensity of sound depends on the _____ of sound.
17. Intensity of faintest sound is _____.
18. The speed of sound in solid is about _____ times that in gases.
19. 1 bell = _____ db.
20. Audible frequency range is from _____ to _____.
21. The waves which require medium for their propagation are called _____.
22. The loudness of sound is directly proportional logarithm of _____.
23. _____ is the characteristics of sound by which we can distinguish between a shrill and a grave sound.
24. Intensity level of faintest audible sound is _____.
25. Variation in focal length of human eye to form a sharp image on retina is called _____.
26. A line joining center of curvature and pole of the spherical mirror is called _____.
27. SI unit of power of lens is _____.
28. The study of behavior of light is called _____.
29. Far sightedness is caused due to _____ eye ball.
30. Light enters the eye through transparent membrane called _____.
31. Electroscope is an instrument used for detecting _____.
32. Frequency is the reciprocal of _____.
33. If distance between the two charges is doubled, the electric force between them will decrease by _____ times.

34. One electron volt is equal to _____ Joules.
35. A capacitor is perfect insulator for _____ current.
36. In step-up transformer, number of turns in _____ coil is greater than number of turns in _____ coil.
37. A radio tuning capacitor is a _____ capacitor.
38. In parallel combination of resistors, potential difference across each resistor is _____.
39. In _____ combination of capacitors, equivalent capacitance is greater than individual capacitance.
40. The number of electrons in one coulomb charge will be _____.
41. Batteries convert _____ into _____ energy.
42. _____ is used to detect the current in the circuit.
43. The resistance of a meter cube of the substance is called _____.
44. Kilo-watt hour is unit of _____.
45. The wire at zero potential is called _____ wire.
46. Circuit breaker works on the principle of _____.
47. Voltmeter is always connected in _____ in a circuit.
48. _____ is a device which is used to convert electrical energy into mechanical energy.
49. _____ converts mechanical energy into electrical.
50. Transformer works on the principle of _____.
51. _____ is study of magnetic effects of current.
52. In Boolean algebra zero represents _____ potential.
53. AND operation is just like _____ combinations of resistors.
54. NOT gate is also called _____.
55. OR operation is just like _____ combinations of resistors.
56. The output of the NAND gate is written as _____.
57. _____ Gate is used to make burglar alarm.
58. _____ Circuits convert the digital signal into analogue signals.
59. The process of emission of electrons from the hot metal surface is called _____.
60. A radioactive sample contains 2000 nuclei. Number of nuclei left after two half lives will be _____.
61. Cell phone transmissions are made with _____ waves.
62. 1 MB = _____ bytes.
63. The speed of sound in air at 0°C is _____.
64. Floppy is coated with _____ oxide.
65. Radium -226 has a half life of _____ years.
66. Radioisotope _____ is used to monitor thyroid functioning
67. Isotopes of an element have the same _____ properties.
68. Charge on alpha particle is _____.
69. Mass energy equation is given by _____.
70. During fission of 1 kg of uranium – 235, energy released is _____ joule.
71. _____ is phenomenon by which radiations split matter into positive and negative ions.
72. Elements are naturally unstable having atomic number greater than _____.

73. _____ Compound is used for diagnosis for brain tumor.
74. Nuclear fission was first observed in 1939 by _____.
75. The temperature of the center of sun is _____.
76. Energy released in each fission reaction is _____ MeV.
77. Volt is unit of _____.
78. Mathematical form of Ohm's law is _____.
79. LDR stands for _____.
80. SI unit of coulomb's constant is _____.
81. Alpha particle is similar to _____ nucleus.
82. SI Unit of electric field intensity is _____.
83. Metals are good conductor of electricity because they have _____.
84. The magnitude of the charge on the electron is _____.
85. For seeing tiny objects we use microscope of _____.
86. Near point of a normal human being is _____ cm.
87. When $L = 3.0\text{m}$ then the time period of simple pendulum is _____.
88. The mass of neutron is almost equal to the mass of _____.
89. Neutron was discovered by _____.
90. The force per unit charge is called _____.
91. The high speed graph plotting device is called _____.
92. In CRO when filament is heated, it emits _____.
93. In CRO electric potential on grid is _____.
94. The transformer in which voltage across secondary is less than the primary voltage is called _____.
95. A transformer mainly consists of primary coil, secondary coil and _____.
96. In simple pendulum kinetic energy is _____ at mean position.
97. In simple pendulum velocity is _____ at mean position.
98. Lenz law is used to determine the direction of _____.
99. For an ohmic material, the graph between _____ and _____ is a straight line.
100. The device which converts electrical energy into mechanical energy is called _____.

Q-3 Answer the following conceptual questions.

1. If the length of a simple pendulum is doubled what will be the change in its time period?
2. A simple pendulum with time period "T" is taken to the mountain where value of acceleration due to gravity is one fourth of its value on earth's surface. What happens to the time period?
3. A ball is dropped from a certain height onto the floor and keeps bouncing is the motion of the ball simple harmonic? Explain.
4. Prove that in SHM, acceleration is directly proportional to the displacement from mean position.
5. A student performed two experiments with a simple pendulum. He / She used this bobs of different masses by keeping other parameters constant. To his / her astonishment the time period of the pendulum did not change, why?
6. What types of waves do not require any material medium for their propagation?

7. Plane waves in the ripple tank undergo refraction when they move from deep to shallow water. What change occurs in the speed of the wave?
8. Why two can with a string stretched between them could be a better way to communicate than merely shouting through air?
9. We can recognize persons speaking with the same loudness from their voice. How is this possible?
10. Why do we not hear the sound of explosions taking place in the distant stars?
11. Why longitudinal waves move faster in solids than transverse waves?
12. Two waves with different frequency have same amplitude. Do they carry same energy? Explain.
13. A silent whistle used to call dogs is silent for humans. Justify this statement.
14. Does the frequency and pitch of sound produced by tuning fork depend on its mass? Explain.
15. What will be the intensity level (in dB) of a siren whose intensity is 10^0 Wm^{-2} ?
16. You can listen your friend round a corner, but you cannot watch him / her. Why?
17. Why do we see flash produced by lightening before we hear sound?
18. A student says that the two terms speed and frequency of the wave refer to the same thing. What is your response?
19. Two people are listening the same music at the same distance. They disagree on its loudness. Explain how this could happen
20. Is there any difference between echo and reflection of sound?
21. Will two separate 50 dB sounds together constitute a 100 dB sound? Explain.
22. Why ultrasound is useful in medical?
23. A man raises his left hand in a Plane mirror; the image facing him is raising his right hand. Explain why?
24. In your own words, explain why light waves are refracted at a boundary between two materials?
25. Explain why a fish under water appears to be at a different depth below the surface than it actually is? Does it appear deeper or shallower?
26. Why or why not concave mirrors are suitable for make up?
27. Why is the driver's side mirror in many cars convex rather than concave?
28. When an optician's testing room is small, he used a mirror to help him test the eye sight of his patients. Explain why?
29. An electrified rod attracts pieces of paper. After a while these papers fly away! Why?
30. In what direction will a positive charge particle move in an electric field?
31. Does each capacitor carry equal charges in series combination? Explain?
32. Each capacitor in parallel combination has equal potential difference between its two plats. Justify the statement.
33. Is the presence of charge necessary for the existence of electrostatic potential?
34. Rubber tires get charged from friction with the road. What is the polarity of the charge?
35. Perhaps you have seen a gasoline truck trailing a metal chain beneath it? What purpose does the chain serve?
36. You might have observed a conductor outside the tall building going into the earth. What purpose does it serve?
37. What is the purpose of deflecting plates in cathode ray oscilloscope?
38. How alpha, beta and gamma rays are differentiated in terms of electric charge?
39. If we double the mass of bob of a simple pendulum, will it affect the time period? Justify your answer.

41. If a high-voltage power line fell across your car while you were in the car why should you not come out of the car?
42. Explain why, a glass rod can be charged by rubbing when held by hand but an iron rod cannot be charged by rubbing, if held by hand?
43. Why in metal, charge is transferred by free electrons rather than by positive charge?
44. Why alpha particles are more ionizing than beta particles?
45. A radioactive sample contains N number of nuclei. What fraction of original number of nuclei will be left after three half lives?
46. Which radiations are more penetrating; Alpha, beta or gamma?
47. What is difference between electric potential difference and emf?
48. How can we increase the force on current carrying conductor placed in a magnetic field?
49. Is the equivalent capacitance of parallel combination larger or smaller than the capacitance of any individual capacitor?
50. What is the difference between a cell and a battery?
51. Can current flow in circuit without potential difference?
52. Two points on an object are at different electric potentials. Does charge necessarily flow between them?
53. How will you define spring constant?
54. Define specific resistance.
55. Draw the diagram to show the direction of magnetic field inside and outside the bar magnet.
56. A positive charge is placed between two oppositely charged plates. Describe the effect of force it experiences.
57. If the magnitude of two charges and distance between them is doubled, what will be the effect on coulomb's force between them?
58. How the direction of current in the coil of a D.C motor is reversed?
59. What is the advantage of circuit breaker over fuse?
60. What are the factors which affect induced emf?
61. What happens to the force between two charges if the distance between them is doubled?
62. In order to measure the current in a circuit why ammeter is always connected in series?
63. In order to measure the voltage in a circuit why voltmeter is always connected in parallel?
64. How many watt-hours are there in 1000J?
65. Convert one kilowatt hour into joules.
66. Is the equivalent capacitance of series combination larger or smaller than the capacitance of any individual capacitor?
67. From your experience of watching cars on the roads at night, are automobile headlamps connected in series or parallel?
68. A certain flash-light can use a 10 Ohm bulb or a 5 Ohm bulb. Which bulb should be used to get the brighter light? Which bulb will discharge the battery first?
69. It is impracticable to connect an electric bulb and an electric heater in series. Why?
70. Does a fuse in a circuit control, the potential difference or the current?
71. Suppose someone handed you three similar iron bars and told you one was not magnet but the other two were. How would you find the iron bar that was not magnet?
72. Suppose you have a coil of wire and a bar magnet. Describe how you could use them to generate an electric current?
73. Which device is used for converting electrical energy into mechanical energy?
74. Suppose we hang a loop of wire so that it can swing easily. If we now put a magnet into the coil, the coil will start swinging, which way will it swing relative to the magnet and why?

77. A conductor wire generates a voltage while moving through a magnetic field. In what direction should the wire be moved, relative to the field to generate the maximum voltage?
78. What is the difference between a generator and motor?
79. What reverses the direction of electric current in the armature coil of D.C. motor?
80. What is meant by ideal transformer? Explain.
81. Can a transformer operate on direct current?
82. Name two factors which can enhance thermionic emission?
83. Give three reasons to support the evidence that cathode rays are negatively charged.
84. When electrons pass through two parallel plates having opposite charges they are deflected towards the positively charged plate. What important characteristic of electrons can be inferred from this?
85. If the primary coil and secondary coil of transformer have same number of turns, what will be the relation between primary and secondary voltage?
86. Why alternating voltage is stepped up from 11 KV to 132 KV at power generating stations?
87. When a moving electron enters the magnetic field, it is deflected from its straight path. Name two factors which can enhance the electron deflection?
88. In what ways is an oscilloscope a voltmeter?
89. How can you compare the logic operation $x = A.B$ with usual operation of multiplication?
90. NAND gate is the reciprocal of AND gate. Discuss.
91. Compare the penetrating power of alpha, beta and gamma rays.
92. It is possible for an element to have different types of atoms explain?
93. What nuclear reaction will release more energy, the fission or the fusion reaction?
94. Which has more penetration power, alpha particle or gamma ray photon?
95. What is the different between natural and artificial radioactivity?
96. How long would you likely have to wait to watch any sample of radioactive atoms completely decay?
97. Which type of natural radioactivity leaves the number of protons and the number of neutrons in the nucleus unchanged?
98. What is meant by short circuit?
99. What is electron-volt?
100. Why do positively charged protons not fly apart due to repulsive force between them?

Q-4 Solve the following numerical problems.

1. The time period of a simple pendulum is 2s. What will be its length on Earth? What will be its length on the moon if $g_m = g_e/6$? Where $g_e = 10\text{ms}^{-2}$.
2. A pendulum of length 0.99 m is taken to the moon by an astronaut. The period of the pendulum is 4.9 s. What is the value of g on the surface of the moon?
3. A simple pendulum completes one vibration in two seconds. Calculate its length when $g = 10.0\text{ms}^{-2}$.
4. A wooden bar vibrating into the water surface in a ripple tank has a frequency 12Hz. The resulting wave has a wavelength of 3 cm. What is the speed of the wave?
5. Water waves in a shallow dish are 6.0 cm long. At one point, the water moves up a down at a rate of 4.8 oscillations per second. Calculate the speed and time period of the water waves.

6. At one end of a ripple tank 80 cm across, a 5 Hz vibrator produces waves whose wavelength is 40 mm. Find the time the waves need to cross the tank.
7. What is the wavelength of the radio waves transmitted by an FM station at 90 MHz. where $1\text{M} = 10^6$, and speed of radio wave is $3 \times 10^8 \text{ ms}^{-1}$.
8. A wave moves on a slinky with frequency of 4 Hz and wavelength of 40 cm. Find the its speed.
9. If 100 waves pass through a point in 20 s, what is the frequency and time period of the wave? If its wavelength is 6 cm, calculate speed of the wave.
10. A transverse wave produced on a spring has frequency 190 Hz and travels length of spring of 90 m in 0.5 s. Calculate period and speed of wave.
11. If at Anarkali bazar Lahore, the sound level is 80 dB, what will be the intensity level of sound there?
12. Calculate the intensity level of faintest audible sound.
13. Calculate the frequency of a sound wave of speed 340 ms^{-1} and wavelength 50 cm.
14. At a particular temperature, the speed of sound in air is 330 ms^{-1} . If the wavelength of a note is 5 cm, calculate the frequency of the sound wave. Is this frequency lies in the audible range of the human ear?
15. A doctor counts 72 heartbeats in 1 min. Calculate the frequency and period of the heartbeats.
16. A marine survey ship sends a sound wave straight to the sea bed. It receives an echo 1.5 s later. The speed of sound in sea water is 1500 ms^{-1} . Find the depth of the sea at this position.
17. A student clapped his hands near a cliff and heard the echo after 5 s. What is the distance of the cliff from the student if the speed of the sound, v is taken as 346 ms^{-1} ?
18. A ship sends out ultrasound that returns from the seabed and is detected after 3.42sec. If the speed of ultrasound through seawater is 1531 ms^{-1} , what is the distance of the seabed from the ship?
19. A sound wave has a frequency of 2 kHz and wavelength 35 cm. How long will it take to travel 1.5km?
20. A normal conversation involves sound intensities of about $3.0 \times 10^{-6} \text{ Wm}^{-2}$. What is the decibel level for this intensity?
21. What is the intensity of the sound for 100 dB?
22. An object 10.0 cm in front of a convex mirror forms an image 5.0 cm behind the mirror. What is the focal length of the mirror?
23. An object 30.0 cm tall is located 10.5 cm from a concave mirror with focal length 16.0cm. (a) Where is the image located? (b) How high is it?
24. An object and its image in a concave mirror are of the same height, yet inverted, when the object is 20.0 cm from the mirror. What is the focal length of the mirror?
25. Find the focal length of a mirror that forms an image 5.66cm behind a mirror of an object placed at 34.4 cm in front of the mirror.
26. An image of a statue appears to be 11.5 cm behind a convex mirror with focal length 13.5 cm. find the distance from the statue to the mirror.
27. A convex lens of focal length 6 cm is to be used to form a virtual image three times the size of the object. Where the lens must be placed?
28. The power of a convex lens is 5D. At what distance the object should be placed from the lens so that its real and 2 times larger image is formed.

29. The charge of how many negatively charged particles would be equal to $100\mu\text{C}$. Assume charge on one negative particle is $1.6 \times 10^{-19} \text{ C}$?
30. Three capacitors of capacitance $3.0 \mu\text{F}$, $4.0 \mu\text{F}$ and $5.0 \mu\text{F}$ are arranged in series combination to a 6 v battery. Find the equivalent capacitance of the combination.
31. Calculate the number of charge carriers when 10 mA current flows through a conductor in 10 s .
32. If the length of a copper wire is 1m , its diameter is 2 mm and specific resistance is $0.54 \times 10^{-2} \text{ ohm meter}$. Find resistance of this wire
33. Two point charges $q_1= 10 \mu\text{C}$ and $q_2= 5 \mu\text{C}$ are placed at a distance of 150 cm . What will be the Coulomb's force between them? Also find the direction of the force.
34. The force of repulsion between two identical positive charges is 0.8 N , when the charges are 0.1 m apart. Find the value of each charge.
35. Two charges repel each other with a force of 0.1 N when they are 5 cm apart. Find the forces between the same charges when they are 2 cm apart.
36. The potential at a point in an electric field is 10^4 V . If a charge of $+100 \mu\text{C}$ is brought from infinity to this point. What would be the amount of work done on it?
37. A point charge of $+2\text{C}$ is transferred from a point at potential 100V to a point at potential 50V , what would be the energy supplied by the charge?
38. A capacitor holds 0.06 coulombs of charge when fully charged by a 9 volt battery. Calculate capacitance of the capacitor.
39. Two capacitors of capacitances $6 \mu\text{F}$ and $12 \mu\text{F}$ are connected in series with 12V battery. Find the equivalent capacitance of the combination.
40. Two capacitors of capacitances $6\mu\text{F}$ and $12\mu\text{F}$ are connected in parallel with a 12 , battery. Find the equivalent capacitance of the combination and charge on each capacitor.
41. A light bulb is suitable on for 40 Sec . if the electrical energy consumed by the bulb during this time is 2400 J , find the power of the bulb.
42. How many watt-hours are there in 1000 J .
43. A current of 3mA is flowing through a wire for 1 minute . What is the charge flowing through the wire?
44. The resistance of a conductor wire is $10 \text{ M}\Omega$. If a potential difference of 100 volt is applied across its ends, then find the value of current passing through it in mA .
45. By applying a potential difference of 10V across a conductor a current of 1.5A passes through it. How much energy would be obtained from the current in 2 minutes ?
46. Two resistances of $2\text{k}\Omega$ and $8\text{k}\Omega$ are joined in series, if a 10 V battery is connected across the ends of this combination. Find the equivalent resistance of the combination and current passing through each of the resistances.
47. Two resistances of $6 \text{ K}\Omega$ and $12 \text{ k}\Omega$ are connected in parallel. A 6V battery is connected across its ends. Find the equivalent resistance of the combination.
48. An electric bulb is marked with 220V , 100W . Find the resistance of the filament of the bulb. If the bulb is used 5 hours daily, find the energy in kilowatt-hour consumed by the bulb in one month (30 days).
49. An incandescent light bulb with an operating resistance of 95 Q is labelled " 150 W ." Is this bulb designed for use in a 120V circuit or a 220V circuit?

50. A house is installed with 10 bulbs of 60 W each of which are used 5 hours daily. If the cost of one unit of electricity is Rs.4. Find the monthly expenditure of electricity (one month =30 days).
51. A 100 W lamp bulb and a 4 kW water heater are connected to a 250 V supply. Calculate the current through each appliance.
52. A resistor of resistance 5.6Ω is connected across a battery of 3.0 V by means of wire of negligible resistance. A current of 0.5 A passes through the resistor. Calculate:
 - a. Power dissipated in the resistor
 - b. Total power produced by the battery.
53. A transformer is needed to convert a mains 240 V supply into a 12 V supply, if there are 2000 turns on the primary coil, then find the number of turns on the secondary coil.
54. A step-up transformer has a turn ratios of 1:100. An alternating supply of 20 V is connected across the primary coil. What is the secondary voltage?
55. A power station generates 500 MW of electrical power which is fed to a transmission line. What current would flow in the transmission line if the input voltage is 250 kV?
56. Cobalt-60 is a radioactive element with half-life of 5.25 years. What fraction of original sample will be left after 26 years?
57. Carbon-14 has a half-life of 5730 years. How long will it take for the quantity of carbon-14 in a sample to drop to one-eighth of the initial quantity?
58. Technetium-99m is a radioactive element and is used to diagnose brain, thyroid liver and kidney diseases. This element has half-life of 36 hours. If there is 200 mg of this technetium present, how much will be left in six hours.
59. Half-life of a radioactive element is 10 minutes. If the initial count rate is 368 counts per minute, find the time for which count rate reaches 23 counts per minute.
60. Ashes from a campfire deep in a cave show carbon-14 activity of only one-eighth the activity of fresh wood. How long ago was that campfire made?
61. Length of spring is 8 cm. When mass of 4 kg is hung to it, its length becomes 16 cm. What is its spring constant?
62. If five waves pass through a point of a medium in 10 seconds. What is its frequency and time period? If its wave length is 5 cm, Calculate the wave speed.
63. The time period of wave is 5 sec. If velocity of the wave is 10 ms^{-1} , then what will be its wavelength?
64. A stationary wave is making five loops. The distance between two stationary points is 10 cm and its velocity is 20 ms^{-1} . What will be its frequency?
65. A stationary wave is making five loops. The distance between two stationary points is 10 cm and its velocity is 20 ms^{-1} . What will be the fundamental harmonic frequency?
66. If the intensity of sound is 1 Wm^{-2} . Calculate its sound level in decibel scale if the intensity of threshold of hearing is 10^{-12} Wm^{-2} .
67. The sound of gun is heard 2 sec after its flash is seen. Calculate the distance of the gun from the listener. The speed of sound is 340 ms^{-1} .
68. Length of a spring is 8 cm. When a mass of 4 kg is hung to it, its length becomes 16 cm. What is its spring constant?
69. If five waves pass through a point of medium in 10 seconds. What is its frequency and time period? If its wave length is 5 cm, calculate the wave speed.

70. The time period of a wave is 5 sec. if velocity of the wave is 10 msec^{-1} , then what will be its wave length?
71. A stationary wave is making five loops. The distance between two stationary points is 10 cm and its velocity is 20 ms^{-1} . What will be its frequency?
72. A stationary wave is making five loops. The distance between two stationary points is 10 cm and its velocity is 20 ms^{-1} . What will be the fundamental harmonic frequency?
73. Calculate the intensity level of loudest sound, which can be heard without pain?
74. If the intensity of sound is 1 Wm^{-2} . Calculate its sound level in decibel scale if the intensity of threshold of hearing is 10^{-12} Wm^{-2} ?
75. The sound of gun is heard 2 seconds after its flash is seen. Calculate the distance of the gun from the listener. The speed of sound is 340 ms^{-1} .
76. Calculate the wavelength of sound produced by a tuning fork of frequency 512 Hz, whereas the speed of sound is 340 ms^{-1}
77. A vibrating tuning fork of frequency 256 Hz is held over the top of a vertical tube full of water. The water is allowed to flow out slowly from the tube and a loud sound is heard when the air column in the tube is 33 cm.
78. An object is placed at a distance of 30 cm from a concave mirror. Find the nature and position of the image if the focal length of the mirror is 5 cm.
79. How far from a concave mirror of focal length 20cm would you place an object to get an image three times enlarged?
80. The real depth of a swimming pool is 2m. What is the apparent depth of the pool if the refractive index of water is 1.33?
81. The focal length of a convex lens is 20 cm. where an object should be placed so as to get an image magnified four times.
82. An object is situated at distance of 10 cm from a concave lens of focal length of 150 cm. Calculate the position, nature and magnification of the image.
83. The near point of a person is 50cm and his far point is 200 cm. Calculate the power of the lenses.
84. An object 2 cm high is placed in front of a convex lens of focal length 14 cm. Where the object should be placed so as to get a real image 4cm high.
85. The depth of a pond is 4m. What is the apparent depth of the pond if water level is 3.5m high? The refractive index of water is 1.37.
86. The charge of how many electrons would be equal to $10 \mu\text{C}$?
87. The current in a lamp is 0.2 A. if the lamp is switched on for 2 hours, what is the total electric charge passing through the lamp?
88. The e.m.f of dry cell is 1.5 V. What is the energy dissipated by the cell in driving 0.4 C of charge round a circuit.
89. If a charge of 15 C flows through an electric heater and amount of electrical energy converted into heat is 9.00 MJ, Calculate the potential difference across the ends of the heater.
90. Find the combined resistance of the three resistors in series. Given that $R_1 = 1 \Omega$, R_2 unknown and $R_3 = 2 \Omega$. The current I recorded in the ammeter is 1 A and the voltmeter reading V across R_2 is 3V.
91. A filament lamp is rating 60 W and 240 V. find the energy produced by the lamp in one hour.
92. A hot water heater is rated 2880 W, 240 V. Calculate the operating current and suggests a suitable rating for a fuse to be used to protect the heater from overloading.
93. A power station giving an output power of 100 kW at 20 000 V is connected by cables to a factory. If resistance of the cables is 5.0Ω , calculate current flowing and power loss in the cables.

94. A man stands some distance away from a cliff. He gives a shout and hears his echo 4 s later. How far away is he from the cliff. Speed of sound in air is 330 ms^{-1} .
95. Calculate the number of particles if 5 mA current flows through a conductor in one hour.
96. Calculate the number of electrons if one coulomb charge is flowing through a conductor.
97. If the length of simple pendulum is four times what will be the change in its time period?
98. Two point charges $q_1 = 6 \mu\text{C}$ and $q_2 = -5 \mu\text{C}$ are placed at a distance of 150 cm. What will be the Coulomb's force between them? Also find the direction of the force.
99. The capacitance of parallel plate capacitor is 100 pF. If the potential difference between its plates is 50 V, Find the quantity of charge on its plate.
100. Find the resistance of copper wire 1 m long with diameter 2 mm. ($\rho = 1.69 \times 10^{-8} \Omega\text{m}$)

Q-6 Long questions

1. What is simple harmonic motion? Prove that for mass attached with spring, acceleration is directly proportional to the displacement from mean position.
2. What is simple pendulum? Write down the features of Simple Harmonic Motion.
3. What are mechanical waves? Discuss types of mechanical waves.
4. What is ripple tank? Explain refraction and reflection with reference to ripple tank experiment.
5. What is a wave? Derive the relation between velocity, frequency and wavelength of a wave.
6. What are damped oscillations? How do shock absorbers damp vibrations of a car?
7. Differentiate between electromagnetic and mechanical waves. Give examples of each.
8. What is loudness? Describe the factors on which it depends.
9. Derive equation for intensity level of sound.
10. How can you prove mechanical wave nature of sound with a simple experiment?
11. Describe a simple experiment to measure the speed of sound by echo method.
12. How sound is produced? Discuss the characteristics of sound.
13. What is reflection of light? Draw a diagram to illustrate reflection at plane surface.
14. Differentiate between concave and convex mirror.
15. State the laws of reflection and verify them through diagram.
16. What is meant by principal focus of convex and concave mirror? Illustrate your answer with diagram.
17. Differentiate between concave and convex mirror on the bases of their principal focus.
18. Write down mirror formula and draw table of sign convention used for solving problems related to mirrors.
19. Explain refraction of light with the help of a suitable diagram.
20. Explain what is meant by totally internal reflecting prism?
21. What is optical fibre? How total internal reflection is used in it?
22. What do you know about total internal reflection? What is necessary condition for it?
23. What is an endoscope? What are its types and uses?
24. Describe the rules for image formation of convex lens with the help of diagram.
25. Draw the diagrams for convex lens showing
 - a) An erect, virtual and enlarged image
 - b) A real, inverted and same size as the object
26. Explain how camera is used to form images?
27. Describe the working of slide projector.

28. What is a simple microscope? Derive equation for its magnifying power. Illustrate your answer with diagram.
29. What is telescope? Describe the working and magnification of refracting telescope with the help of diagram.
30. What is meant by accommodation? Explain.
31. What do you know about nearsightedness? How is it corrected?
32. What do you know about farsightedness? How is it corrected?
33. What is meant by electrostatic induction? Explain with example.
34. How can a gold leaf electroscope be charged positively? Explain.
35. What is electroscope? How is it used to detect the presence of charge?
36. State and explain coulomb's law.
37. What is a capacitor? Derive equation for its capacitance.
38. Derive equation for equivalent capacitance of series combination of capacitors.
39. Derive equation for equivalent capacitance of parallel combination of capacitors.
40. Write down some uses of capacitors.
41. Explain the working of electrostatic air cleaner.
42. How lightning occurs? How are buildings prevented from lightning?
43. What is electric current? Write down its formula and define its unit.
44. Battery is the source current. Explain.
45. What is electric current? How is it measured?
46. What is emf? Write down its equation and define its unit.
47. State and explain Ohm's law.
48. Differentiate between ohmic and non-ohmic materials with suitable examples.
49. Differentiate between ohmic and non-ohmic materials with reference to voltage-current characteristics.
50. What is specific resistance? Derive its equation.
51. Describe the factors affecting resistance.
52. Derive equation for equivalent resistance of series combination of resistance.
53. Derive equation for equivalent resistance of parallel combination of resistance.
54. State and explain joules law.
55. What is meant by electric power? Derive its equation and also define its unit.
56. Differentiate between direct and alternating current with the help of graph.
57. Differentiate between fuse and circuit breaker.
58. What is kilowatt-hour? Convert it into joules.
59. What is meant by short circuit? How does it occur?
60. Why should you not operate any electrical appliance with wet hands? Justify your answer.
61. Draw the circuit diagram of parallel combination of resistance and write down its characteristics.
62. Draw the circuit diagram of series combination of resistance and write down its characteristics.
63. Differentiate between parallel and series combination of resistances with reference to current and voltage across each resistor. Also draw their circuit diagram.
64. Differentiate between parallel and series combination of capacitances with reference to charge and voltage across each capacitor. Also draw their circuit diagram.
65. A straight current carrying conductor produces magnetic field. Explain it with the help of experiment.

66. How a current carrying conductor does experiences magnetic force in a magnetic field? How it can be increased?
67. Explain the working of a DC motor.
68. Briefly explain the working of A.C generator.
69. Explain the phenomenon of mutual induction.
70. What is transformer? Differentiate between step-up and step-down transformer with reference to number of turns of primary and secondary coil.
71. Discuss the following with reference to transformer a) Working principle b) Coils c) Core
72. Explain the working of transformer in detail.
73. How power is transmitted from power stations to city consumers? Explain with the help of diagram.
74. What is meant by thermionic emission? Explain.
75. What is an electron gun? How is it used to investigate the properties of electron beam?
76. What is cathode ray oscilloscope? Draw its structure and write down its main components.
77. Discuss three main components of cathode ray oscilloscope.
78. Draw the symbol and truth table for NAND gate.
79. Draw the symbol and truth table for NOR gate.
80. How a NAND gate is used to make burglar alarm? Explain.
81. Differentiate between analogue and digital electronics. Write down names of three analogue and digital devices used in daily.
82. Explain the working of radio transmitter.
83. How data is transmitted through optical fibre?
84. What are the components of information technology?
85. Differentiate between information technology and telecommunication.
86. What is meant by natural radioactivity? How different types of radiations were detected?
87. What is meant by background radiations?
88. Describe penetrating ability of alpha, beta and gamma rays with the help of diagram.
89. Compare the ionization effect of alpha, beta and gamma rays.
90. Discuss Alpha and beta decay with the help of equation.
91. Explain the term half-life.
92. How number of nuclei left 'N' and original number of nuclei 'N₀' are related with half life? Support your answer with the help of graph.
93. How radioisotopes are produced artificially? Give two examples.
94. What is meant by carbon dating? Explain.
95. Write down some uses of radioactive tracers.
96. Differentiate between natural and artificial radioactivity.
97. Explain nuclear fission reaction in detail.
98. What is meant by fission chain reaction? Explain.
99. What safety precautions are taken to prevent from radiation hazards?
100. What are the harmful effects for radiations on human beings?