Chapter 1

Physical World

Solutions

SECTION - A

Objective Type Questions

(Physics, Technology and Society)

1. Origin of the word 'Science' is from

   (1) French word 'Scientia' (2) Greek word 'Scientia'

   (3) Latin word 'Scientia', which means 'scientific' (4) Latin word 'Scientia', which means 'to know'

Sol. Answer (4)

2. Scientific method involves

   (1) Systematic observations, controlled experiments, qualitative and quantitative reasoning, mathematical modelling and prediction

   (2) Systematic observations, controlled experiments, qualitative and quantitative reasoning and mathematical modelling

   (3) Systematic observations, controlled experiments, qualitative and quantitative reasoning, mathematical modelling, prediction and verification

   (4) Systematic observations, controlled experiments, qualitative and quantitative reasoning

Sol. Answer (3)

3. Origin of the word 'Physics' is from

   (1) French word 'Fusis' (2) Latin word 'Fusis'

   (3) Greek word 'Fusis', which means 'Nature' (4) Greek word 'Fusis', which means 'Physical'

Sol. Answer (3)

4. Main thrust in physics is on

   (1) Unification (2) Reduction (3) Both (1) & (2) (4) Experiments

Sol. Answer (3)

5. Explaining diverse physical phenomena in terms of a few concepts and laws is

   (1) Reduction (2) Unification (3) Law (4) Fact

Sol. Answer (2)

6. Deriving the properties of a bigger, more complex system from the properties and interaction of its constituent simpler parts is

(1) Unification (2) Reduction (3) Law (4) Fact

Sol. Answer (2)

7. Logical possibility that an assertion, hypothesis or a theory can be contradicted by an observation or the outcome of a physical experiment is

(1) Law (2) Hypothesis (3) Fact (4) Falsifiability

Sol. Answer (4)

8. A theory proposed to explain observed phenomena is

(1) Postulate (2) Hypothesis (3) Law (4) Model

Sol. Answer (4)

9. A truth, which is self-evident is a/an

(1) Axiom (2) Postulate (3) Either (1) or (2) (4) Hypothesis

Sol. Answer (3)

10. "Science is not just a collection of laws, a catalogue of unrelated facts. It is a creation of human mind, with its freely invented ideas and concepts." Who made these remarks?

(1) Newton (2) Maxwell (3) Einstein (4) Raman

Sol. Answer (3)

11. "The most incomprehensible thing about the world is that it is comprehensible." Who made these remarks?

(1) Newton (2) Maxwell (3) Einstein (4) Raman

Sol. Answer (3)

12. "We know very little and yet it is astonishing that we know so much, and still more astonishing that so little knowledge (or science) can give us so much power." Who made these remarks?

(1) Newton (2) Maxwell (3) Einstein (4) Bertrand Russel

Sol. Answer (4)

13. "I do not know what I may appear to the world, I seem to have been only like a boy playing on the sea-shore and diverting myself every now and then finding a smoother pebble or a prettier shell than ordinary, while the great ocean of truth lay undiscovered before me." Who said this?

(1) Newton (2) Maxwell (3) Einstein (4) Raman

Sol. Answer (1)

14. A thought experiment in Physics is one which is

(1) Theoretically possible but experimentally not feasible

(2) Neither theoretically possible nor experimentally feasible

(3) Performed by a non-physicist

(4) Performed by a chemist

Sol. Answer (1)

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15. In 'Mesoscopic Physics', we deal with
(1) Phenomena at laboratory
(2) Molecular phenomena
(3) Nuclear phenomena
(4) Few tens or hundreds of atom

Sol. Answer (4)

16. "Classical Physics" deals with
(1) Macroscopic phenomena
(2) Mesoscopic phenomena
(3) Microscopic phenomena
(4) Sometimes mesoscopic sometimes microscopic

Sol. Answer (1)

17. The scope of physics covers almost
(1) 10^{-14} m (or even less) to 10^{26} m range of length
(2) 10^{-22} s to 10^{18} s range of time
(3) 10^{-30} kg to 10^{55} kg range of mass
(4) All of these

Sol. Answer (4)

18. Strategy of approximation involves
(1) All the complexities of a phenomena
(2) Extracting essential features of a phenomena from its less significant aspects
(3) Qualitative thinking
(4) Both (1) & (3)

Sol. Answer (2)

19. An Indian scientist who won Nobel Prize for Physics is
(1) Sir J.C. Bose (2) H.J. Bhaba (3) M.N. Saha (4) Sir. C.V. Raman

Sol. Answer (4)

20. Which of the following statements is not true?
(1) Solar cells may be future source of power for cars
(2) Development in medicine may increase average life expectancy
(3) X-rays were discovered by Roentgen
(4) Radioactivity was discovered by Madam Curie

Sol. Answer (4)

21. Albert Einstein was awarded Nobel Prize for his work on
(1) Special theory of relativity
(2) General theory of relativity
(3) Photoelectric effect
(4) Mass-energy equivalence

Sol. Answer (3)

22. The India born and USA based Nobel LaureateProf. Chandrasekhara is known for his work on
(1) Study of cosmic rays
(2) Development of relativistic theory of electron
(3) Prediction of tachyons
(4) Stability of stars and existence of a stable mass limit for white dwarfs

Sol. Answer (4)

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23. Abdus Salam, a Pakistan national won Nobel Prize in the field of
(1) Inelastic scattering of light by molecules
(2) Unification of weak and electromagnetic interaction
(3) Superconductivity
(4) Laser technology

Sol. Answer (2)

24. Who gave quantum model of atom?
(1) Rutherford (2) Bohr (3) Newton (4) Faraday

Sol. Answer (2)

25. Which of the following statements given below are false?
a. Becquerel discovered radioactivity
b. Fraunhoffer lines were first discovered by Wollaston
c. Photoelectric effect was discovered by Einstein
(1) a, b & c (2) a & c (3) b & c (4) c only

Sol. Answer (4)

26. The persons, who were given Nobel prize twice, are
(1) Madame Curie and Albert Einstein
(2) John Bardeen and Albert Einstein
(3) Max Planck and Albert Einstein
(4) Madame Curie and John Bardeen

Sol. Answer (4)

27. The country, which awards the prestigious Nobel prize, is
(1) USA (2) UK (3) Sweden (4) Germany

Sol. Answer (3)

28. The scientific principle involved in supercomputers is
(1) Electromagnetic induction
(2) Thermodynamics
(3) Superconductivity
(4) Amplification by population inversion

Sol. Answer (3)

29. The scientific principle involved in radio and TV broadcast is
(1) Superconductivity
(2) Propagation of electromagnetic waves
(3) Electromagnetic induction
(4) Amplification by population inversion

Sol. Answer (2)

30. It has been postulated that there may be some particle moving with speed greater than the speed of light. Such particles have been named as
(1) Mesons (2) Pions (3) Tachyons (4) Leptons

Sol. Answer (3)

31. The scientific principle involved in LASER is
(1) Newton's laws of motion
(2) Faraday's laws of induction
(3) Coulomb's laws of induction
(4) Amplification by population inversion

Sol. Answer (4)

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(Fundamental Forces in Nature)

32. Which of the following statements is/are correct?

(1) Universal law of gravitation is an assumption or hypothesis

(2) Universal law of gravitation can be proved

(3) Universal law of gravitation can be verified

(4) Both (1) & (3)

Sol. Answer (4)

33. If F_g, F_N, F_W and F_E be the gravitational, nuclear, weak and electromagnetic forces respectively, then arrange them in proper order as per their strength.

(1) $F_g > F_N > F_W > F_E$ (2) $F_g < F_W < F_E < F_N$ (3) $F_E > F_N > F_W > F_g$ (4) $F_W < F_g < F_E < F_N$

Sol. Answer (2)

34. Forces which obey inverse square law are

(1) Gravitational forces (2) Electromagnetic forces

(3) Nuclear forces (4) Both (1) & (2)

Sol. Answer (4)

35. Choose the correct statement.

(1) Gravitational force is weakest force (2) Electrostatic force is weakest force

(3) Nuclear force is weakest force (4) Electromagnetic force is strongest force

Sol. Answer (1)

36. Choose the correct statement.

(1) Strong nuclear forces are charge independent (2) Weak nuclear forces are charge independent

(3) Gravitational forces are charge independent (4) All of these

Sol. Answer (4)

37. Choose the correct statement.

(1) Gravitational forces are attractive forces

(2) Nuclear forces are attractive forces

(3) Electromagnetic forces can be attractive as well as repulsive

(4) All of these

Sol. Answer (4)

38. Choose the correct statement.

(1) Strong nuclear force is 100 times stronger than electrostatic force

(2) Strong nuclear force is 10^{13} times stronger than weak nuclear force

(3) Strong nuclear force is 10^{39} times stronger than gravitational force

(4) All of these

Sol. Answer (4)

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39. Choose the correct statement.
(1) Range of strong nuclear force is $\approx 10^{-15}$ m
(2) Range of weak nuclear force is $\approx 10^{-16}$ m
(3) Gravitational and electromagnetic force have infinite range
(4) All of these

Sol. Answer (4)

40. Choose the correct statement.
(1) Strong nuclear force is mediated by the particle 'π-meson'
(2) Weak nuclear force is mediated by the particle 'Boson'
(3) Electromagnetic force is mediated by the particle 'photon' and gravitational force is mediated by the particle 'graviton'
(4) All of these

Sol. Answer (4)

41. Choose the correct statement.
(1) Gravitational force is conservative
(2) Electrostatic force is conservative
(3) Nuclear force is non-conservative
(4) All of these

Sol. Answer (4)

42. Choose the correct statement.
(1) Gravitational force is a central force
(2) Electromagnetic force is a central force
(3) Nuclear force is a non-central force
(4) All of these

Sol. Answer (4)

43. Choose the correct statement.
(1) Gravitational force is not affected by intervening medium
(2) Electromagnetic force is affected by intervening medium
(3) Nuclear force does not obey inverse square law
(4) All of these

Sol. Answer (4)

(Discoveries and Nature of Physical Laws)

44. Choose the correct statement.
(1) Hans Lippershey is associated with the discovery of telescope
(2) Kepler is associated with the discovery of telescope
(3) C.V. Raman is associated with the discovery of telescope
(4) Hubble is associated with the discovery of telescope

Sol. Answer (1)

45. Choose the correct statement.
(1) C.V. Raman is associated with scattering of light by the molecules
(2) Neil Bohr is associated with scattering of light by the molecules
(3) S. Chandrashekhar is associated with scattering of light by the molecules
(4) Heisenberg is associated with radioactivity

Sol. Answer (1)

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46. Choose the correct statement.
(1) F. Caree is associated with refrigerator
(2) H. Hertz is associated with electromagnetic waves
(3) James Chadwick is associated with the discovery of neutron
(4) All of these

Sol. Answer (4)

47. Choose the correct statement.
(1) Scientific principle involved in refrigerator is laws of thermodynamics
(2) Scientific principle involved in steam engine is laws of thermodynamics
(3) Scientific principle involved in rocket propulsion is Newton's laws of motion
(4) All of these

Sol. Answer (4)

48. Choose the correct statement.
(1) Newton unified celestial and terrestrial mechanics
(2) Maxwell verified experimentally the predictions of the theory of 'electroweak force'
(3) Glashow showed that electricity and magnetism are inseparable aspects of 'electromagnetism'
(4) Rubia unified celestial and terrestrial mechanics

Sol. Answer (1)

49. Choose the correct statement.
(1) Law of conservation of linear momentum is valid in the presence of an external force also
(2) For angular momentum of a system to remain constant, it is not necessary that external torque acting on it be zero
(3) Charge can be created and destroyed
(4) A conservation law cannot be proved

Sol. Answer (4)

50. Choose the correct statement.
(1) Symmetry of nature w.r.t. translation in time is equivalent to law of conservation of energy
(2) Symmetry of nature w.r.t. translation in space is equivalent to law of conservation of linear momentum
(3) Isotropy of space is equivalent to law of conservation of angular momentum
(4) All of these

Sol. Answer (4)

SECTION - B

Objective Type Questions

(Fundamental Forces in Nature, Nature of Physical Laws)

1. The exchange particles responsible for weak interactions are
(1) Gluons (2) π-mesons (3) Photons (4) W and Z bosons

Sol. Answer (4)

Weak interaction takes place through the exchange of BOSONS $\rightarrow$ W and Z bosons

2. Maxwell unified
   (1) Electricity with gravitation
   (2) Electricity with magnetism
   (3) Electromagnetism with optics
   (4) Electromagnetism with weak interaction

Sol. Answer (3)

Maxwell unified electromagnetism with optics.

3. Which of the following is not a derived force?
   (1) Tension in a string
   (2) van der Waals forces
   (3) Nuclear force between proton-proton
   (4) Electrostatic force between proton-proton

Sol. Answer (4)

Electrostatic force between proton-proton is a fundamental force.

4. Which one of the following does not experience strong nuclear force?
   (1) Leptons (2) Baryons (3) Hadrons (4) Proton

Sol. Answer (1)

Leptons does not experience strong nuclear force.

SECTION - C

Assertion - Reason Type Questions

1. A : Quark-quark force is said to be fundamental force instead of strong nuclear force.
   R : Nucleons consist of more fundamental particles known as quarks.

Sol. Answer (1)

2. A : Gravitational force is the weakest force among all other forces.
   R : Gravitational force between the two masses is independent of the medium in between.

Sol. Answer (2)

3. A : Gravitational force dominates terrestrial phenomena.
   R : Matter is mostly electrically neutral and gravitational force are only of attractive nature.

Sol. Answer (1)

4. A : Gravitational force is always attractive but electromagnetic force can be attractive or repulsive.
   R : Mass comes only in one variety (there is no negative mass) but charge comes in two varieties. (Positive and negative charge)

Sol. Answer (1)

5. A : If m and m_0 are moving mass, rest mass of a body and c is velocity of light, then kinetic energy of the body is $E = (m - m_0)c^2$.
   R : Total energy of a body is sum of kinetic energy and rest mass energy.

Sol. Answer (1)

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