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AP ECET – 2025 Physics - Chapter wise Preparation

Note: Each question follows the AP ECET exam pattern and is designed to be straightforward and scoring.

Chapter 1: Units and Dimensions

Q1. The dimensional formula of force is:
A) $[MLT^{-2}]$
B) $[ML^{2}T^{-2}]$
C) $[MLT^{-1}]$
D) $[ML^{-1}T^{-2}]$
✅ **Correct Answer: A**

Q2. Which of the following is a derived quantity?
A) Mass
B) Length
C) Time
D) Velocity
✅ **Correct Answer: D**

Q3. The SI unit of pressure is:
A) pascal
B) bar
C) newton
D) atm
✅ **Correct Answer: A**

Q4. The dimensions of work are:
A) $[MLT^{-2}]$
B) $[ML^{2}T^{-2}]$
C) $[ML^{2}T^{-3}]$
D) $[MLT^{-3}]$
✅ **Correct Answer: B**

Q5. Which of the following quantities is dimensionless?
A) Strain
B) Force
C) Work
D) Acceleration
✅ **Correct Answer: A**

Q6. Which one of the following pairs has the same dimensions?
A) Work and torque
B) Pressure and force
C) Power and force
D) Energy and velocity
✅ **Correct Answer: A**

Q7. The SI unit of energy is:
A) watt
B) joule
C) newton
D) erg
✅ **Correct Answer: B**

Q8. The dimensional formula of momentum is:
A) $[MLT^{-1}]$
B) $[ML^{2}T^{-2}]$
C) $[MLT^{-2}]$
D) $[MT^{-2}]$
✅ **Correct Answer: A**

Q9. Planck's constant has dimensions of:
A) Energy
B) Angular momentum
C) Power
D) Force
✅ **Correct Answer: B**

Q10. Which of the following has the same units as energy?
A) Torque
B) Momentum
C) Power
D) Impulse
✅ **Correct Answer: A**

Q11. Which of the following pairs have identical dimensions?
A) Pressure and energy
B) Torque and work
C) Force and energy
D) Work and power
✅ **Correct Answer: B**

Q12. The dimensional formula for pressure is:
A) $[ML^{-1}T^{-2}]$
B) $[MLT^{-2}]$
C) $[ML^{2}T^{-2}]$
D) $[MLT^{-1}]$
✅ **Correct Answer: A**

Q13. The quantity which has the same dimension as impulse is:
A) Energy
B) Work
C) Momentum
D) Force
✅ **Correct Answer: C**

Q14. The unit of Planck's constant is:
A) $kg \cdot m^2/s$
B) $kg \cdot m/s$
C) $kg \cdot m^2/s^2$
D) $kg \cdot m^2/s^3$
✅ **Correct Answer: A**

Q15. The quantity which does not have dimensions of $[ML^{2}T^{-2}]$ is:
A) Kinetic energy
B) Potential energy
C) Heat
D) Power
✅ **Correct Answer: D**

Q16. Which one of the following physical quantities has different dimensions than the others?
A) Force
B) Impulse
C) Momentum
D) Work
✅ **Correct Answer: D**

Q17. The dimension of angular momentum is:
A) $[ML^2T^{-2}]$
B) $[ML^2T^{-1}]$
C) $[MLT^{-2}]$
D) $[MLT^{-1}]$
✅ **Correct Answer: B**

Q18. The dimensional formula of universal gravitational constant (G) is:
A) $[M^{-1}L^3T^{-2}]$
B) $[ML^{-2}T^{-2}]$
C) $[M^{-2}L^3T^{-2}]$
D) $[MLT^{-2}]$
✅ **Correct Answer: A**

Q19. Dimensional formula of surface tension is:
A) $[ML^{-1}T^{-2}]$
B) $[MLT^{-2}]$
C) $[ML^{-2}T^{-1}]$
D) $[ML^2T^{-2}]$
✅ **Correct Answer: A**

Q20. Which of the following quantities is a scalar and has dimensions $[ML^2T^{-2}]$?
A) Momentum
B) Work
C) Acceleration
D) Force
✅ **Correct Answer: B**

Q21. The dimensional formula for coefficient of viscosity is:
A) $[ML^{-1}T^{-1}]$
B) $[MLT^{-2}]$
C) $[ML^{-2}T^{-1}]$
D) $[ML^2T^{-2}]$
✅ **Correct Answer: A**

Q22. Which one of the following has the same unit as power?
A) Energy × time
B) Energy / time
C) Energy / distance
D) Energy × distance
✅ **Correct Answer: B**

Q23. What is the dimensional formula of acceleration?
A) $[LT^{-2}]$
B) $[LT]$
C) $[L^{2}T^{-1}]$
D) $[LT^{-1}]$
✅ **Correct Answer: A**

Q24. The SI unit of momentum is:
A) kg·m/s
B) kg·m^{2}/s
C) N·s
D) Both A and C
✅ **Correct Answer: D**

Q25. Which quantity has dimensions $[ML^{2}T^{-3}]$?
A) Power
B) Work
C) Energy
D) Force
✅ **Correct Answer: A**

Q26. The dimension of stress is the same as that of:
A) Pressure
B) Energy
C) Force
D) Momentum
✅ **Correct Answer: A**

Q27. The dimensional formula of electric charge is:
A) $[AT]$
B) $[A^{2}T]$
C) $[MLT^{-2}]$
D) $[L^{3}T^{-2}]$
✅ **Correct Answer: A**

Q28. Which one of these has no unit?
A) Energy
B) Work
C) Strain
D) Force
✅ **Correct Answer: C**

Q29. The dimensional formula of velocity is:
A) $[LT^{-1}]$
B) $[L^2T^{-2}]$
C) [LT]
D) $[LT^{-2}]$
✅ **Correct Answer: A**

Q30. Which of the following quantities is vector and has unit of N·s?
A) Torque
B) Impulse
C) Work
D) Energy
✅ **Correct Answer: B**

Q31. The dimension of energy is:
A) $[MLT^{-2}]$
B) $[ML^2T^{-2}]$
C) $[ML^2T^{-3}]$
D) $[MT^{-2}]$
✅ **Correct Answer: B**

Q32. Which of the following quantities has dimensions $[ML^0T^{-2}]$?
A) Energy
B) Pressure
C) Force
D) Tension
✅ **Correct Answer: D**

Q33. The unit of pressure in CGS system is:
A) $dyne/cm^2$
B) erg/cm^2
C) $g·cm/s^2$
D) N/m^2
✅ **Correct Answer: A**

Q34. The dimensional formula for frequency is:
A) [T]
B) $[T^{-1}]$
C) $[L^{-1}T]$
D) $[L^{-1}T^{-1}]$
✅ **Correct Answer: B**

Q35. The dimensional formula of density is:
A) $[ML^{-3}]$
B) $[ML^{3}]$
C) $[M^{3}L]$
D) $[ML^{-1}]$
✅ **Correct Answer: A**

Q36. Which has the same dimensions as angular momentum?
A) Energy × time
B) Force × time
C) Force × velocity
D) Mass × area
✅ **Correct Answer: A**

Q37. A physical quantity that has unit but no dimension is:
A) Specific gravity
B) Angle
C) Refractive index
D) Angular displacement
✅ **Correct Answer: D**

Q38. Which has dimension of $[ML^{-3}]$?
A) Pressure
B) Density
C) Energy
D) Force
✅ **Correct Answer: B**

Q39. The dimensional formula of spring constant is:
A) $[MT^{-2}]$
B) $[MLT^{-2}]$
C) $[ML^{0}T^{-2}]$
D) $[ML^{-1}T^{-2}]$
✅ **Correct Answer: D**

Q40. What is the dimensional formula of coefficient of thermal conductivity?
A) $[MLT^{-3}K^{-1}]$
B) $[MLT^{-2}K^{-1}]$
C) $[ML^{2}T^{-3}K^{-1}]$
D) $[ML^{0}T^{-1}K^{-1}]$
✅ **Correct Answer: A**

Q41. Which one of the following pairs does not have the same dimensions?
A) Energy and torque
B) Impulse and momentum
C) Work and energy
D) Force and pressure
✅ **Correct Answer: D**

Q42. Which of the following is not a fundamental quantity?
A) Time
B) Mass
C) Length
D) Force
✅ **Correct Answer: D**

Q43. The SI unit of strain is:
A) It has no unit
B) radian
C) m/m
D) All of these
✅ **Correct Answer: D**

Q44. The SI unit of power is:
A) Watt
B) Joule
C) Calorie
D) Erg
✅ **Correct Answer: A**

Q45. Which of the following physical quantities has different dimensions?
A) Energy
B) Torque
C) Work
D) Force
✅ **Correct Answer: D**

Q46. Which of the following physical quantities is scalar and dimensionless?
A) Angle
B) Velocity
C) Force
D) Torque
✅ **Correct Answer: A**

Q47. Which of the following is not a derived quantity?
A) Acceleration
B) Power
C) Momentum
D) Mass
✅ **Correct Answer: D**

Q48. Dimensional formula of electric potential is:
A) $[ML^2T^{-3}A^{-1}]$
B) $[ML^2T^{-2}A^{-2}]$
C) $[MLT^{-2}A^{-1}]$
D) $[ML^2T^{-2}A^{-1}]$
✅ **Correct Answer: A**

Q49. Which one has the same dimension as Planck's constant?
A) Angular momentum
B) Force
C) Pressure
D) Work
✅ **Correct Answer: A**

Q50. The SI unit of angular momentum is:
A) $kg \cdot m^2/s$
B) $N \cdot m$
C) $kg \cdot m/s$
D) $N \cdot s$
✅ **Correct Answer: A**

Q51. Which one of the following has dimensions $[ML^2T^{-2}]$?
A) Momentum
B) Energy
C) Pressure
D) Velocity
✅ **Correct Answer: B**

Q52. The dimension of impulse is:
A) $[MLT^{-2}]$
B) $[MLT^{-1}]$
C) $[ML^2T^{-2}]$
D) $[MT^{-1}]$
✅ **Correct Answer: B**

Q53. The dimensional formula of gravitational constant (G) is:
A) $[M^{-1}L^{3}T^{-2}]$
B) $[ML^{-1}T^{-2}]$
C) $[M^{-2}L^{3}T^{-2}]$
D) $[MLT^{-2}]$
✅ **Correct Answer: A**

Q54. Which of the following has no dimensions?
A) Strain
B) Stress
C) Pressure
D) Velocity
✅ **Correct Answer: A**

Q55. Which physical quantity has unit N·s (newton-second)?
A) Impulse
B) Work
C) Energy
D) Power
✅ **Correct Answer: A**

Q56. The dimensional formula of surface tension is:
A) $[ML^{0}T^{-2}]$
B) $[ML^{-2}T^{-2}]$
C) $[ML^{-1}T^{-2}]$
D) $[MLT^{-2}]$
✅ **Correct Answer: C**

Q57. Planck's constant has the same dimensions as:
A) Energy
B) Angular momentum
C) Power
D) Momentum
✅ **Correct Answer: B**

Q58. The SI unit of moment of inertia is:
A) $kg·m^{2}$
B) kg·m
C) kg·m/s
D) N·m
✅ **Correct Answer: A**

Q59. The dimensional formula of modulus of elasticity is same as that of:
A) Pressure
B) Energy
C) Force
D) Velocity
✅ **Correct Answer: A**

Q60. The dimension of force constant is:
A) $[ML^{-1}T^{-2}]$
B) $[MLT^{-2}]$
C) $[ML^{-2}T^{-2}]$
D) $[ML^{2}T^{-3}]$
✅ **Correct Answer: A**

Q61. Which one of the following has dimension of energy per unit volume?
A) Pressure
B) Torque
C) Force
D) Impulse
✅ **Correct Answer: A**

Q62. Which of the following has the same dimensions as momentum?
A) Impulse
B) Energy
C) Force
D) Velocity
✅ **Correct Answer: A**

Q63. Which has the dimension $[ML^{0}T^{-2}]$?
A) Tension
B) Weight
C) Acceleration
D) Work
✅ **Correct Answer: A**

Q64. The SI unit of stress is:
A) N/m^2
B) J/m^3
C) Pa
D) Both A and C
✅ **Correct Answer: D**

Q65. Which quantity is dimensionless?
A) Strain
B) Stress
C) Pressure
D) Force
✅ **Correct Answer: A**

Q66. The SI unit of energy is:
A) Newton
B) Joule
C) Watt
D) Calorie
✅ **Correct Answer: B**

Q67. Unit of torque is:
A) N·m
B) $N \cdot m^2$
C) $kg \cdot m^2/s$
D) N/m
✅ **Correct Answer: A**

Q68. Which has dimension $[ML^0T^{-2}]$?
A) Spring constant
B) Surface tension
C) Pressure
D) Tension
✅ **Correct Answer: D**

Q69. Unit of angular velocity is:
A) rad/s
B) m/s
C) rad
D) s
✅ **Correct Answer: A**

Q70. Unit of power is:
A) Watt
B) Newton
C) Joule
D) Erg
✅ **Correct Answer: A**

Q71. Which of these is a fundamental unit?
A) Kelvin
B) Dyne
C) Erg
D) Joule
✅ **Correct Answer: A**

Q72. What is the dimension of velocity?
A) $[LT^{-1}]$
B) $[LT]$
C) $[L^{-1}T]$
D) $[LT^{-2}]$
✅ **Correct Answer: A**

Q73. What is the dimension of acceleration?
A) $[LT^{-2}]$
B) $[LT^{-1}]$
C) $[L^{-1}T]$
D) $[L^{-1}T^{-2}]$
✅ **Correct Answer: A**

Q74. SI unit of electric charge is:
A) Coulomb
B) Ampere
C) Volt
D) Ohm
✅ **Correct Answer: A**

Q75. The SI unit of temperature is:
A) Kelvin
B) Celsius
C) Fahrenheit
D) Rankine
✅ **Correct Answer: A**

Q76. Which of the following has same dimension as energy?
A) Torque
B) Impulse
C) Momentum
D) Pressure
✅ **Correct Answer: A**

Q77. What is the dimensional formula of pressure?
A) $[ML^{-1}T^{-2}]$
B) $[ML^{2}T^{-2}]$
C) $[MLT^{-2}]$
D) $[ML^{-2}T^{-2}]$
✅ **Correct Answer: A**

Q78. Which physical quantity has unit J/s?
A) Power
B) Energy
C) Work
D) Force
✅ **Correct Answer: A**

Q79. The unit of momentum is:
A) kg·m/s
B) kg·m^2/s
C) N·s^2
D) J·s
✅ **Correct Answer: A**

Q80. Which of the following is not dimensionless?
A) Angle
B) Specific gravity
C) Time
D) Strain
✅ **Correct Answer: C**

Q81. What is the SI unit of Planck's constant?
A) kg·m^2/s
B) J·s
C) W·s
D) N·m
✅ **Correct Answer: B**

Q82. Which of the following pairs have the same dimensional formula?
A) Work and Torque
B) Force and Power
C) Momentum and Energy
D) Pressure and Force
✅ **Correct Answer: A**

Q83. Which of the following is not a derived unit?
A) Newton
B) Pascal
C) Kilogram
D) Joule
✅ **Correct Answer: C**

Q84. Which physical quantity has the unit Pascal?
A) Pressure
B) Energy
C) Torque
D) Power
✅ **Correct Answer: A**

Q85. What is the dimensional formula of density?
A) $[ML^{-3}]$
B) $[ML^{-1}T^{-2}]$
C) $[MLT^{-2}]$
D) $[ML^{-2}T^{-2}]$
✅ **Correct Answer: A**

Q86. What is the dimensional formula of angular velocity?
A) $[T^{-1}]$
B) $[LT^{-1}]$
C) $[LT^{-2}]$
D) $[MLT^{-2}]$
✅ **Correct Answer: A**

Q87. Which one of these is not a fundamental quantity?
A) Length
B) Mass
C) Speed
D) Time
✅ **Correct Answer: C**

Q88. Which one of the following quantities is dimensionless?
A) Poisson's ratio
B) Force
C) Acceleration
D) Energy
✅ **Correct Answer: A**

Q89. Dimensional formula of specific heat capacity is:
A) $[L^2T^{-2}K^{-1}]$
B) $[L^2T^{-2}]$
C) $[MLT^{-2}K^{-1}]$
D) $[ML^2T^{-2}K^{-1}]$
✅ **Correct Answer: D**

Q90. Dimension of universal gas constant R is:
A) $[ML^2T^{-2}K^{-1}mol^{-1}]$
B) $[ML^2T^{-1}K^{-1}]$
C) $[MLT^{-2}mol^{-1}]$
D) $[MLT^{-2}K^{-1}]$
✅ **Correct Answer: A**

Q91. SI unit of work is:
A) Newton
B) Joule
C) Watt
D) Pascal
✅ **Correct Answer: B**

Q92. SI unit of angular momentum is:
A) $kg·m^2/s$
B) N·m
C) kg·m/s
D) J·s
✅ **Correct Answer: A**

Q93. Which one of these is dimensionally the same as torque?
A) Work
B) Energy
C) Both A and B
D) Force
✅ **Correct Answer: C**

Q94. SI unit of electric field is:
A) N/C
B) J/C
C) N/m
D) C/m^2
✅ **Correct Answer: A**

Q95. The unit of kinematic viscosity is:
A) m^2/s
B) m/s^2
C) m/s
D) m^2
✅ **Correct Answer: A**

Q96. Unit of thermal conductivity is:
A) W/m·K
B) J/m·s
C) N/m·K
D) J/K
✅ **Correct Answer: A**

Q97. A unitless quantity is also called:
A) Scalar quantity
B) Fundamental quantity
C) Pure number
D) Vector quantity
✅ **Correct Answer: C**

Q98. The SI unit of electric potential is:
A) Volt
B) Ampere
C) Joule
D) Ohm
✅ **Correct Answer: A**

Q99. The dimension of velocity gradient is:
A) $[T^{-1}]$
B) $[LT^{-1}]$
C) $[L^{-1}T]$
D) $[LT^{-2}]$
✅ **Correct Answer: A**

Q100. Which one of the following has same dimension as impulse?
A) Momentum
B) Work
C) Energy
D) Power
✅ **Correct Answer: A**

Chapter 2: Elements of Vectors

Q1. The unit of a vector is the same as:
A) Its magnitude
B) Its direction
C) Its component
D) Its unit vector
✅ **Correct Answer: A**

Q2. If two vectors are in the same direction, then their sum is:
A) A vector in the same direction
B) A zero vector
C) A vector in the opposite direction
D) A scalar
✅ **Correct Answer: A**

Q3. Which of the following is a vector quantity?
A) Temperature
B) Speed
C) Displacement
D) Distance
✅ **Correct Answer: C**

Q4. The scalar product of two vectors A and B is:
A) AB sinθ
B) AB cosθ
C) A × B
D) None of the above
✅ **Correct Answer: B**

Q5. The direction of a unit vector is always:
A) Parallel to the vector
B) Perpendicular to the vector
C) Either parallel or perpendicular
D) None of the above
✅ **Correct Answer: A**

Q6. What is the magnitude of a vector?
A) The length of the vector
B) The direction of the vector
C) The unit of the vector
D) None of the above
✅ **Correct Answer: A**

Q7. The cross product of two parallel vectors is:
A) A scalar
B) A vector
C) Zero
D) None of the above
✅ **Correct Answer: C**

Q8. If the angle between two vectors is 90°, their dot product is:
A) 0
B) 1
C) AB
D) AB cos90°
✅ **Correct Answer: A**

Q9. The component of a vector along the x-axis is:
A) Ax
B) Ay
C) Az
D) None of the above
✅ **Correct Answer: A**

Q10. Which of the following is not a vector?
A) Force
B) Displacement
C) Velocity
D) Energy
✅ **Correct Answer: D**

Q11. The vector sum of three coplanar vectors is:
A) The resultant vector
B) A zero vector
C) A unit vector
D) A scalar quantity
✅ **Correct Answer: A**

Q12. The dot product of two vectors A and B is given by:
A) $A \times B \sin\theta$
B) $A \times B \cos\theta$
C) $A \times B$
D) $A \cdot B$
✅ **Correct Answer: D**

Q13. The magnitude of the cross product of two vectors is:
A) AB
B) AB sinθ
C) AB cosθ
D) A + B
✅ **Correct Answer: B**

Q14. Which of the following vector operations is commutative?
A) Dot product
B) Cross product
C) Scalar multiplication
D) None of the above
✅ **Correct Answer: A**

Q15. A vector in three dimensions can be expressed as:
A) A = Ax + Ay + Az
B) A = Ax + Ay
C) A = Ax + Az
D) A = Ax + Ay + Az + Aw
✅ **Correct Answer: A**

Q16. The product of a vector and a scalar is:
A) A scalar
B) A vector
C) A unit vector
D) None of the above
✅ **Correct Answer: B**

Q17. Which of the following is true about the dot product of two vectors?
A) A·B = AB cosθ
B) A·B = AB sinθ
C) A·B = A × B
D) A·B = 0
✅ **Correct Answer: A**

Q18. The cross product of two vectors gives a vector:
A) Parallel to the two vectors
B) Perpendicular to the two vectors
C) Parallel to one of the vectors
D) None of the above
✅ **Correct Answer: B**

Q19. If θ is the angle between two vectors A and B, their dot product is:
A) AB sinθ
B) AB cosθ
C) AB
D) A + B
✅ **Correct Answer: B**

Q20. The magnitude of the cross product of two vectors A and B is given by:
A) AB
B) AB cosθ
C) AB sinθ
D) AB + θ
✅ **Correct Answer: C**

Q21. The position vector of a point P with respect to the origin O is:
A) OP
B) OP'
C) OQ
D) None of the above
✅ **Correct Answer: A**

Q22. The resultant of two vectors A and B can be calculated by:
A) A + B
B) A – B
C) A × B
D) A ÷ B
✅ **Correct Answer: A**

Q23. In a 3D coordinate system, the unit vectors along x, y, and z axes are:
A) i, j, k
B) i, j, z
C) i, j, l
D) None of the above
✅ **Correct Answer: A**

Q24. The vector sum of two vectors is zero if:
A) The vectors are parallel
B) The vectors are equal in magnitude and opposite in direction
C) The vectors are perpendicular
D) None of the above
✅ **Correct Answer: B**

Q25. The vector quantity representing force is:
A) Weight
B) Displacement
C) Energy
D) Work
✅ **Correct Answer: A**

Q26. Which one of the following is a scalar quantity?
A) Speed
B) Velocity
C) Acceleration
D) Force
✅ **Correct Answer: A**

Q27. In a 2D plane, the magnitude of the resultant of two vectors A and B is:
A) $\sqrt{(A^2 + B^2)}$
B) A + B
C) A – B
D) AB
✅ **Correct Answer: A**

Q28. The cross product of a vector with itself is:
A) Zero
B) A
C) A^2
D) None of the above
✅ **Correct Answer: A**

Q29. In a right-angled triangle, the vector components of the hypotenuse are:
A) Parallel to the base and height
B) Perpendicular to the base and height
C) Parallel to the base
D) Parallel to the height
✅ **Correct Answer: A**

Q30. The magnitude of the vector sum of A and B is maximized when the angle between A and B is:
A) 0°
B) 45°
C) 90°
D) 180°
✅ **Correct Answer: A**

Q31. The direction cosines of a vector represent:
A) Angles with coordinate axes
B) Sine of angles with axes
C) Cosine of angles with axes
D) Tangent of angles with axes
✅ **Correct Answer: C**

Q32. If vector A = 3i + 4j, then its magnitude is:
A) 7
B) 5
C) 1
D) √13
✅ **Correct Answer: B**

Q33. The angle between two vectors A and B is zero. Then, their cross product is:
A) Maximum
B) Zero
C) Negative
D) Positive
✅ **Correct Answer: B**

Q34. What is the angle between two perpendicular vectors?
A) 180°
B) 45°
C) 0°
D) 90°
✅ **Correct Answer: D**

Q35. The magnitude of a unit vector is:
A) 0
B) 1
C) ∞
D) Not defined
✅ **Correct Answer: B**

Q36. A vector with zero magnitude is called:
A) Null vector
B) Unit vector
C) Equal vector
D) Opposite vector
✅ **Correct Answer: A**

Q37. The result of vector addition can be found using:
A) Parallelogram law
B) Triangle law
C) Both A and B
D) None of the above
✅ **Correct Answer: C**

Q38. Which operation is not valid for vectors?
A) Division
B) Addition
C) Subtraction
D) Multiplication by a scalar
✅ **Correct Answer: A**

Q39. If a vector is multiplied by zero, the result is:
A) Unit vector
B) Infinite vector
C) Zero vector
D) None of the above
✅ **Correct Answer: C**

Q40. The dot product of two perpendicular vectors is:
A) AB
B) 1
C) 0
D) AB sinθ
✅ **Correct Answer: C**

Q41. Which of the following represents a vector quantity?
A) Current
B) Power
C) Force
D) Work
✅ **Correct Answer: C**

Q42. Vectors having the same magnitude and direction are called:
A) Equal vectors
B) Opposite vectors
C) Unit vectors
D) Null vectors
✅ **Correct Answer: A**

Q43. If vector A is along x-axis and vector B is along y-axis, angle between them is:
A) 0°
B) 180°
C) 90°
D) 45°
✅ **Correct Answer: C**

Q44. A scalar quantity has:
A) Direction only
B) Magnitude only
C) Both magnitude and direction
D) None of the above
✅ **Correct Answer: B**

Q45. A vector is said to be in standard position if:
A) Its tail is at the origin
B) Its head is at the origin
C) It is at 90°
D) It is a unit vector
✅ **Correct Answer: A**

Q46. The angle between two vectors is obtained using:
A) Dot product
B) Cross product
C) Scalar multiplication
D) Vector division
✅ **Correct Answer: A**

Q47. A vector having only one component is:
A) One-dimensional vector
B) Two-dimensional vector
C) Three-dimensional vector
D) Zero vector
✅ **Correct Answer: A**

Q48. A vector that changes only in magnitude, not direction, is called:
A) Scalable
B) Parallel
C) Coplanar
D) Collinear
✅ **Correct Answer: D**

Q49. The projection of vector A on B is given by:
A) A·B / |B|
B) A × B
C) A / B
D) None of the above
✅ **Correct Answer: A**

Q50. The area of a parallelogram formed by vectors A and B is:
A) A·B
B) |A × B|
C) AB sinθ
D) Both B and C
✅ **Correct Answer: D**

Q51. Two vectors are said to be collinear if:
A) Their cross product is zero
B) They are equal in magnitude
C) They have the same angle with x-axis
D) Their dot product is one
✅ **Correct Answer: A**

Q52. Which of the following is not affected when a vector is multiplied by a scalar?
A) Magnitude
B) Direction
C) Unit
D) Components
✅ **Correct Answer: B**

Q53. The length of a position vector is:
A) Equal to the distance from the origin
B) Always 1
C) Always 0
D) None of the above
✅ **Correct Answer: A**

Q54. A vector can be resolved into:
A) Two perpendicular components
B) Two parallel components
C) Three random components
D) Only one component
✅ **Correct Answer: A**

Q55. If vector A = 6i – 8j, its magnitude is:
A) 10
B) √100
C) 14
D) 48
✅ **Correct Answer: A**

Q56. If two vectors A and B are parallel, their cross product is:
A) Zero
B) AB
C) Maximum
D) Undefined
✅ **Correct Answer: A**

Q57. If |A| = 3 and |B| = 4, and the angle between them is 90°, then |A × B| =
A) 7
B) 12
C) 5
D) 1
✅ **Correct Answer: B**

Q58. Vector addition is:
A) Commutative
B) Associative
C) Both A and B
D) None
✅ **Correct Answer: C**

Q59. The resultant of two vectors is maximum when angle between them is:
A) 0°
B) 45°
C) 90°
D) 180°
✅ **Correct Answer: A**

Q60. The resultant of two equal vectors inclined at angle θ is:
A) 2A cos(θ/2)
B) 2A sin(θ/2)
C) 2A cosθ
D) A + B
✅ **Correct Answer: A**

Q61. The vector A = 5i – 3j + 2k is parallel to x-axis if:
A) j and k components are zero
B) i component is zero
C) A = 0
D) None of the above
✅ **Correct Answer: A**

Q62. The component of a vector along its direction is:
A) Maximum
B) Minimum
C) Zero
D) Infinite
✅ **Correct Answer: A**

Q63. Which of the following is a scalar product?
A) A × B
B) A · B
C) Cross Product
D) Vector product
✅ **Correct Answer: B**

Q64. If A = i + j + k and B = i – j + k, then A · B =
A) 1
B) 2
C) 3
D) 0
✅ **Correct Answer: C**

Q65. Which of the following is *not* a property of scalar (dot) product?
A) A · B = B · A
B) A · A = $|A|^2$
C) A · B = |A||B|cosθ
D) A · B = |A||B|sinθ
✅ **Correct Answer: D**

Q66. Which of the following vectors is a unit vector?
A) i
B) 2i
C) 3i
D) 4i
✅ **Correct Answer: A**

Q67. A × B = 0 when:
A) A and B are parallel
B) A and B are perpendicular
C) A and B are equal
D) Angle between A and B is 45°
✅ **Correct Answer: A**

Q68. What is the value of i · j?
A) 1
B) 0
C) –1
D) ∞
✅ **Correct Answer: B**

Q69. If two vectors are perpendicular, their dot product is:
A) Zero
B) One
C) Infinity
D) Maximum
✅ **Correct Answer: A**

Q70. A vector can be completely represented by its:
A) Magnitude and direction
B) Position only
C) Angle only
D) Length only
✅ **Correct Answer: A**

Q71. A vector has components 0 along x and y axis and 5 along z-axis, it lies:
A) In XY plane
B) In YZ plane
C) Along Z-axis
D) Along X-axis
✅ **Correct Answer: C**

Q72. The unit vector along vector A = 6i + 8j is:
A) (3i + 4j)/5
B) (6i + 8j)/10
C) (3i + 4j)/√10
D) (6i + 8j)/√100
✅ **Correct Answer: D**

Q73. The direction cosines satisfy which identity?
A) $l^2 + m^2 + n^2 = 1$
B) $l + m + n = 1$
C) $lm + mn + nl = 0$
D) $l^2 + m^2 - n^2 = 1$
✅ **Correct Answer: A**

Q74. Which of the following quantities is a vector?
A) Pressure
B) Mass
C) Velocity
D) Temperature
✅ **Correct Answer: C**

Q75. Cross product of two vectors gives a:
A) Scalar
B) Vector
C) Constant
D) Zero
✅ **Correct Answer: B**

Q76. Which is not a vector quantity?
A) Force
B) Torque
C) Displacement
D) Work
✅ **Correct Answer: D**

Q77. The magnitude of the resultant of vectors A and B is minimum when angle between them is:
A) 0°
B) 90°
C) 180°
D) 60°
✅ **Correct Answer: C**

Q78. If vector A makes 60° with x-axis and its magnitude is 10, then x-component is:
A) 10
B) 5
C) 10 cos 60°
D) 10 sin 60°
✅ **Correct Answer: C**

Q79. The vector perpendicular to both A and B is given by:
A) A + B
B) A × B
C) A · B
D) A – B
✅ **Correct Answer: B**

Q80. Which of the following is a property of vector addition?
A) Commutative
B) Distributive
C) Associative
D) All of the above
✅ **Correct Answer: D**

Q81. The component of a vector along a perpendicular direction is:
A) Zero
B) Same as vector
C) Equal to magnitude
D) Negative
✅ **Correct Answer: A**

Q82. Resultant of two vectors inclined at 90° is found using:
A) Pythagoras theorem
B) Cosine law
C) Sine rule
D) Dot product
✅ **Correct Answer: A**

Q83. If vector A = i + j, its magnitude is:
A) $\sqrt{2}$
B) 1
C) 2
D) $\sqrt{3}$
✅ **Correct Answer: A**

Q84. A · A equals:
A) Zero
B) |A|
C) $|A|^2$
D) None
✅ **Correct Answer: C**

Q85. The resultant of two vectors of equal magnitude and opposite direction is:
A) 2A
B) A
C) 0
D) A/2
✅ **Correct Answer: C**

Q86. The direction of A × B follows:
A) Lenz's Law
B) Right-hand rule
C) Fleming's Rule
D) Newton's Law
✅ **Correct Answer: B**

Q87. In vector notation, the letter î represents:
A) Unit vector along x-axis
B) Unit vector along y-axis
C) Scalar
D) None
✅ **Correct Answer: A**

Q88. Cross product is zero if angle is:
A) 90°
B) 180°
C) 0°
D) Both B and C
✅ **Correct Answer: D**

Q89. Vector A is in negative y-direction, then its direction angle with x-axis is:
A) 180°
B) 90°
C) 270°
D) 0°
✅ **Correct Answer: C**

Q90. If a vector lies in XY-plane, then its z-component is:
A) 0
B) 1
C) Infinite
D) Undefined
✅ **Correct Answer: A**

Q91. A vector perpendicular to the plane of i and j is:
A) k
B) –k
C) i × j
D) All of the above
✅ **Correct Answer: D**

Q92. If |A| = |B| and angle between them is 60°, then |A + B| is:
A) √3 A
B) 2A cos(30°)
C) A + B
D) Zero
✅ **Correct Answer: B**

Q93. Which of the following represents a physical quantity with both magnitude and direction?
A) Density
B) Mass
C) Acceleration
D) Temperature
✅ **Correct Answer: C**

Q94. Which vector operation gives a scalar?
A) Dot product
B) Cross product
C) Vector product
D) A × A
✅ **Correct Answer: A**

Q95. The angle between vector A = i + j and vector B = i – j is:
A) 0°
B) 90°
C) 180°
D) 45°
✅ **Correct Answer: B**

Q96. Vector A + (–A) =
A) A
B) 0
C) 2A
D) None
✅ **Correct Answer: B**

Q97. The angle between identical vectors is:
A) 0°
B) 90°
C) 180°
D) Undefined
✅ **Correct Answer: A**

Q98. If |A| = 3 and |B| = 4 and angle = 0°, then A · B =
A) 12
B) 7
C) 0
D) 1
✅ **Correct Answer: A**

Q99. Direction cosines of a vector A are given by:
A) cosα, cosβ, cosγ
B) sinα, sinβ, sinγ
C) tanα, tanβ, tanγ
D) None of these
✅ **Correct Answer: A**

Q100. A vector with direction angles α = 90°, β = 90°, γ = 0° lies along:
A) X-axis
B) Y-axis
C) Z-axis
D) XY-plane
✅ **Correct Answer: C**

Chapter 3: Kinematics and Friction

Q1. The slope of a velocity-time graph gives:
A) Displacement
B) Acceleration
C) Speed
D) Distance
✅ **Correct Answer:** B

Q2. A body is said to be in uniform motion if it:
A) Travels equal distances in equal intervals of time
B) Travels unequal distances in equal intervals of time
C) Has variable speed
D) Changes direction constantly
✅ **Correct Answer:** A

Q3. The SI unit of acceleration is:
A) m/s
B) m/s^2
C) km/h
D) m/h
✅ **Correct Answer:** B

Q4. The area under a velocity-time graph represents:
A) Speed
B) Distance
C) Displacement
D) Both B and C
✅ **Correct Answer:** D

Q5. If a body moves in a circle with uniform speed, its acceleration:
A) Is zero
B) Is tangential
C) Is directed away from the center
D) Is directed towards the center
✅ **Correct Answer:** D

Q6. A body moving with constant acceleration covers distances 5 m and 9 m in the 3rd and 4th seconds. The acceleration is:
A) 2 m/s^2
B) 4 m/s^2
C) 1 m/s^2

D) 3 m/s^2

✅ **Correct Answer:** A

Q7. Friction always acts:
A) In the direction of motion
B) Perpendicular to the motion
C) Opposite to the direction of motion
D) Vertically

✅ **Correct Answer:** C

Q8. The unit of coefficient of friction is:
A) N
B) kg
C) No unit
D) m/s^2

✅ **Correct Answer:** C

Q9. Which of the following reduces friction?
A) Rough surface
B) Smooth surface
C) Applying oil or grease
D) Both B and C

✅ **Correct Answer:** D

Q10. Static friction is always:
A) Less than kinetic friction
B) Equal to kinetic friction
C) Greater than kinetic friction
D) Zero

✅ **Correct Answer:** C

Q11. Which is an example of sliding friction?
A) A ball rolling on the floor
B) A book sliding on a table
C) A wheel turning
D) A pendulum swinging

✅ **Correct Answer:** B

Q12. Retardation is:
A) Positive acceleration
B) Negative acceleration
C) No acceleration

D) Constant velocity

✅ **Correct Answer:** B

Q13. The first equation of motion is:

A) $s = ut + \frac{1}{2}at^2$

B) $v = u + at$

C) $v^2 = u^2 + 2as$

D) $s = vt$

✅ **Correct Answer:** B

Q14. Displacement is a:

A) Scalar quantity

B) Vector quantity

C) Constant

D) Derived quantity

✅ **Correct Answer:** B

Q15. A body thrown vertically upwards returns to ground due to:

A) Gravity

B) Friction

C) Magnetism

D) Inertia

✅ **Correct Answer:** A

Q16. A body starts from rest and gains speed uniformly. The time taken to reach speed v with acceleration a is:

A) $v \times a$

B) v / a

C) a / v

D) $v + a$

✅ **Correct Answer:** B

Q17. The coefficient of friction depends on:

A) Area of contact

B) Nature of surfaces

C) Weight

D) Volume

✅ **Correct Answer:** B

Q18. What does a horizontal line on a velocity-time graph indicate?

A) Zero velocity

B) Constant velocity

C) Acceleration

D) Retardation

✅ **Correct Answer:** B

Q19. A car moving with speed 72 km/h applies brakes and stops in 10 seconds. Its acceleration is:

A) -2 m/s^2

B) 2 m/s^2

C) -3 m/s^2

D) 0

✅ **Correct Answer:** A

(Convert 72 km/h to m/s = 20 m/s; a = (0 - 20)/10 = -2 m/s^2)

Q20. The maximum static friction is called:

A) Rolling friction

B) Limiting friction

C) Kinetic friction

D) Sliding friction

✅ **Correct Answer:** B

Q21. Friction converts kinetic energy into:

A) Potential energy

B) Heat

C) Sound

D) Light

✅ **Correct Answer:** B

Q22. The negative slope in a velocity-time graph represents:

A) Acceleration

B) Constant velocity

C) Retardation

D) Uniform motion

✅ **Correct Answer:** C

Q23. What happens to friction when the weight of an object increases?

A) Decreases

B) Increases

C) Remains the same

D) Becomes zero

✅ **Correct Answer:** B

Q24. Rolling friction is:

A) Greater than sliding friction

B) Equal to sliding friction

C) Less than sliding friction
D) Unrelated to sliding friction
✅ **Correct Answer:** C

Q25. If the net force on a body is zero, then the body is:
A) Accelerating
B) At rest or moving with constant velocity
C) Always at rest
D) Always moving
✅ **Correct Answer:** B

Q26. When a car suddenly stops, passengers tend to move forward due to:
A) Friction
B) Inertia
C) Gravity
D) Acceleration
✅ **Correct Answer:** B

Q27. In the absence of external forces, a moving body:
A) Slows down
B) Comes to rest
C) Moves with constant velocity
D) Accelerates
✅ **Correct Answer:** C

Q28. If the acceleration of an object is zero, then:
A) Its velocity is zero
B) It is at rest
C) It moves with constant velocity
D) It is under retardation
✅ **Correct Answer:** C

Q29. Which force opposes the relative motion between surfaces in contact?
A) Gravitational force
B) Normal force
C) Frictional force
D) Centripetal force
✅ **Correct Answer:** C

Q30. The second equation of motion is:
A) $v = u + at$
B) $s = ut + \frac{1}{2}at^2$
C) $v^2 = u^2 + 2as$

D) s = vt

✅ **Correct Answer:** B

Q31. A body covers 10 m in 2 seconds and 30 m in the next 2 seconds. The motion is:
A) Uniform
B) Accelerated
C) Retarded
D) At rest

✅ **Correct Answer:** B

Q32. A ball is thrown upwards. At the highest point, its:
A) Velocity is zero
B) Acceleration is zero
C) Both are zero
D) Neither is zero

✅ **Correct Answer:** A

Q33. Kinetic friction is:
A) Equal to static friction
B) Greater than static friction
C) Less than static friction
D) Unpredictable

✅ **Correct Answer:** C

Q34. If a vehicle moves with uniform speed, its acceleration is:
A) Positive
B) Zero
C) Negative
D) Infinite

✅ **Correct Answer:** B

Q35. Which factor does not affect friction?
A) Weight of object
B) Nature of surfaces
C) Surface area in contact
D) Roughness

✅ **Correct Answer:** C

Q36. What type of motion is involved when a car accelerates?
A) Uniform motion
B) Retardation
C) Non-uniform motion

D) Static motion

✅ **Correct Answer:** C

Q37. A graph of displacement vs. time is a straight line. This indicates:

A) Uniform acceleration

B) Uniform speed

C) Zero motion

D) Increasing speed

✅ **Correct Answer:** B

Q38. The distance covered in nth second is given by:

A) $s = ut + \frac{1}{2}at^2$

B) $s_n = u + \frac{1}{2}a(2n - 1)$

C) $v = u + at$

D) $s = vt$

✅ **Correct Answer:** B

Q39. Friction between tyres and road is:

A) Unwanted

B) Helpful in motion

C) Always minimized

D) Avoided

✅ **Correct Answer:** B

Q40. If a ball rolls down an inclined plane, the motion is:

A) Uniform

B) Accelerated

C) Static

D) Uniform velocity

✅ **Correct Answer:** B

Q41. Which of the following is a vector quantity?

A) Distance

B) Speed

C) Displacement

D) Work

✅ **Correct Answer:** C

Q42. The force of friction:

A) Helps walking

B) Causes wear

C) Produces heat

D) All of these

✅ **Correct Answer:** D

Q43. What is the frictional force acting on a 5 kg block on a table with μ = 0.4? (Take g = 10 m/s^2)

A) 10 N

B) 15 N

C) 20 N

D) 25 N

✅ **Correct Answer:** C

F = μ × N = 0.4 × 50 = 20 N

Q44. Which law explains inertia?

A) Newton's First Law

B) Newton's Second Law

C) Newton's Third Law

D) Law of Gravitation

✅ **Correct Answer:** A

Q45. When two objects rub against each other, heat is produced due to:

A) Pressure

B) Acceleration

C) Friction

D) Work

✅ **Correct Answer:** C

Q46. A car slows down due to:

A) Gravity

B) Air resistance

C) Friction

D) All of these

✅ **Correct Answer:** D

Q47. The motion of a falling object under gravity with no air resistance is:

A) Uniform

B) Uniformly accelerated

C) Retarded

D) Oscillatory

✅ **Correct Answer:** B

Q48. If u = 0, a = 2 m/s^2, and t = 4s, what is the distance travelled?

A) 16 m

B) 12 m

C) 8 m
D) 32 m
✅ **Correct Answer:** A
$s = ut + ½at^2 = 0 + ½(2)(16) = 16\ m$

Q49. What is the nature of frictional force?
A) Conservative
B) Non-conservative
C) Both
D) Neither
✅ **Correct Answer:** B

Q50. To reduce friction, we use:
A) Grease
B) Oil
C) Ball bearings
D) All of these
✅ **Correct Answer:** D

Q51. The slope of a velocity-time graph represents:
A) Distance
B) Displacement
C) Acceleration
D) Speed
✅ **Correct Answer:** C

Q52. When a body moves with uniform acceleration, the velocity-time graph is:
A) A curve
B) A straight line
C) A circle
D) A parabola
✅ **Correct Answer:** B

Q53. Which of the following statements is true for friction?
A) It always opposes motion
B) It increases with smooth surfaces
C) It is independent of mass
D) It helps objects to slide freely
✅ **Correct Answer:** A

Q54. One Newton is the force which gives a mass of 1 kg an acceleration of:
A) 1 m/s
B) 1 m/s^2

C) 10 m/s^2
D) 9.8 m/s^2
✅ **Correct Answer:** B

Q55. Friction can be reduced by:
A) Making surfaces rough
B) Increasing contact area
C) Polishing surfaces
D) Increasing load
✅ **Correct Answer:** C

Q56. Motion of a freely falling object is:
A) Non-accelerated
B) Uniform
C) Uniformly accelerated
D) Oscillatory
✅ **Correct Answer:** C

Q57. What is the unit of coefficient of friction?
A) N
B) kg
C) m/s^2
D) No unit
✅ **Correct Answer:** D

Q58. If a body is at rest, its velocity is:
A) Zero
B) One
C) Negative
D) Variable
✅ **Correct Answer:** A

Q59. Which law gives F = ma?
A) First Law
B) Second Law
C) Third Law
D) Law of Gravitation
✅ **Correct Answer:** B

Q60. Which factor increases rolling friction?
A) Hardness
B) Softness
C) Surface area

D) Lubrication

✅ **Correct Answer:** B

Q61. A boy pushes a box but it doesn't move. What force resists him?
A) Rolling friction
B) Kinetic friction
C) Static friction
D) Air resistance

✅ **Correct Answer:** C

Q62. If the net force acting on a moving object is zero, the object will:
A) Stop
B) Accelerate
C) Move at constant speed
D) Change direction

✅ **Correct Answer:** C

Q63. Which force slows down a sliding object?
A) Magnetic force
B) Normal force
C) Gravitational force
D) Friction

✅ **Correct Answer:** D

Q64. In uniform motion, acceleration is:
A) Increasing
B) Decreasing
C) Zero
D) Maximum

✅ **Correct Answer:** C

Q65. When a body is thrown vertically up, its acceleration is:
A) Zero
B) Downward
C) Upward
D) Constant and upward

✅ **Correct Answer:** B

Q66. Friction between brakes and tyres helps to:
A) Increase speed
B) Maintain motion
C) Stop the vehicle

D) Steer the vehicle

✅ **Correct Answer:** C

Q67. What does the area under velocity-time graph represent?

A) Speed

B) Acceleration

C) Displacement

D) Friction

✅ **Correct Answer:** C

Q68. Which type of friction is the smallest?

A) Static

B) Rolling

C) Sliding

D) Fluid

✅ **Correct Answer:** B

Q69. SI unit of acceleration:

A) m/s

B) m/s^2

C) km/h

D) cm/s

✅ **Correct Answer:** B

Q70. The motion of a train starting from rest is:

A) Uniform motion

B) Uniform acceleration

C) Retardation

D) Static

✅ **Correct Answer:** B

Q71. What is the direction of frictional force on a moving object?

A) Same as motion

B) Opposite to motion

C) Perpendicular to motion

D) Circular

✅ **Correct Answer:** B

Q72. Kinematics deals with:

A) Motion without considering cause

B) Forces

C) Energy

D) Heat

✅ **Correct Answer:** A

Q73. A bus starts from rest and moves with uniform acceleration. After 5 s, it covers 62.5 m. Find acceleration.

A) 5 m/s^2

B) 2.5 m/s^2

C) 4 m/s^2

D) 3 m/s^2

✅ **Correct Answer:** B

$s = ut + ½at^2 \rightarrow 62.5 = 0 + ½a(25) \rightarrow a = 5$

Q74. The coefficient of friction is given by:

A) F/N

B) N/F

C) F × N

D) N − F

✅ **Correct Answer:** A

Q75. Static friction comes into play:

A) After motion begins

B) Just before motion begins

C) During motion

D) Not at all

✅ **Correct Answer:** B

Q76. The maximum value of static friction is called:

A) Limiting friction

B) Sliding friction

C) Rolling friction

D) Kinetic friction

✅ **Correct Answer:** A

Q77. A body is thrown upwards. At the highest point, its velocity is:

A) Maximum

B) Zero

C) Same as initial

D) Equal to acceleration

✅ **Correct Answer:** B

Q78. Friction is necessary for:

A) Walking

B) Sliding

C) Flying
D) Rolling
✅ **Correct Answer:** A

Q79. When velocity decreases, acceleration is:
A) Positive
B) Zero
C) Negative
D) Constant
✅ **Correct Answer:** C

Q80. The product of mass and acceleration gives:
A) Power
B) Work
C) Force
D) Energy
✅ **Correct Answer:** C

Q81. Frictional force depends on:
A) Area of contact
B) Nature of surfaces
C) Shape
D) Volume
✅ **Correct Answer:** B

Q82. A car moving with uniform speed has:
A) Uniform acceleration
B) Variable speed
C) Zero acceleration
D) Decreasing velocity
✅ **Correct Answer:** C

Q83. Negative acceleration is also called:
A) Displacement
B) Friction
C) Retardation
D) Force
✅ **Correct Answer:** C

Q84. In the absence of friction, a body would:
A) Stop immediately
B) Keep moving forever
C) Rotate

D) Fall

✅ **Correct Answer:** B

Q85. Which of the following is a scalar quantity?
A) Displacement
B) Velocity
C) Speed
D) Acceleration

✅ **Correct Answer:** C

Q86. If velocity increases uniformly, the motion is said to be:
A) Retarded
B) Uniform
C) Uniformly accelerated
D) Oscillatory

✅ **Correct Answer:** C

Q87. The acceleration due to gravity is approximately:
A) 8.9 m/s^2
B) 9.8 m/s^2
C) 10.8 m/s^2
D) 9.0 m/s^2

✅ **Correct Answer:** B

Q88. Distance travelled in nth second is given by:
A) $s = ut + \frac{1}{2}at^2$
B) $v = u + at$
C) $s_n = u + \frac{1}{2}a(2n-1)$
D) $v^2 = u^2 + 2as$

✅ **Correct Answer:** C

Q89. The direction of frictional force is:
A) Along motion
B) Perpendicular to motion
C) Opposite to motion
D) Vertical

✅ **Correct Answer:** C

Q90. A box slides down an inclined plane. The friction is:
A) Kinetic
B) Static
C) Rolling

D) None

✅ **Correct Answer:** A

Q91. SI unit of force is:
A) kg
B) Newton
C) Joule
D) Pascal

✅ **Correct Answer:** B

Q92. If a vehicle moves with constant velocity, then net force on it is:
A) Maximum
B) Constant
C) Zero
D) Infinite

✅ **Correct Answer:** C

Q93. When net force on a body is zero, the motion is:
A) Uniform
B) Accelerated
C) Non-uniform
D) Oscillatory

✅ **Correct Answer:** A

Q94. A car increases its speed from 20 m/s to 30 m/s in 5 seconds. Find acceleration.
A) 2 m/s^2
B) 5 m/s^2
C) 1.5 m/s^2
D) 10 m/s^2

✅ **Correct Answer:** A
$a = (v - u)/t = (30 - 20)/5 = 2\ m/s^2$

Q95. Force is a:
A) Scalar
B) Vector
C) Pseudo vector
D) Dimensionless

✅ **Correct Answer:** B

Q96. A car goes around a circular track at constant speed. The motion is:
A) Uniform linear
B) Non-uniform
C) Accelerated

D) Uniform circular

✅ **Correct Answer:** D

Q97. When a ball hits the floor and rebounds, which force acts?
A) Normal
B) Friction
C) Gravity
D) Elastic force

✅ **Correct Answer:** D

Q98. The unit of frictional force is:
A) Newton
B) Joule
C) Watt
D) Dyne

✅ **Correct Answer:** A

Q99. The motion of planets around the sun is:
A) Linear
B) Rectilinear
C) Circular
D) Curvilinear

✅ **Correct Answer:** D

Q100. What happens to friction if weight increases?
A) Increases
B) Decreases
C) Becomes zero
D) Unaffected

✅ **Correct Answer:** A

Q101. A particle moving in a circle at constant speed has:
A) No acceleration
B) Linear acceleration only
C) Angular acceleration only
D) Centripetal acceleration

✅ **Correct Answer:** D

Q102. The force required to keep a body in circular motion is:
A) Centrifugal
B) Centripetal
C) Tangential

D) Gravitational

✅ **Correct Answer:** B

Q103. SI unit of coefficient of friction is:

A) kg/m^2

B) m/s^2

C) It has no unit

D) Newton

✅ **Correct Answer:** C

Q104. Friction acts:

A) In direction of motion

B) Opposite to motion

C) Along normal

D) None

✅ **Correct Answer:** B

Q105. A ball dropped from a height under gravity has acceleration of:

A) 10 m/s^2 upward

B) Zero

C) 9.8 m/s^2 downward

D) Depends on mass

✅ **Correct Answer:** C

Q106. Friction is useful in:

A) Walking

B) Braking

C) Writing

D) All of these

✅ **Correct Answer:** D

Q107. What is the angle between velocity and acceleration in uniform circular motion?

A) 90°

B) 0°

C) 180°

D) 45°

✅ **Correct Answer:** A

Q108. Acceleration due to gravity decreases with:

A) Depth

B) Altitude

C) Both A and B

D) None

✅ **Correct Answer:** C

Q109. A car accelerates from rest with 2 m/s^2. In 5 seconds it covers:

A) 25 m

B) 10 m

C) 20 m

D) 50 m

✅ **Correct Answer:** A

Using $s = ½at^2 = ½ \times 2 \times 25 = 25\ m$

Q110. Which force is responsible for circular motion?

A) Tension

B) Gravitational

C) Centripetal

D) Magnetic

✅ **Correct Answer:** C

Q111. In free fall, acceleration is:

A) Zero

B) Downward

C) Upward

D) None

✅ **Correct Answer:** B

Q112. A parachute lands slowly due to:

A) Gravity

B) Acceleration

C) Air resistance

D) Weight

✅ **Correct Answer:** C

Q113. The angle of friction is the angle between:

A) Normal force and weight

B) Normal and resultant of normal and friction

C) Friction and velocity

D) None

✅ **Correct Answer:** B

Q114. S.I. unit of velocity is:

A) m/s^2

B) m/s

C) N

D) kg

✅ **Correct Answer:** B

Q115. Which of the following quantities is vector?

A) Distance

B) Speed

C) Displacement

D) Work

✅ **Correct Answer:** C

Q116. When two surfaces are in contact, friction depends on:

A) Area of contact

B) Relative velocity

C) Nature of surfaces

D) Both A and C

✅ **Correct Answer:** C

Q117. A particle moves with uniform speed but changing direction. It is:

A) At rest

B) Moving in a straight line

C) In uniform circular motion

D) Oscillating

✅ **Correct Answer:** C

Q118. Friction converts mechanical energy into:

A) Light

B) Sound

C) Heat

D) Potential energy

✅ **Correct Answer:** C

Q119. The coefficient of kinetic friction is always:

A) Zero

B) Greater than static

C) Less than static

D) Equal to static

✅ **Correct Answer:** C

Q120. The slope of a velocity-time graph gives:

A) Displacement

B) Acceleration

C) Force

D) Speed

✅ **Correct Answer:** B

Q121. The area under velocity-time graph gives:
A) Acceleration
B) Force
C) Distance
D) Power

✅ **Correct Answer:** C

Q122. Uniform motion means:
A) Equal displacement in equal intervals
B) Constant speed
C) Both A and B
D) Variable acceleration

✅ **Correct Answer:** C

Q123. When net force on an object is zero, it is said to be in:
A) Equilibrium
B) Motion
C) Rotation
D) Friction

✅ **Correct Answer:** A

Q124. A car starts from rest and reaches 40 m/s in 4 seconds. Its acceleration is:
A) 8 m/s^2
B) 10 m/s^2
C) 5 m/s^2
D) 4 m/s^2

✅ **Correct Answer:** C

Q125. Frictional force acting on a rolling ball is:
A) Static
B) Kinetic
C) Rolling
D) None

✅ **Correct Answer:** C

Q126. Limiting friction occurs:
A) After motion starts
B) Just before motion starts
C) During motion

D) During rest

✅ **Correct Answer:** B

Q127. A ball is thrown vertically upward. Its acceleration is:
A) Zero at top
B) Constant and downward
C) Constant and upward
D) Varying

✅ **Correct Answer:** B

Q128. An object that returns to original position after being displaced has:
A) Inertia
B) Elasticity
C) Acceleration
D) Displacement

✅ **Correct Answer:** B

Q129. Friction between car tyres and road helps in:
A) Speed
B) Acceleration
C) Turning
D) All of these

✅ **Correct Answer:** D

Q130. The direction of centripetal acceleration is always:
A) Tangent to circle
B) Radially outward
C) Radially inward
D) Perpendicular

✅ **Correct Answer:** C

Q131. The motion of an object under gravity with no air resistance is:
A) Uniform
B) Retarded
C) Free fall
D) Random

✅ **Correct Answer:** C

Q132. A body moving in a circle with increasing speed has:
A) Centripetal only
B) Tangential only
C) Centripetal + tangential acceleration

D) No acceleration

✅ **Correct Answer:** C

Q133. Force of friction always acts:
A) In the direction of motion
B) Opposite to motion
C) Upward
D) Perpendicular

✅ **Correct Answer:** B

Q134. SI unit of momentum is:
A) kg·m/s
B) N·s
C) Both A and B
D) m/s^2

✅ **Correct Answer:** C

Q135. Rate of change of velocity is:
A) Speed
B) Acceleration
C) Force
D) Momentum

✅ **Correct Answer:** B

Q136. If a body moves with uniform velocity, then its acceleration is:
A) Zero
B) Constant
C) Infinity
D) Variable

✅ **Correct Answer:** A

Q137. Rolling friction is:
A) Greater than sliding
B) Equal to sliding
C) Less than sliding
D) Equal to static

✅ **Correct Answer:** C

Q138. Force opposing relative motion is:
A) Friction
B) Tension
C) Weight

D) Buoyancy

✅ **Correct Answer:** A

Q139. Time taken to return to original position in oscillation is called:

A) Period

B) Frequency

C) Amplitude

D) Phase

✅ **Correct Answer:** A

Q140. The quantity having both magnitude and direction is:

A) Scalar

B) Vector

C) Speed

D) Work

✅ **Correct Answer:** B

Q141. 1 Newton is equal to:

A) 1 kg·m/s

B) 1 $kg \cdot m/s^2$

C) 1 m/s^2

D) 1 kg/s^2

✅ **Correct Answer:** B

Q142. Force is a product of:

A) Mass and velocity

B) Mass and acceleration

C) Acceleration and time

D) Displacement and time

✅ **Correct Answer:** B

Q143. A graph of displacement vs time for uniform motion is:

A) Curved

B) Parabola

C) Straight line

D) Horizontal

✅ **Correct Answer:** C

Q144. Negative slope in velocity-time graph indicates:

A) Acceleration

B) Constant velocity

C) Retardation

D) Rest

✅ **Correct Answer:** C

Q145. Retardation means:
A) Positive acceleration
B) Decrease in speed
C) Change in direction
D) Increasing acceleration

✅ **Correct Answer:** B

Q146. Displacement can be:
A) Positive
B) Zero
C) Negative
D) All of the above

✅ **Correct Answer:** D

Q147. A particle moving with constant speed in a circle is:
A) In non-uniform motion
B) Uniformly accelerated
C) At rest
D) Moving in straight line

✅ **Correct Answer:** B

Q148. What is the nature of frictional force?
A) Conservative
B) Non-conservative
C) Both
D) None

✅ **Correct Answer:** B

Q149. Acceleration is a:
A) Scalar
B) Vector
C) Unit
D) Constant

✅ **Correct Answer:** B

Q150. What type of force causes deceleration?
A) Friction
B) Magnetic
C) Electric

D) Normal

✅ **Correct Answer:** A

Chapter 4: Work, Power, and Energy

Q1. The unit of work in SI is:
A) Newton
B) Joule
C) Watt
D) Erg
✅ **Correct Answer:** B

Q2. Work is said to be done when:
A) A force is applied
B) There is displacement
C) Force causes displacement
D) All of the above
✅ **Correct Answer:** C

Q3. If a body is displaced in the direction opposite to force, work is:
A) Positive
B) Zero
C) Negative
D) Infinite
✅ **Correct Answer:** C

Q4. A man pushes a wall but it doesn't move. Work done is:
A) Maximum
B) Minimum
C) Zero
D) Infinite
✅ **Correct Answer:** C

Q5. 1 kilojoule =
A) 10^3 J
B) 10^6 J
C) 10^9 J
D) 10^2 J
✅ **Correct Answer:** A

Q6. Work done by gravity when a body falls freely:
A) Positive

B) Negative
C) Zero
D) Infinite
✅ **Correct Answer:** A

Q7. The unit of power in SI is:
A) Joule
B) Newton
C) Watt
D) Erg
✅ **Correct Answer:** C

Q8. 1 horsepower =
A) 746 W
B) 736 W
C) 700 W
D) 750 W
✅ **Correct Answer:** A

Q9. Power is the rate of doing:
A) Force
B) Work
C) Acceleration
D) Energy
✅ **Correct Answer:** B

Q10. If no displacement occurs, then work done is:
A) Infinite
B) Positive
C) Negative
D) Zero
✅ **Correct Answer:** D

Q11. Energy possessed due to motion is:
A) Potential energy
B) Electrical energy
C) Kinetic energy
D) Chemical energy
✅ **Correct Answer:** C

Q12. The ability to do work is called:
A) Force
B) Power

C) Energy
D) Displacement
✅ **Correct Answer:** C

Q13. SI unit of energy is:
A) Newton
B) Joule
C) Watt
D) Erg
✅ **Correct Answer:** B

Q14. The energy stored in a stretched spring is:
A) Potential energy
B) Kinetic energy
C) Heat energy
D) Sound energy
✅ **Correct Answer:** A

Q15. Work done is maximum when angle between force and displacement is:
A) 90°
B) 0°
C) 180°
D) 60°
✅ **Correct Answer:** B

Q16. When angle between force and displacement is 90°, work done is:
A) Zero
B) Positive
C) Negative
D) Maximum
✅ **Correct Answer:** A

Q17. Potential energy depends on:
A) Mass and speed
B) Height and mass
C) Volume and area
D) Distance and velocity
✅ **Correct Answer:** B

Q18. Kinetic energy is directly proportional to:
A) Speed^2
B) Speed
C) Height

D) Displacement

✅ **Correct Answer:** A

Q19. Formula for work:

A) W = F + d

B) W = F/d

C) W = F × d

D) W = F × a

✅ **Correct Answer:** C

Q20. A body of mass 10 kg is raised 2 m. Work done is:

A) 100 J

B) 196 J

C) 200 J

D) 20 J

✅ **Correct Answer:** C

(Work = mgh = 10×9.8×2 = 196 J ≈ 200 J)

Q21. Power of doing 1 joule work in 1 second is:

A) 1 kW

B) 1 W

C) 1 J

D) 1 hp

✅ **Correct Answer:** B

Q22. The commercial unit of energy is:

A) Joule

B) Watt

C) kWh

D) Erg

✅ **Correct Answer:** C

Q23. 1 kWh =

A) 3600 J

B) 3.6×10^6 J

C) 1000 J

D) 10^6 J

✅ **Correct Answer:** B

Q24. A 100 W bulb burns for 10 hours. Energy consumed is:

A) 1 kWh

B) 0.5 kWh

C) 10 kWh

D) 2 kWh

✅ **Correct Answer:** A

(100W × 10h = 1000 Wh = 1 kWh)

Q25. A person does 200 J of work in 20 s. His power is:

A) 10 W

B) 20 W

C) 5 W

D) 2000 W

✅ **Correct Answer:** A

Q26. The law of conservation of energy states:

A) Energy can be created

B) Energy is lost in work

C) Energy cannot be created or destroyed

D) Energy becomes mass

✅ **Correct Answer:** C

Q27. SI unit of mechanical energy is:

A) Watt

B) Erg

C) Joule

D) Newton

✅ **Correct Answer:** C

Q28. Potential energy of a body at ground level is:

A) Maximum

B) Zero

C) Negative

D) Infinite

✅ **Correct Answer:** B

Q29. When kinetic energy doubles, velocity becomes:

A) Half

B) Double

C) $\sqrt{2}$ times

D) 4 times

✅ **Correct Answer:** C

Q30. The sum of kinetic and potential energy is:

A) Total energy

B) Thermal energy

C) Electrical energy

D) Mechanical energy

✅ **Correct Answer:** D

Q31. Energy possessed due to position is:

A) Electrical

B) Kinetic

C) Potential

D) Sound

✅ **Correct Answer:** C

Q32. A body of mass 2 kg moving with speed 3 m/s. Kinetic energy is:

A) 9 J

B) 6 J

C) 3 J

D) 12 J

✅ **Correct Answer:** B

(½mv² = ½×2×9 = 9 J)

Q33. Power × Time =

A) Energy

B) Work

C) Displacement

D) Both A and B

✅ **Correct Answer:** D

Q34. Work done against gravity is stored as:

A) Kinetic energy

B) Potential energy

C) Thermal energy

D) Mechanical energy

✅ **Correct Answer:** B

Q35. A machine that converts energy from one form to another is:

A) Generator

B) Transformer

C) Motor

D) Energy converter

✅ **Correct Answer:** D

Q36. Watt is equal to:

A) 1 J/s

B) 1 J

C) 1 W/s

D) 1 N/s

✅ **Correct Answer:** A

Q37. 1 Erg =

A) 10^{-3} J

B) 10^{-4} J

C) 10^{-7} J

D) 10^{-6} J

✅ **Correct Answer:** C

Q38. What is the work done when a force of 10 N moves an object by 2 m?

A) 10 J

B) 5 J

C) 20 J

D) 2 J

✅ **Correct Answer:** C

Q39. Power is measured using a:

A) Wattmeter

B) Ammeter

C) Voltmeter

D) Dynamometer

✅ **Correct Answer:** A

Q40. A weight lifter lifts 100 kg to a height of 2 m. Work done is:

A) 1000 J

B) 2000 J

C) 1960 J

D) 980 J

✅ **Correct Answer:** C

Q41. Kinetic energy depends on:

A) Mass only

B) Velocity only

C) Both mass and velocity

D) None

✅ **Correct Answer:** C

Q42. Negative work is done when:

A) Displacement is opposite to force

B) Displacement is same as force

C) Displacement is zero

D) Force is zero

✅ **Correct Answer:** A

Q43. The energy from fuel is:
A) Potential
B) Kinetic
C) Chemical
D) Thermal

✅ **Correct Answer:** C

Q44. Power of a machine depends on:
A) Work done
B) Time taken
C) Both A and B
D) Displacement

✅ **Correct Answer:** C

Q45. Efficiency is defined as:
A) (Output/Input) × 100
B) (Input/Output) × 100
C) Work × Time
D) Force × Distance

✅ **Correct Answer:** A

Q46. Work done is scalar or vector?
A) Scalar
B) Vector
C) Both
D) None

✅ **Correct Answer:** A

Q47. Mechanical energy is conserved in:
A) Frictionless system
B) Real-world system
C) Ideal gas
D) Liquid system

✅ **Correct Answer:** A

Q48. Energy stored in water at a height is:
A) Heat
B) Kinetic
C) Electrical

D) Potential

✅ **Correct Answer:** D

Q49. The product of force and velocity is:

A) Power

B) Work

C) Energy

D) Momentum

✅ **Correct Answer:** A

Q50. A powerful machine does:

A) Less work in more time

B) More work in less time

C) Equal work in equal time

D) Less work in less time

✅ **Correct Answer:** B

Q51. The work-energy theorem states:

A) Work = Power × Time

B) Work = Change in kinetic energy

C) Work = Force × Time

D) Work = Energy × Distance

✅ **Correct Answer:** B

Q52. Power is a _____ quantity.

A) Scalar

B) Vector

C) Pseudo vector

D) Complex

✅ **Correct Answer:** A

Q53. The work done by centripetal force is:

A) Zero

B) Positive

C) Negative

D) Infinite

✅ **Correct Answer:** A

Q54. What is the efficiency of a machine with 100 J input and 80 J output?

A) 20%

B) 100%

C) 80%

D) 50%

✅ **Correct Answer:** C

Q55. What does a kilowatt-hour measure?
A) Power
B) Current
C) Energy
D) Voltage

✅ **Correct Answer:** C

Q56. Which of the following has maximum kinetic energy?
A) A falling stone
B) A parked car
C) A stretched spring
D) Water at height

✅ **Correct Answer:** A

Q57. The angle between force and displacement is 60°, find work done if F = 10 N and d = 5 m.
A) 25 J
B) 50 J
C) 30 J
D) 20 J

✅ **Correct Answer:** C
(W = Fd cosθ = 10×5×cos60 = 25 J)

Q58. Which machine has 100% efficiency?
A) Real
B) Imaginary
C) Ideal
D) Electric

✅ **Correct Answer:** C

Q59. In which case is no work done?
A) Holding a bag stationary
B) Pulling a cart
C) Lifting a box
D) Pushing a car

✅ **Correct Answer:** A

Q60. Which one is not a unit of energy?
A) Joule
B) Calorie

C) Kilowatt
D) Erg
✅ **Correct Answer:** C

Q61. 1 calorie =
A) 4.18 J
B) 0.418 J
C) 41.8 J
D) 418 J
✅ **Correct Answer:** A

Q62. A boy does 120 J of work in 2 minutes. His power is:
A) 1 W
B) 2 W
C) 10 W
D) 1.5 W
✅ **Correct Answer:** A
(120 J / 120 s = 1 W)

Q63. Work done in lifting a 1 kg mass to a height of 10 m is:
A) 98 J
B) 100 J
C) 9.8 J
D) 10 J
✅ **Correct Answer:** A

Q64. A 50 W bulb glows for 2 hours. Energy consumed is:
A) 0.1 kWh
B) 0.5 kWh
C) 0.05 kWh
D) 1 kWh
✅ **Correct Answer:** B

Q65. One horsepower is equal to how many kilowatts?
A) 0.75 kW
B) 0.746 kW
C) 1 kW
D) 746 kW
✅ **Correct Answer:** B

Q66. When a spring is compressed, it gains:
A) Kinetic energy
B) Potential energy

C) Heat energy
D) No energy
✅ **Correct Answer:** B

Q67. What is the potential energy of a 2 kg body at a height of 3 m?
A) 58.8 J
B) 60 J
C) 6 J
D) 30 J
✅ **Correct Answer:** A
(PE = mgh = 2×9.8×3)

Q68. Rate of energy consumption is called:
A) Work
B) Power
C) Energy
D) Force
✅ **Correct Answer:** B

Q69. Which physical quantity equals work/time?
A) Velocity
B) Power
C) Acceleration
D) Energy
✅ **Correct Answer:** B

Q70. SI unit of potential energy is:
A) Watt
B) Joule
C) Newton
D) Ampere
✅ **Correct Answer:** B

Q71. If work is done at an angle θ, formula becomes:
A) W = Fd
B) W = Fd sinθ
C) W = Fd cosθ
D) W = Fd tanθ
✅ **Correct Answer:** C

Q72. Which is not a form of energy?
A) Magnetic
B) Gravitational

C) Displacement
D) Sound
✅ **Correct Answer:** C

Q73. Work done is measured in:
A) J/s
B) N/s
C) N-m
D) Watt
✅ **Correct Answer:** C

Q74. Which energy transformation takes place in a hydroelectric plant?
A) Kinetic to electrical
B) Potential to kinetic
C) Potential to electrical
D) All of the above
✅ **Correct Answer:** D

Q75. Power developed in lifting a 50 kg object to 10 m in 5 s is:
A) 500 W
B) 980 W
C) 1000 W
D) 9800 W
✅ **Correct Answer:** B
(P = mgh/t = 50×9.8×10 / 5 = 980 W)

Q76. Energy from Sun is:
A) Chemical
B) Light
C) Solar
D) Nuclear
✅ **Correct Answer:** D

Q77. The energy of an object due to its motion is called:
A) Potential energy
B) Electrical energy
C) Kinetic energy
D) Magnetic energy
✅ **Correct Answer:** C

Q78. What is the work done in moving a charge in an electric field?
A) Electrical energy
B) Magnetic work

C) Electrostatic work
D) Mechanical energy
✅ **Correct Answer:** A

Q79. Which form of energy is used in electric fan?
A) Heat
B) Sound
C) Electrical
D) Chemical
✅ **Correct Answer:** C

Q80. Which of these is a renewable energy source?
A) Coal
B) Oil
C) Solar
D) Petrol
✅ **Correct Answer:** C

Q81. If a body is lifted vertically up, work done depends on:
A) Mass only
B) Height only
C) Both mass and height
D) Volume
✅ **Correct Answer:** C

Q82. One joule is equal to:
A) 1 N × 1 cm
B) 1 N × 1 m
C) 1 N/m
D) 1 kg m^2/s
✅ **Correct Answer:** B

Q83. Work done is negative when:
A) Displacement is in direction of force
B) Displacement is opposite to force
C) Displacement is zero
D) Force is zero
✅ **Correct Answer:** B

Q84. Energy stored in food is:
A) Potential
B) Kinetic
C) Chemical

D) Thermal

✅ **Correct Answer:** C

Q85. Energy in motion is called:
A) Chemical
B) Electrical
C) Kinetic
D) Potential

✅ **Correct Answer:** C

Q86. In SI system, work is expressed in terms of:
A) kgf
B) erg
C) joule
D) dyne

✅ **Correct Answer:** C

Q87. A car is moving at constant velocity. What is the net work done by engine?
A) Positive
B) Zero
C) Negative
D) Variable

✅ **Correct Answer:** B

Q88. Gravitational potential energy is defined relative to:
A) Infinity
B) Surface
C) Ground level
D) Center of earth

✅ **Correct Answer:** C

Q89. Power is inversely proportional to:
A) Work
B) Energy
C) Time
D) Force

✅ **Correct Answer:** C

Q90. A moving object stops. Its kinetic energy:
A) Becomes infinite
B) Becomes zero
C) Becomes potential

D) Becomes force

✅ **Correct Answer:** B

Q91. Which is not an SI unit?

A) Watt

B) Joule

C) Erg

D) Newton

✅ **Correct Answer:** C

Q92. Mechanical energy is conserved in:

A) Inelastic collision

B) Elastic collision

C) All systems

D) Frictional system

✅ **Correct Answer:** B

Q93. A motor pumps 1000 liters of water to a height of 10 m. Mass = 1000 kg. Work done = ?

A) 10000 J

B) 98000 J

C) 9800 J

D) 1000 J

✅ **Correct Answer:** B

(mgh = 1000×9.8×10)

Q94. A 60 W bulb operates for 5 hours. Energy consumed = ?

A) 0.3 kWh

B) 3 kWh

C) 1.5 kWh

D) 0.03 kWh

✅ **Correct Answer:** A

Q95. Which device measures energy consumption?

A) Voltmeter

B) Ammeter

C) Wattmeter

D) Energy meter

✅ **Correct Answer:** D

Q96. A person carrying a bag on shoulder is doing:

A) Work

B) No work

C) Negative work

D) Mechanical work

✅ **Correct Answer:** B

Q97. Work done is maximum when angle between force and displacement is:

A) 0°

B) 90°

C) 45°

D) 180°

✅ **Correct Answer:** A

Q98. Watt × second =

A) Work

B) Force

C) Power

D) Momentum

✅ **Correct Answer:** A

Q99. Total mechanical energy is:

A) Sum of all forms of energy

B) Kinetic only

C) Potential only

D) Kinetic + Potential

✅ **Correct Answer:** D

Q100. Work done in uniform circular motion is:

A) Zero

B) Maximum

C) Minimum

D) Variable

✅ **Correct Answer:** A

Chapter 5: Simple Harmonic Motion and Acoustics

Q1. Which of the following is a characteristic of simple harmonic motion (SHM)?
A) Constant velocity
B) Acceleration is proportional to displacement and directed towards the mean position
C) Acceleration is constant
D) Displacement is always positive
✅ **Correct Answer: B**

Q2. The time period of a simple pendulum depends on:
A) Mass of the bob
B) Length of the pendulum
C) Amplitude
D) Material of the string
✅ **Correct Answer: B**

Q3. In SHM, the velocity is maximum at:
A) Extreme positions
B) Mean position
C) Midway between extreme and mean
D) None of the above
✅ **Correct Answer: B**

Q4. The graph of displacement vs time for SHM is:
A) Linear
B) Parabolic
C) Sine or Cosine wave
D) Exponential
✅ **Correct Answer: C**

Q5. Frequency is the:
A) Reciprocal of time period
B) Product of time period
C) Difference between amplitude and wavelength
D) Equal to the square of time period
✅ **Correct Answer: A**

Q6. The unit of angular frequency is:
A) Hz
B) rad/s
C) m/s
D) s
✅ **Correct Answer: B**

Q7. The total energy in SHM is:
A) Constant
B) Increases with time
C) Zero
D) Depends on the displacement
✅ **Correct Answer: A**

Q8. The displacement in SHM is given by:
A) $x = A \sin(\omega t + \phi)$
B) $x = A + \omega t$
C) x = A e^ωt
D) $x = A \tan(\omega t)$
✅ **Correct Answer: A**

Q9. The amplitude of SHM is the:
A) Maximum displacement from the mean position
B) Minimum velocity
C) Distance between two mean positions
D) Total distance covered in one cycle
✅ **Correct Answer: A**

Q10. A body executing SHM has a maximum acceleration of 2 m/s^2 and an amplitude of 0.1 m. Find the angular frequency.
A) 2 rad/s
B) √20 rad/s
C) 10 rad/s
D) 4.47 rad/s
✅ **Correct Answer: D**

Q11. In SHM, when displacement is maximum, acceleration is:
A) Zero
B) Maximum
C) Minimum
D) Equal to velocity
✅ **Correct Answer: B**

Q12. In SHM, when velocity is zero, displacement is:
A) Zero
B) Minimum
C) Maximum
D) Half of maximum
✅ **Correct Answer: C**

Q13. A pendulum oscillates 60 times in one minute. Its frequency is:
A) 1 Hz
B) 2 Hz
C) 60 Hz
D) 1.5 Hz
✅ **Correct Answer: A**

Q14. The SI unit of frequency is:
A) rad/s
B) Hz
C) m/s
D) N
✅ **Correct Answer: B**

Q15. The energy of a particle performing SHM is:
A) Always kinetic
B) Always potential
C) Alternates between kinetic and potential
D) Always zero
✅ **Correct Answer: C**

Q16. The phase difference between displacement and velocity in SHM is:
A) π
B) π/2
C) 0
D) π/4
✅ **Correct Answer: B**

Q17. What is the formula for the total energy in SHM?
A) $E = \frac{1}{2} m\omega^2 A^2$
B) $E = m\omega A^2$
C) $E = \frac{1}{2} mv^2$
D) $E = \frac{1}{2} kx^2$
✅ **Correct Answer: A**

Q18. A spring-mass system executes SHM with time period T. If the mass is doubled, the time period becomes:
A) T/2
B) T
C) $T\sqrt{2}$
D) 2T
✅ **Correct Answer: C**

Q19. A body completes 10 oscillations in 5 seconds. Its frequency is:
A) 0.5 Hz
B) 1 Hz
C) 2 Hz
D) 5 Hz
✅ **Correct Answer: C**

Q20. The maximum speed in SHM is given by:
A) $A\omega$
B) A/ω
C) $\omega^2 A$
D) $A^2\omega$
✅ **Correct Answer: A**

Q21. A pendulum bob is released from a certain height. It starts oscillating due to:
A) Friction
B) Electrostatic force
C) Gravitational force
D) Magnetic force
✅ **Correct Answer: C**

Q22. Which of the following is not a SHM?
A) Motion of pendulum
B) Vibration of tuning fork
C) Circular motion
D) Motion of spring-mass
✅ **Correct Answer: C**

Q23. The unit of amplitude is:
A) m/s
B) m
C) rad
D) Hz
✅ **Correct Answer: B**

Q24. Which quantity changes continuously in SHM?
A) Mass
B) Displacement
C) Angular velocity
D) Time
✅ **Correct Answer: B**

Q25. In SHM, potential energy is maximum at:
A) Mean position
B) Equilibrium
C) Extreme position
D) Everywhere
✅ **Correct Answer: C**

Q26. Acoustics is the study of:
A) Sound
B) Light
C) Heat
D) Motion
✅ **Correct Answer: A**

Q27. The speed of sound in air is approximately:
A) 300 m/s
B) 330 m/s
C) 280 m/s
D) 250 m/s
✅ **Correct Answer: B**

Q28. Which of the following is not required for sound propagation?
A) Medium
B) Source
C) Vibration
D) Light
✅ **Correct Answer: D**

Q29. Frequency range of human hearing is:
A) 2 Hz to 20 Hz
B) 20 Hz to 20,000 Hz
C) 20 kHz to 50 kHz
D) 1 Hz to 100 kHz
✅ **Correct Answer: B**

Q30. Sound travels fastest in:
A) Air
B) Water
C) Steel
D) Vacuum
✅ **Correct Answer: C**

Q31. Which quantity does not change in SHM?
A) Velocity
B) Displacement
C) Mass
D) Acceleration
✅ **Correct Answer: C**

Q32. Which part of the wave determines the pitch of a sound?
A) Amplitude
B) Frequency
C) Wavelength
D) Speed
✅ **Correct Answer: B**

Q33. What is the phase difference between acceleration and displacement in SHM?
A) 0
B) π/2
C) π
D) π/4
✅ **Correct Answer: C**

Q34. The SI unit of angular velocity is:
A) rad
B) rad/s
C) s^{-1}
D) m/s^2
✅ **Correct Answer: B**

Q35. SHM is a special case of:
A) Linear motion
B) Uniform motion
C) Periodic motion
D) Uniform circular motion
✅ **Correct Answer: C**

Q36. In SHM, the restoring force is directly proportional to:
A) Displacement
B) Velocity
C) Mass
D) Time
✅ **Correct Answer: A**

Q37. The wave which needs a medium for propagation is:
A) Sound wave
B) Light wave
C) X-ray
D) Radio wave
✅ **Correct Answer: A**

Q38. What is the formula for time period of a spring-mass system?
A) $T=2\pi\sqrt{m/k}$
B) $T=2\pi/\omega$
C) $T=\sqrt{k/m}$
D) $T=1/f$
✅ **Correct Answer: A**

Q39. In SHM, maximum kinetic energy occurs at:
A) Mean position
B) Extreme position
C) Halfway to amplitude
D) Nowhere
✅ **Correct Answer: A**

Q40. A body performing SHM completes one vibration in 0.2 s. What is the frequency?
A) 0.2 Hz
B) 5 Hz
C) 2 Hz
D) 10 Hz
✅ **Correct Answer: D**

Q41. The time taken to complete one oscillation is:
A) Frequency
B) Time period
C) Wavelength
D) Amplitude
✅ **Correct Answer: B**

Q42. The sound level is measured in:
A) Newtons
B) Joules
C) Hertz
D) Decibels
✅ **Correct Answer: D**

Q43. For a particle in SHM, at maximum displacement:
A) Speed is maximum
B) Acceleration is zero
C) Acceleration is maximum
D) Force is minimum
✅ **Correct Answer: C**

Q44. Which wave can travel in vacuum?
A) Sound wave
B) Light wave
C) Water wave
D) Shock wave
✅ **Correct Answer: B**

Q45. SHM is defined as motion under:
A) Constant force
B) Constant velocity
C) Restoring force proportional to displacement
D) Increasing force
✅ **Correct Answer: C**

Q46. Audible sound range for humans is:
A) 1 Hz – 10 Hz
B) 10 Hz – 10,000 Hz
C) 20 Hz – 20,000 Hz
D) 20 Hz – 200,000 Hz
✅ **Correct Answer: C**

Q47. The total mechanical energy in SHM remains:
A) Increasing
B) Decreasing
C) Constant
D) Zero
✅ **Correct Answer: C**

Q48. In SHM, acceleration is maximum when:
A) Displacement is zero
B) Velocity is maximum
C) Displacement is maximum
D) Energy is zero
✅ **Correct Answer: C**

Q49. Speed of sound in vacuum is:
A) 330 m/s
B) 1500 m/s
C) Zero
D) Infinite
✅ **Correct Answer: C**

Q50. Which of the following is not an example of SHM?
A) Tuning fork vibration
B) Spring oscillation
C) Moon's revolution
D) Pendulum swing
✅ **Correct Answer: C**

Q51. The maximum displacement in SHM is called:
A) Velocity
B) Acceleration
C) Amplitude
D) Frequency
✅ **Correct Answer: C**

Q52. The relation between frequency and time period is:
A) $f=1/T$
B) $f=T$
C) $f=2T$
D) $f=T^2$
✅ **Correct Answer: A**

Q53. Which of the following quantities changes continuously during SHM?
A) Mass
B) Time period
C) Displacement
D) Frequency
✅ **Correct Answer: C**

Q54. The equation of SHM is:
A) $F=-kx$ or $a=-\omega^2 x$
B) $F=kx$
C) $a = x^2$
D) $F = ma^2$
✅ **Correct Answer: A**

Q55. Sound travels fastest in:
A) Air
B) Water
C) Vacuum
D) Steel
✅ **Correct Answer: D**

Q56. The SI unit of frequency is:
A) Seconds
B) Radian
C) Hertz
D) Watt
✅ **Correct Answer: C**

Q57. In SHM, velocity is maximum at:
A) Amplitude
B) Equilibrium
C) Maximum displacement
D) Zero point
✅ **Correct Answer: B**

Q58. What is the angular frequency ω\omegaω in terms of time period TTT?
A) ω=2πT
B) ω=2π/T
C) ω=T/2π
D) ω=T^2
✅ **Correct Answer: B**

Q59. Speed of sound in dry air at room temperature is about:
A) 300 m/s
B) 340 m/s
C) 400 m/s
D) 500 m/s
✅ **Correct Answer: B**

Q60. What determines the loudness of a sound?
A) Wavelength
B) Frequency
C) Amplitude
D) Speed
✅ **Correct Answer: C**

Q61. Damped harmonic motion occurs when:
A) Restoring force increases
B) Energy is added
C) Friction or resistance is present
D) No external force is present
✅ **Correct Answer: C**

Q62. The motion of a pendulum is:
A) Linear motion
B) Uniform motion
C) Circular motion
D) Simple harmonic motion (for small angles)
✅ **Correct Answer: D**

Q63. If amplitude is doubled, total energy becomes:
A) 2 times
B) 4 times
C) Half
D) Same
✅ **Correct Answer: B**

Q64. What is the formula for frequency of SHM?
A) f=1/T
B) f=T
C) f=T^2
D) f=ω^2
✅ **Correct Answer: A**

Q65. Acoustics is the study of:
A) Heat
B) Light
C) Sound
D) Motion
✅ **Correct Answer: C**

Q66. What happens to frequency when wavelength increases (in constant speed medium)?
A) Increases
B) Decreases
C) No change
D) Doubles
✅ **Correct Answer: B**

Q67. In a sound wave, which quantity represents loudness?
A) Wavelength
B) Amplitude
C) Frequency
D) Velocity
✅ **Correct Answer: B**

Q68. The condition for resonance in an air column is:
A) Wavelength = column length
B) Air pressure is zero
C) Natural frequency = applied frequency
D) Speed = 0
✅ **Correct Answer: C**

Q69. The distance between two successive compressions is:
A) Frequency
B) Time period
C) Amplitude
D) Wavelength
✅ **Correct Answer: D**

Q70. Which of the following is an example of transverse wave?
A) Sound wave
B) Light wave
C) Earthquake (P-wave)
D) Spring wave
✅ **Correct Answer: B**

Q71. SHM has restoring force that is:
A) Constant
B) Zero
C) Proportional to displacement
D) Proportional to velocity
✅ **Correct Answer: C**

Q72. One complete wave cycle corresponds to:
A) One crest
B) One trough
C) One wavelength
D) One node
✅ **Correct Answer: C**

Q73. In SHM, the graph between acceleration and displacement is:
A) Parabola
B) Circle
C) Straight line
D) Hyperbola
✅ **Correct Answer: C**

Q74. Beats are produced due to:
A) Difference in amplitude
B) Difference in speed
C) Interference of two waves of slightly different frequencies
D) Change in phase
✅ **Correct Answer: C**

Q75. Number of beats per second is equal to:
A) Sum of frequencies
B) Difference of frequencies
C) Product of frequencies
D) Average of frequencies
✅ **Correct Answer: B**

Q101. The total mechanical energy in SHM is:
A) Constant
B) Zero
C) Increases
D) Decreases
✅ **Correct Answer: A**

Q102. The unit of angular frequency is:
A) m/s
B) Hz
C) rad/s
D) N
✅ **Correct Answer: C**

Q103. When a sound wave travels in air, the physical quantity which is transmitted is:
A) Molecules
B) Energy
C) Air particles
D) Electric current
✅ **Correct Answer: B**

Q104. Sound cannot travel in:
A) Water
B) Air
C) Steel
D) Vacuum
✅ **Correct Answer: D**

Q105. The relation between displacement (x) and acceleration (a) in SHM is:
A) $a \propto x$
B) $a \propto -x$
C) $a=0$
D) $a \propto x^2$
✅ **Correct Answer: B**

Q106. The number of oscillations per unit time is called:
A) Amplitude
B) Frequency
C) Time period
D) Displacement
✅ **Correct Answer: B**

Q107. What determines the pitch of a sound?
A) Amplitude
B) Speed
C) Frequency
D) Loudness
✅ **Correct Answer: C**

Q108. Time period of a simple pendulum depends on:
A) Mass
B) Amplitude
C) Length
D) Initial velocity
✅ **Correct Answer: C**

Q109. In SHM, velocity is zero when:
A) At equilibrium
B) At mean position
C) At amplitude
D) Never
✅ **Correct Answer: C**

Q110. Which of the following affects speed of sound in air?
A) Humidity
B) Frequency
C) Loudness
D) Wavelength
✅ **Correct Answer: A**

Q111. Which is a longitudinal wave?
A) Light
B) Water wave
C) Sound
D) X-rays
✅ **Correct Answer: C**

Q112. When two waves superimpose, they undergo:
A) Reflection
B) Refraction
C) Interference
D) Dispersion
✅ **Correct Answer: C**

Q113. SI unit of amplitude is:
A) Hertz
B) Meter
C) Second
D) Pascal
✅ **Correct Answer: B**

Q114. In resonance, the amplitude of vibration:
A) Decreases
B) Becomes zero
C) Remains same
D) Becomes maximum
✅ **Correct Answer: D**

Q115. In SHM, acceleration is:
A) Constant
B) Zero
C) Proportional to displacement and directed opposite to it
D) Independent of displacement
✅ **Correct Answer: C**

Q116. A wave with frequency 50 Hz and wavelength 2 m has speed:
A) 100 m/s
B) 25 m/s
C) 50 m/s
D) 2 m/s
✅ **Correct Answer: A**

Q117. If frequency of tuning fork increases, the pitch:
A) Increases
B) Decreases
C) Remains same
D) Becomes inaudible
✅ **Correct Answer: A**

Q118. SI unit of wave number is:
A) m
B) m^2
C) m^{-1}
D) rad
✅ **Correct Answer: C**

Q119. The total energy of SHM is proportional to:
A) Amplitude
B) $Amplitude^2$
C) $Amplitude^3$
D) Frequency
✅ **Correct Answer: B**

Q120. A sound wave with high amplitude is:
A) Soft
B) Loud
C) High pitch
D) Low frequency
✅ **Correct Answer: B**

Q121. Frequency range of human hearing is:
A) 10 Hz to 10 kHz
B) 20 Hz to 20,000 Hz
C) 50 Hz to 1,000 Hz
D) 100 Hz to 100,000 Hz
✅ **Correct Answer: B**

Q122. For a simple pendulum, time period is independent of:
A) Length
B) Gravity
C) Mass
D) Amplitude (for small angles)
✅ **Correct Answer: C**

Q123. In SHM, at extreme positions:
A) Velocity is maximum
B) Acceleration is zero
C) Kinetic energy is maximum
D) Potential energy is maximum
✅ **Correct Answer: D**

Q124. In wave motion, the particle of the medium:
A) Moves with wave
B) Remains stationary
C) Oscillates about mean position
D) Moves in circular path
✅ **Correct Answer: C**

Q125. Speed of sound in vacuum is:
A) 0 m/s
B) 340 m/s
C) 1000 m/s
D) Infinite
✅ **Correct Answer: A**

Q126. Beats are used to measure:
A) Loudness
B) Frequency difference
C) Velocity
D) Time
✅ **Correct Answer: B**

Q127. The main condition for SHM is:
A) Constant speed
B) Proportional restoring force
C) Non-linear motion
D) Constant acceleration
✅ **Correct Answer: B**

Q128. The distance between two successive nodes is:
A) λ
B) λ/2
C) λ/4
D) 2λ
✅ **Correct Answer: B**

Q129. Unit of sound intensity:
A) dB
B) Hz
C) m/s
D) rad/s
✅ **Correct Answer: A**

Q130. Sound waves are:
A) Transverse
B) Longitudinal
C) Stationary
D) Circular
✅ **Correct Answer: B**

Q131. Quality of sound is determined by:
A) Amplitude
B) Frequency
C) Waveform
D) Speed
✅ **Correct Answer: C**

Q132. In echo, sound is:
A) Absorbed
B) Transmitted
C) Reflected
D) Refracted
✅ **Correct Answer: C**

Q133. SHM is a type of:
A) Random motion
B) Periodic motion
C) Rotational motion
D) Brownian motion
✅ **Correct Answer: B**

Q134. The unit of time period is:
A) Hertz
B) Second
C) Meter
D) m/s
✅ **Correct Answer: B**

Q135. Ultrasonic waves have frequency:
A) < 20 Hz
B) > 20,000 Hz
C) 1–100 Hz
D) 50 Hz
✅ **Correct Answer: B**

Q136. A tuning fork produces:
A) Transverse waves
B) Longitudinal waves
C) Mechanical waves
D) None
✅ **Correct Answer: C**

Q137. Node is a point of:
A) Maximum vibration
B) No vibration
C) Minimum vibration
D) Constant amplitude
✅ **Correct Answer: B**

Q138. Time period of SHM depends on:
A) Mass only
B) Amplitude only
C) System's parameters
D) Initial velocity
✅ **Correct Answer: C**

Q139. The restoring force is maximum at:
A) Mean position
B) Zero displacement
C) Maximum displacement
D) Half amplitude
✅ **Correct Answer: C**

Q140. The frequency of sound wave depends on:
A) Source
B) Medium
C) Distance
D) Intensity
✅ **Correct Answer: A**

Q141. Which one of the following is NOT a property of SHM?
A) Acceleration ∝ displacement
B) Motion is periodic
C) Restoring force is constant
D) Energy is conserved
✅ **Correct Answer: C**

Q142. SHM can be represented as:
A) Linear motion
B) Random motion
C) Projection of uniform circular motion
D) Brownian motion
✅ **Correct Answer: C**

Q143. In SHM, maximum kinetic energy is at:
A) Amplitude
B) Equilibrium
C) Half path
D) Node
✅ **Correct Answer: B**

Q144. SI unit of loudness:
A) Decibel
B) Watt
C) Meter
D) Joule
✅ **Correct Answer: A**

Q145. The velocity of particle in SHM is zero at:
A) Equilibrium
B) Amplitude
C) Node
D) Center
✅ **Correct Answer: B**

Q146. When sound enters from air to water:
A) Speed increases
B) Speed decreases
C) Frequency changes
D) Pitch decreases
✅ **Correct Answer: A**

Q147. In SHM, potential energy is maximum at:
A) Mean position
B) Amplitude
C) Equilibrium
D) Zero displacement
✅ **Correct Answer: B**

Q148. Loudness depends on:
A) Frequency
B) Intensity
C) Wavelength
D) Speed
✅ **Correct Answer: B**

Q149. Wavelength is measured in:
A) Seconds
B) Hertz
C) Meters
D) Degrees
✅ **Correct Answer: C**

Q150. Speed = frequency × ____
A) Amplitude
B) Displacement
C) Wavelength
D) Velocity
✅ **Correct Answer: C**

Chapter 6: Heat and Thermodynamics

Q1. Which of the following is a unit of heat?

- A) Joule
- B) Watt
- C) Newton
- D) Pascal

✅ **Correct Answer:** A) Joule

Q2. The specific heat of a substance is defined as:

- A) Heat required to raise temperature of 1 gram of substance by 1°C
- B) Heat required to melt 1 gram of substance
- C) Heat required to boil 1 gram of substance
- D) Heat emitted during chemical reaction

✅ **Correct Answer:** A) Heat required to raise temperature of 1 gram of substance by 1°C

Q3. The SI unit of thermal conductivity is:

- A) W/m·K
- B) J/kg·K
- C) N/m^2
- D) K/m

✅ **Correct Answer:** A) W/m·K

Q4. In heat transfer, conduction occurs in:

- A) Solids only
- B) Liquids only
- C) Gases only
- D) Vacuum

✅ **Correct Answer:** A) Solids only

Q5. The amount of heat required to raise the temperature of a body depends on:

- A) Mass
- B) Specific heat
- C) Temperature difference
- D) All of the above

  ✅ **Correct Answer:** D) All of the above

Q6. One calorie is equal to:

- A) 4.186 joules
- B) 1 joule
- C) 10 joules
- D) 0.5 joules

  ✅ **Correct Answer:** A) 4.186 joules

Q7. Which law states that "heat added to a system is equal to the increase in internal energy plus work done"?

- A) First law of thermodynamics
- B) Second law of thermodynamics
- C) Zeroth law of thermodynamics
- D) Law of conservation of mass

  ✅ **Correct Answer:** A) First law of thermodynamics

Q8. The process in which no heat is exchanged with surroundings is called:

- A) Isothermal
- B) Adiabatic
- C) Isochoric
- D) Isobaric

  ✅ **Correct Answer:** B) Adiabatic

Q9. Temperature is a measure of:

- A) Heat
- B) Internal energy

- C) Average kinetic energy of molecules
- D) Total kinetic energy of molecules

✅ **Correct Answer:** C) Average kinetic energy of molecules

Q10. Heat transfer through fluids occurs mainly by:

- A) Convection
- B) Conduction
- C) Radiation
- D) Diffusion

✅ **Correct Answer:** A) Convection

Q11. The zeroth law of thermodynamics deals with:

- A) Conservation of energy
- B) Entropy
- C) Thermal equilibrium
- D) Heat engines

✅ **Correct Answer:** C) Thermal equilibrium

Q12. The instrument used to measure temperature is:

- A) Thermometer
- B) Barometer
- C) Calorimeter
- D) Manometer

✅ **Correct Answer:** A) Thermometer

Q13. In an isothermal process:

- A) Temperature changes
- B) Pressure remains constant
- C) Volume remains constant
- D) Temperature remains constant

✅ **Correct Answer:** D) Temperature remains constant

Q14. In which mode of heat transfer is a medium not required?

- A) Conduction
- B) Convection
- C) Radiation
- D) All require medium

✅ **Correct Answer:** C) Radiation

Q15. Unit of entropy in SI system is:

- A) J/kg·K
- B) J/K
- C) W/K
- D) Cal/K

✅ **Correct Answer:** B) J/K

Q16. In a heat engine, the efficiency increases if:

- A) Sink temperature increases
- B) Source temperature decreases
- C) Sink temperature decreases
- D) Work done decreases

✅ **Correct Answer:** C) Sink temperature decreases

Q17. The amount of heat required to convert unit mass of a substance from solid to liquid at constant temperature is:

- A) Latent heat of fusion
- B) Latent heat of vaporization
- C) Specific heat
- D) Sensible heat

✅ **Correct Answer:** A) Latent heat of fusion

Q18. Which gas law relates pressure and temperature?

- A) Boyle's law

- B) Charles’s law
- C) Gay-Lussac’s law
- D) Avogadro’s law

✅ **Correct Answer:** C) Gay-Lussac’s law

Q19. The equation PV = nRT is known as:

- A) Ideal gas law
- B) Van der Waals equation
- C) Dalton’s law
- D) Boyle’s law

✅ **Correct Answer:** A) Ideal gas law

Q20. Absolute zero temperature is:

- A) -100°C
- B) 0°C
- C) -273.15°C
- D) -459°F

✅ **Correct Answer:** C) -273.15°C

Q21. SI unit of temperature is:

- A) Degree Celsius
- B) Fahrenheit
- C) Kelvin
- D) Centigrade

✅ **Correct Answer:** C) Kelvin

Q22. Which one of the following does not affect the rate of conduction?

- A) Material of the conductor
- B) Thickness
- C) Temperature difference

- D) Color of surface

✅ **Correct Answer:** D) Color of surface

Q23. The heat energy transferred per unit time through unit area per unit temperature gradient is called:

- A) Thermal resistance
- B) Thermal conductivity
- C) Heat capacity
- D) Calorific value

✅ **Correct Answer:** B) Thermal conductivity

Q24. Which of the following is a poor conductor of heat?

- A) Copper
- B) Silver
- C) Wood
- D) Aluminum

✅ **Correct Answer:** C) Wood

Q25. Heat capacity is defined as:

- A) Heat required to raise temperature by 1°C
- B) Heat required to melt 1 gram of solid
- C) Ratio of pressure to temperature
- D) Heat needed to boil water

✅ **Correct Answer:** A) Heat required to raise temperature by 1°C

Q26. Which of the following laws is NOT related to thermodynamics?

- A) Joule's Law
- B) Newton's Law
- C) Zeroth Law
- D) Second Law

✅ **Correct Answer:** B) Newton's Law

Q27. Efficiency of Carnot engine depends on:

- A) Nature of working substance
- B) Temperature of source and sink
- C) Pressure
- D) Specific heat

✅ **Correct Answer:** B) Temperature of source and sink

Q28. In isobaric process:

- A) Pressure remains constant
- B) Volume remains constant
- C) Temperature remains constant
- D) All change

✅ **Correct Answer:** A) Pressure remains constant

Q29. Calorimeter works on the principle of:

- A) Law of conservation of mass
- B) Law of conservation of momentum
- C) Law of conservation of energy
- D) First law of motion

✅ **Correct Answer:** C) Law of conservation of energy

Q30. Which of the following is NOT a thermodynamic process?

- A) Isothermal
- B) Isobaric
- C) Isochoric
- D) Isomagnetic

✅ **Correct Answer:** D) Isomagnetic

Q51. A perfect black body is a good:

- A) Reflector
- B) Refractor

- C) Absorber
- D) Conductor

✅ **Correct Answer:** C) Absorber

Q52. Specific heat of water is maximum at:

- A) 0°C
- B) 4°C
- C) 10°C
- D) 100°C

✅ **Correct Answer:** B) 4°C

Q53. The SI unit of heat is:

- A) Calorie
- B) Joule
- C) Erg
- D) Watt

✅ **Correct Answer:** B) Joule

Q54. When gas expands adiabatically:

- A) Temperature rises
- B) Temperature remains constant
- C) Temperature falls
- D) Volume decreases

✅ **Correct Answer:** C) Temperature falls

Q55. Which of the following processes has maximum efficiency?

- A) Real heat engine
- B) Carnot cycle
- C) Otto cycle
- D) Diesel cycle

✅ **Correct Answer:** B) Carnot cycle

Q56. Heat energy is transferred in liquids and gases mainly by:

- A) Conduction
- B) Convection
- C) Radiation
- D) Both A and B

✅ **Correct Answer:** B) Convection

Q57. Which one is a state function?

- A) Work
- B) Heat
- C) Internal energy
- D) None

✅ **Correct Answer:** C) Internal energy

Q58. The area under a PV graph represents:

- A) Heat
- B) Temperature
- C) Work done
- D) Pressure

✅ **Correct Answer:** C) Work done

Q59. In which process does the internal energy of an ideal gas not change?

- A) Adiabatic
- B) Isochoric
- C) Isobaric
- D) Isothermal

✅ **Correct Answer:** D) Isothermal

Q60. For an adiabatic process:

- A) Q = 0
- B) W = 0

- C) ΔU = 0
- D) T = 0

✅ **Correct Answer:** A) Q = 0

Q61. The value of γ (gamma) = Cp/Cv for a monoatomic gas is:

- A) 1.33
- B) 1.66
- C) 1.5
- D) 1.2

✅ **Correct Answer:** B) 1.66

Q62. One calorie is equal to:

- A) 2.1 J
- B) 4.2 J
- C) 5.2 J
- D) 10 J

✅ **Correct Answer:** B) 4.2 J

Q63. The first law of thermodynamics is a restatement of:

- A) Conservation of momentum
- B) Conservation of energy
- C) Conservation of mass
- D) None

✅ **Correct Answer:** B) Conservation of energy

Q64. Which law states that heat cannot flow from colder body to hotter body without external work?

- A) First law
- B) Second law
- C) Zeroth law

- D) Third law

✅ **Correct Answer:** B) Second law

Q65. The thermal conductivity of a perfect insulator is:

- A) Zero
- B) One
- C) Infinite
- D) Very high

✅ **Correct Answer:** A) Zero

Q66. Which mode of heat transfer is dominant in solids?

- A) Conduction
- B) Convection
- C) Radiation
- D) None

✅ **Correct Answer:** A) Conduction

Q67. Thermal expansion is due to:

- A) Decrease in pressure
- B) Increase in internal energy
- C) Decrease in volume
- D) Chemical reaction

✅ **Correct Answer:** B) Increase in internal energy

Q68. The gas constant R has units of:

- A) J/mol·K
- B) J/mol
- C) J/K
- D) J/kg

✅ **Correct Answer:** A) J/mol·K

Q69. Cp - Cv = R holds true for:

- A) Liquids
- B) Solids
- C) Ideal gases
- D) All of these

✅ **Correct Answer:** C) Ideal gases

Q70. If heat is added to a system, internal energy increases and:

- A) Work done is negative
- B) Work is done by the system
- C) System loses energy
- D) Temperature decreases

✅ **Correct Answer:** B) Work is done by the system

Q71. When a body radiates heat without increase in temperature, the process is:

- A) Endothermic
- B) Adiabatic
- C) Isothermal
- D) Radiative cooling

✅ **Correct Answer:** D) Radiative cooling

Q72. For Carnot engine, efficiency depends on:

- A) Pressure
- B) Source & sink temperature
- C) Volume
- D) Heat capacity

✅ **Correct Answer:** B) Source & sink temperature

Q73. A system in thermal equilibrium must have:

- A) Same volume
- B) Same pressure
- C) Same temperature

- D) Same mass

✅ **Correct Answer:** C) Same temperature

Q74. Which law is used in calorimetry?

- A) Newton's law
- B) Boyle's law
- C) Conservation of energy
- D) Gay-Lussac's law

✅ **Correct Answer:** C) Conservation of energy

Q75. When ice melts at 0°C, temperature:

- A) Increases
- B) Remains constant
- C) Decreases
- D) Doubles

✅ **Correct Answer:** B) Remains constant

Q101. Which of the following is a thermodynamic process?

- A) Isobaric
- B) Isochoric
- C) Isothermal
- D) All of these

✅ **Correct Answer:** D) All of these

Q102. If no heat is exchanged with surroundings, the process is:

- A) Isothermal
- B) Isobaric
- C) Adiabatic
- D) Isometric

✅ **Correct Answer:** C) Adiabatic

Q103. The SI unit of temperature is:

- A) Celsius
- B) Fahrenheit
- C) Kelvin
- D) Rankine

✅ **Correct Answer:** C) Kelvin

Q104. Heat transfer through vacuum takes place by:

- A) Conduction
- B) Convection
- C) Radiation
- D) None

✅ **Correct Answer:** C) Radiation

Q105. Which of the following expands the most for the same rise in temperature?

- A) Solids
- B) Liquids
- C) Gases
- D) All expand equally

✅ **Correct Answer:** C) Gases

Q106. On which factor does thermal conductivity depend?

- A) Nature of material
- B) Area of cross section
- C) Thickness
- D) All of these

✅ **Correct Answer:** D) All of these

Q107. The latent heat of fusion of ice is:

- A) 336 J/kg
- B) 336 kJ/kg
- C) 4.2 kJ/kg

- D) 420 J/kg

✅ **Correct Answer:** B) 336 kJ/kg

Q108. Efficiency of Carnot engine is always:

- A) 0%
- B) 100%
- C) Less than 100%
- D) Greater than 100%

✅ **Correct Answer:** C) Less than 100%

Q109. For an ideal gas undergoing an isothermal process:

- A) $\Delta U = 0$
- B) $W = 0$
- C) $Q = 0$
- D) $T = 0$

✅ **Correct Answer:** A) $\Delta U = 0$

Q110. The Zeroth law of thermodynamics defines:

- A) Energy conservation
- B) Entropy
- C) Temperature
- D) Pressure

✅ **Correct Answer:** C) Temperature

Q111. Which gas has the highest value of Cp?

- A) Hydrogen
- B) Oxygen
- C) Helium
- D) Water vapour

✅ **Correct Answer:** D) Water vapour

Q112. Change in internal energy for a cyclic process is:

- A) Positive
- B) Negative
- C) Zero
- D) Infinite

✅ **Correct Answer:** C) Zero

Q113. Which is the correct equation for specific heat?

- A) $Q = mc^2$
- B) $Q = mgh$
- C) $Q = mc\Delta T$
- D) $Q = Pt$

✅ **Correct Answer:** C) $Q = mc\Delta T$

Q114. Which of the following is the best conductor of heat?

- A) Silver
- B) Wood
- C) Glass
- D) Rubber

✅ **Correct Answer:** A) Silver

Q115. Boyle's Law applies to:

- A) Constant temperature
- B) Constant pressure
- C) Constant volume
- D) Constant energy

✅ **Correct Answer:** A) Constant temperature

Q116. An ideal gas obeys:

- A) $PV = nRT$
- B) $PV = \text{constant}$
- C) $V = \text{constant}$

- D) T = constant

  ✅ **Correct Answer:** A) PV = nRT

Q117. The melting point of ice on Kelvin scale is:

- A) 0 K
- B) 100 K
- C) 273 K
- D) 373 K

  ✅ **Correct Answer:** C) 273 K

Q118. Radiation travels at the speed of:

- A) Sound
- B) Water
- C) Light
- D) Air

  ✅ **Correct Answer:** C) Light

Q119. One mole of gas at STP occupies:

- A) 22.4 L
- B) 1 L
- C) 10 L
- D) 0.224 L

  ✅ **Correct Answer:** A) 22.4 L

Q120. The pressure of a gas is directly proportional to:

- A) Volume
- B) Temperature
- C) Density
- D) Mass

  ✅ **Correct Answer:** B) Temperature

Q121. When work is done by the system, it is taken as:

- A) Positive
- B) Negative
- C) Zero
- D) None

✅ **Correct Answer:** A) Positive

Q122. Which surface is best for absorption of heat radiation?

- A) White and polished
- B) Black and rough
- C) Silver and smooth
- D) Transparent glass

✅ **Correct Answer:** B) Black and rough

Q123. Which of the following is the coldest?

- A) 0°C
- B) 32°F
- C) 273 K
- D) -1°C

✅ **Correct Answer:** D) -1°C

Q124. The value of universal gas constant R in J/mol·K is:

- A) 6.63
- B) 8.31
- C) 9.8
- D) 1.38

✅ **Correct Answer:** B) 8.31

Q125. The degree of hotness is measured by:

- A) Heat
- B) Energy
- C) Temperature

- D) Power

✅ **Correct Answer:** C) Temperature

Q126. Heat required to raise the temperature of a body by 1°C is:

- A) Specific heat
- B) Calorific value
- C) Thermal capacity
- D) Latent heat

✅ **Correct Answer:** C) Thermal capacity

Q127. The change in temperature during latent heat exchange is:

- A) Maximum
- B) Minimum
- C) Constant
- D) Variable

✅ **Correct Answer:** C) Constant

Q128. If two bodies are in thermal equilibrium with a third body, then they are in thermal equilibrium with each other. This is:

- A) First law
- B) Second law
- C) Zeroth law
- D) Third law

✅ **Correct Answer:** C) Zeroth law

Q129. The temperature at which both Celsius and Fahrenheit scales read the same is:

- A) 0°
- B) -273°
- C) -40°
- D) 100°

✅ **Correct Answer:** C) -40°

Q130. The triple point of water is:

- A) 0°C
- B) 100°C
- C) 273.16 K
- D) 373 K

✅ **Correct Answer:** C) 273.16 K

Q131. Work done in isochoric process is:

- A) Maximum
- B) Zero
- C) Infinite
- D) Positive

✅ **Correct Answer:** B) Zero

Q132. The heat required to convert unit mass of liquid into vapor at constant temperature is:

- A) Specific heat
- B) Latent heat of vaporization
- C) Latent heat of fusion
- D) Thermal capacity

✅ **Correct Answer:** B) Latent heat of vaporization

Q133. Unit of coefficient of linear expansion is:

- A) °C
- B) m/°C
- C) K^{-1}
- D) J/K

✅ **Correct Answer:** C) K^{-1}

Q134. The internal energy of an ideal gas depends only on:

- A) Pressure

- B) Volume
- C) Temperature
- D) Mass

✅ **Correct Answer:** C) Temperature

Q135. Gas laws are applicable for:

- A) High pressure
- B) Low temperature
- C) Ideal gases
- D) Liquids

✅ **Correct Answer:** C) Ideal gases

Q136. Thermodynamics deals with:

- A) Chemical energy
- B) Mechanical energy
- C) Heat and its transformation
- D) None

✅ **Correct Answer:** C) Heat and its transformation

Q137. The lowest temperature that can be reached theoretically is:

- A) 0°F
- B) -273°C
- C) -100°C
- D) -1000°C

✅ **Correct Answer:** B) -273°C

Q138. Latent heat of vaporization is always:

- A) More than latent heat of fusion
- B) Less than latent heat of fusion
- C) Equal to latent heat of fusion

- D) Zero

✅ **Correct Answer:** A) More than latent heat of fusion

Q139. Thermal expansion of a solid is due to:

- A) Free electrons
- B) Vibration of atoms
- C) Conduction
- D) Pressure

✅ **Correct Answer:** B) Vibration of atoms

Q140. In which process temperature remains constant?

- A) Isobaric
- B) Isothermal
- C) Isochoric
- D) Adiabatic

✅ **Correct Answer:** B) Isothermal

Q141. What is the mode of transfer of heat from Sun to Earth?

- A) Conduction
- B) Convection
- C) Radiation
- D) Both A and B

✅ **Correct Answer:** C) Radiation

Q142. Temperature of boiling water under normal atmospheric pressure is:

- A) 50°C
- B) 100°C
- C) 212°C
- D) 150°C

✅ **Correct Answer:** B) 100°C

Q143. Expansion of gases is maximum in:

- A) Solids
- B) Liquids
- C) Gases
- D) All same

✅ **Correct Answer:** C) Gases

Q144. A hot body emits radiation at a rate proportional to:

- A) T
- B) T^2
- C) T^3
- D) T^4

✅ **Correct Answer:** D) T^4 (Stefan-Boltzmann law)

Q145. Which gas law relates pressure and temperature?

- A) Boyle's law
- B) Charles's law
- C) Gay-Lussac's law
- D) Avogadro's law

✅ **Correct Answer:** C) Gay-Lussac's law

Q146. The heat content of a system is called:

- A) Work
- B) Internal energy
- C) Enthalpy
- D) Entropy

✅ **Correct Answer:** C) Enthalpy

Q147. Which is not a path function?

- A) Work
- B) Heat
- C) Internal energy

- D) Both A and B

✅ **Correct Answer:** C) Internal energy

Q148. Entropy is a measure of:

- A) Energy
- B) Randomness
- C) Temperature
- D) Pressure

✅ **Correct Answer:** B) Randomness

Q149. For a given mass of gas at constant volume, pressure is directly proportional to:

- A) Density
- B) Temperature
- C) Molar mass
- D) Volume

✅ **Correct Answer:** B) Temperature

Q150. In SI system, the unit of entropy is:

- A) J/K
- B) J·s
- C) N·m
- D) J/mol

✅ **Correct Answer:** A) J/K

Chapter 7: Modern Physics

Q1. Who proposed the quantum theory?
A) Bohr
B) Einstein
C) Planck
D) Rutherford
✅ **Correct Answer: C**

Q2. The energy of a photon is directly proportional to:
A) Frequency
B) Wavelength
C) Amplitude
D) Speed
✅ **Correct Answer: A**

Q3. What is the unit of Planck's constant?
A) Js
B) Nm
C) eV
D) $kg \cdot m^2/s$
✅ **Correct Answer: A**

Q4. The photoelectric effect supports the:
A) Wave nature of light
B) Particle nature of light
C) Reflection of light
D) Refraction of light
✅ **Correct Answer: B**

Q5. Which of the following phenomena can be explained by the quantum theory?
A) Reflection
B) Photoelectric effect
C) Refraction
D) Diffraction
✅ **Correct Answer: B**

Q6. Which device is used to detect radiation?
A) Spectrometer
B) Thermometer
C) Geiger-Müller Counter
D) Barometer
✅ **Correct Answer: C**

Q7. The mass-energy equivalence principle is given by:
A) $E = mc^2$
B) $E = hf$
C) $F = ma$
D) $V = IR$
✅ **Correct Answer: A**

Q8. The wavelength of X-rays is:
A) Longer than UV rays
B) Shorter than gamma rays
C) Longer than radio waves
D) Shorter than UV rays
✅ **Correct Answer: D**

Q9. The maximum number of electrons in the K-shell is:
A) 2
B) 8
C) 18
D) 32
✅ **Correct Answer: A**

Q10. Radioactive decay is a:
A) Physical change
B) Reversible reaction
C) Nuclear phenomenon
D) Chemical reaction
✅ **Correct Answer: C**

Q11. The half-life of a radioactive substance is the time in which:
A) All nuclei decay
B) Mass reduces to zero
C) Half of the radioactive nuclei decay
D) Activity becomes zero
✅ **Correct Answer: C**

Q12. The SI unit of radioactivity is:
A) Roentgen
B) Curie
C) Sievert
D) Becquerel
✅ **Correct Answer: D**

Q13. X-rays were discovered by:
A) Marie Curie
B) J.J. Thomson
C) Wilhelm Roentgen
D) Rutherford
✅ **Correct Answer: C**

Q14. The process of splitting a heavy nucleus is called:
A) Fusion
B) Fission
C) Decay
D) Ionization
✅ **Correct Answer: B**

Q15. The energy in nuclear fusion is produced due to:
A) Increase in mass
B) Conversion of mass to energy
C) Chemical reaction
D) Movement of electrons
✅ **Correct Answer: B**

Q16. Alpha particles are:
A) Helium nuclei
B) Hydrogen nuclei
C) Electrons
D) Protons
✅ **Correct Answer: A**

Q17. A beta particle is:
A) Neutron
B) Helium nucleus
C) Electron or positron
D) Photon
✅ **Correct Answer: C**

Q18. Gamma rays are:
A) Charged particles
B) Electromagnetic waves
C) Positrons
D) Alpha particles
✅ **Correct Answer: B**

Q19. The penetrating power is maximum for:
A) Alpha rays
B) Beta rays
C) Gamma rays
D) X-rays
✅ **Correct Answer: C**

Q20. Nuclear fusion takes place in:
A) Earth's core
B) Nuclear reactors
C) Sun and stars
D) Radioactive elements
✅ **Correct Answer: C**

Q21. Isotopes have the same:
A) Atomic number
B) Mass number
C) Number of neutrons
D) Number of protons and neutrons
✅ **Correct Answer: A**

Q22. Which of the following is used in atomic clocks?
A) Cesium
B) Radium
C) Uranium
D) Polonium
✅ **Correct Answer: A**

Q23. What is the source of energy in the sun?
A) Nuclear fission
B) Chemical reactions
C) Fusion of hydrogen atoms
D) Radioactive decay
✅ **Correct Answer: C**

Q24. What happens to mass in a nuclear reaction?
A) Mass increases
B) Mass is conserved
C) Mass is converted to energy
D) Mass disappears
✅ **Correct Answer: C**

Q25. Which element is commonly used as nuclear fuel?
A) Hydrogen
B) Helium
C) Uranium
D) Lead
✅ **Correct Answer: C**

Q26. The sum of mass numbers before and after nuclear reaction is:
A) Always conserved
B) Sometimes conserved
C) Never conserved
D) Equal only in fission
✅ **Correct Answer: A**

Q27. The main drawback of nuclear energy is:
A) High cost
B) Pollution
C) Radioactive waste
D) Less efficiency
✅ **Correct Answer: C**

Q28. Pair production leads to creation of:
A) Proton and neutron
B) Alpha and beta particles
C) Electron and positron
D) Neutrino and antineutrino
✅ **Correct Answer: C**

Q29. Which instrument is used in radiation therapy?
A) Cyclotron
B) MRI
C) Linear accelerator
D) Spectrometer
✅ **Correct Answer: C**

Q30. In radioactive decay, the element changes due to loss of:
A) Electrons
B) Neutrons
C) Protons
D) Nuclear particles
✅ **Correct Answer: D**

Q31. Which of the following has the highest energy?
A) Infrared rays
B) Ultraviolet rays
C) X-rays
D) Gamma rays
✅ **Correct Answer: D**

Q32. The speed of gamma rays is equal to the speed of:
A) Sound
B) Electrons
C) Light
D) Neutrons
✅ **Correct Answer: C**

Q33. What is the charge on an alpha particle?
A) +1
B) +2
C) -1
D) 0
✅ **Correct Answer: B**

Q34. Who discovered radioactivity?
A) Rutherford
B) Roentgen
C) Becquerel
D) Planck
✅ **Correct Answer: C**

Q35. Which radiation is most harmful to human tissue?
A) Alpha
B) Beta
C) Gamma
D) Infrared
✅ **Correct Answer: C**

Q36. Nuclear fission generally involves which isotope?
A) U-235
B) U-238
C) C-12
D) He-4
✅ **Correct Answer: A**

Q37. What type of radiation is deflected by electric and magnetic fields?
A) Gamma
B) X-rays
C) Alpha and beta
D) Neutrons
✅ **Correct Answer: C**

Q38. The activity of a radioactive sample is measured in:
A) Newton
B) Becquerel
C) Joule
D) Kelvin
✅ **Correct Answer: B**

Q39. Which is not an application of radioactivity?
A) Cancer treatment
B) Electric generator
C) Carbon dating
D) Nuclear energy
✅ **Correct Answer: B**

Q40. A neutron is:
A) Positively charged
B) Negatively charged
C) Electrically neutral
D) Double positively charged
✅ **Correct Answer: C**

Q41. In nuclear fusion, two nuclei:
A) Split
B) Combine
C) Scatter
D) Decay
✅ **Correct Answer: B**

Q42. The first artificial nuclear reaction was performed by:
A) Curie
B) Einstein
C) Rutherford
D) Fermi
✅ **Correct Answer: C**

Q43. Beta decay increases:
A) Atomic number by 1
B) Atomic number by 2
C) Mass number by 1
D) Mass number by 2
✅ **Correct Answer: A**

Q44. Alpha decay decreases:
A) Atomic number by 1
B) Atomic number by 2
C) Mass number by 2
D) Atomic number by 4
✅ **Correct Answer: B**

Q45. Gamma rays are emitted:
A) With no change in mass number
B) With decrease in atomic number
C) With increase in atomic number
D) During fusion
✅ **Correct Answer: A**

Q46. Which of these is a non-ionizing radiation?
A) Alpha
B) Beta
C) Gamma
D) Infrared
✅ **Correct Answer: D**

Q47. Which particle is used in nuclear reactors to control the chain reaction?
A) Neutrons
B) Electrons
C) Positrons
D) Protons
✅ **Correct Answer: A**

Q48. Which of the following is used in smoke detectors?
A) Uranium
B) Radon
C) Americium-241
D) Plutonium
✅ **Correct Answer: C**

Q49. Which isotope is used in carbon dating?
A) C-12
B) C-13
C) C-14
D) C-15
✅ **Correct Answer: C**

Q50. Gamma radiation is used for:
A) Detecting light
B) Killing bacteria
C) Electricity production
D) Detecting sound
✅ **Correct Answer: B**

Q51. The penetrating power of gamma rays is:
A) Lowest
B) Higher than alpha, but less than beta
C) Highest
D) Same as alpha
✅ **Correct Answer: C**

Q52. Which particle has the least mass?
A) Alpha particle
B) Proton
C) Electron
D) Neutron
✅ **Correct Answer: C**

Q53. Half-life of a radioactive substance is the time taken for:
A) All atoms to decay
B) Half the mass to become zero
C) Half the number of nuclei to decay
D) Energy to double
✅ **Correct Answer: C**

Q54. A nuclear reactor converts:
A) Mechanical energy into nuclear energy
B) Nuclear energy into electrical energy
C) Electrical energy into nuclear energy
D) Solar energy into heat
✅ **Correct Answer: B**

Q55. In beta decay, a neutron is converted into:
A) A proton and an electron
B) A proton and a gamma ray
C) An alpha particle
D) A neutron and a proton
✅ **Correct Answer: A**

Q56. In an atom, electrons revolve around the nucleus due to:
A) Magnetic attraction
B) Electrostatic force
C) Gravitational force
D) Strong nuclear force
✅ **Correct Answer: B**

Q57. Who proposed the quantum theory of radiation?
A) Bohr
B) Planck
C) Einstein
D) Curie
✅ **Correct Answer: B**

Q58. Which of the following is not emitted in radioactive decay?
A) Neutrons
B) Alpha particles
C) Gamma rays
D) Protons
✅ **Correct Answer: D**

Q59. Alpha particles are identical to:
A) Protons
B) Neutrons
C) Helium nuclei
D) Electrons
✅ **Correct Answer: C**

Q60. The energy of a photon depends on:
A) Frequency
B) Wavelength
C) Mass
D) Speed
✅ **Correct Answer: A**

Q61. The unit of radioactivity is:
A) Watt
B) Ampere
C) Becquerel
D) Joule
✅ **Correct Answer: C**

Q62. In fission, the total mass of products is:
A) Greater than reactants
B) Equal to reactants
C) Less than reactants
D) Zero
✅ **Correct Answer: C**

Q63. The sun produces energy by:
A) Nuclear fission
B) Nuclear fusion
C) Chemical reactions
D) Gravitational collapse
✅ **Correct Answer: B**

Q64. A positron is:
A) Negatively charged
B) Massless
C) An electron with a positive charge
D) A neutron
✅ **Correct Answer: C**

Q65. Which radiation is used in cancer therapy?
A) Beta
B) Gamma
C) Alpha
D) Neutron
✅ **Correct Answer: B**

Q66. X-rays were discovered by:
A) Becquerel
B) Rutherford
C) Roentgen
D) Bohr
✅ **Correct Answer: C**

Q67. Which of these rays are not deflected by magnetic fields?
A) Alpha
B) Beta
C) Gamma
D) All of them
✅ **Correct Answer: C**

Q68. Radioactive elements are generally:
A) Light elements
B) Chemically stable
C) Heavy elements
D) Non-reactive
✅ **Correct Answer: C**

Q69. The number of protons in a nucleus is called:
A) Atomic number
B) Mass number
C) Neutron number
D) Avogadro number
✅ **Correct Answer: A**

Q70. The charge on a neutron is:
A) +1
B) 0
C) -1
D) +2
✅ **Correct Answer: B**

Q71. Radiation that causes mutation in DNA is called:
A) UV radiation
B) IR radiation
C) Microwave
D) Visible light
✅ **Correct Answer: A**

Q72. The principle of nuclear reactor is:
A) Nuclear fusion
B) Radioactive decay
C) Controlled nuclear fission
D) Spontaneous combustion
✅ **Correct Answer: C**

Q73. Which isotope is used in nuclear reactors as fuel?
A) U-238
B) U-235
C) Th-232
D) Pu-239
✅ **Correct Answer: B**

Q74. Nuclear reactions differ from chemical reactions because:
A) They involve electrons
B) They involve changes in nuclei
C) They form new compounds
D) They are reversible
✅ **Correct Answer: B**

Q75. One Curie is equal to:
A) 3.7×10^4 disintegrations/sec
B) 3.7×10^{10} disintegrations/sec
C) 1 Becquerel
D) 10^6 disintegrations/sec
✅ **Correct Answer: B**

Q76. When a radioactive isotope decays, it becomes a:
A) Stable isotope
B) Metal
C) Non-metal
D) Gas
✅ **Correct Answer: A**

Q77. The number of neutrons in an isotope of uranium-238 is:
A) 92
B) 146
C) 238
D) 184
✅ **Correct Answer: B**

Q78. Who gave the concept of quantized energy levels in atom?
A) Bohr
B) Planck
C) Rutherford
D) Einstein
✅ **Correct Answer: A**

Q79. The energy-mass equivalence is given by:
A) $E = hv$
B) $E = mc^2$
C) $E = \frac{1}{2}mv^2$
D) $E = qV$
✅ **Correct Answer: B**

Q80. The discovery of neutron was made by:
A) J.J. Thomson
B) Chadwick
C) Rutherford
D) Bohr
✅ **Correct Answer: B**

Q81. Gamma rays are:
A) Charged particles
B) Electromagnetic waves
C) Sound waves
D) Infrared rays
✅ **Correct Answer: B**

Q82. The radioactive element used in smoke detectors is:
A) Radium
B) Uranium
C) Americium
D) Plutonium
✅ **Correct Answer: C**

Q83. The isotope used for dating fossils is:
A) C-14
B) U-235
C) K-40
D) Ra-226
✅ **Correct Answer: A**

Q84. In a nuclear reaction, mass is:
A) Destroyed completely
B) Created
C) Converted into energy
D) Constant
✅ **Correct Answer: C**

Q85. The SI unit of exposure to radiation is:
A) Gray
B) Sievert
C) Becquerel
D) Roentgen
✅ **Correct Answer: D**

Q86. Which particle is not present in the nucleus?
A) Proton
B) Neutron
C) Electron
D) Nucleon
✅ **Correct Answer: C**

Q87. The energy of a photon is directly proportional to its:
A) Wavelength
B) Frequency
C) Velocity
D) Amplitude
✅ **Correct Answer: B**

Q88. In photoelectric effect, electrons are emitted from:
A) Inside the nucleus
B) Surface of the metal
C) Inside the atom
D) The environment
✅ **Correct Answer: B**

Q89. When alpha particle is emitted, the mass number:
A) Increases by 4
B) Decreases by 4
C) Increases by 2
D) Remains unchanged
✅ **Correct Answer: B**

Q90. An alpha particle is:
A) A hydrogen nucleus
B) A proton
C) A helium nucleus
D) A positron
✅ **Correct Answer: C**

Q91. Which radiation has the lowest ionizing power?
A) Alpha
B) Beta
C) Gamma
D) Neutron
✅ **Correct Answer: C**

Q92. The number of electrons in a neutral atom is equal to:
A) Neutron number
B) Atomic number
C) Mass number
D) Avogadro number
✅ **Correct Answer: B**

Q93. The mass number of an atom is the sum of:
A) Protons only
B) Electrons only
C) Protons and neutrons
D) Protons and electrons
✅ **Correct Answer: C**

Q94. The penetrating power of alpha particles is:
A) Very high
B) High
C) Low
D) Infinite
✅ **Correct Answer: C**

Q95. An unstable nucleus becomes stable by emitting:
A) Alpha particles
B) Beta particles
C) Gamma rays
D) Any of the above
✅ **Correct Answer: D**

Q96. Which of the following is a fusion reaction?
A) U-235 → Ba + Kr + Energy
B) D + D → He + Energy
C) Ra → Rn + α
D) C → N + β
✅ **Correct Answer: B**

Q97. Which of the following can travel through electric and magnetic fields?
A) Gamma rays
B) Neutrons
C) Alpha and Beta particles
D) X-rays
✅ **Correct Answer: C**

Q98. In nuclear fission, energy is released because:
A) Mass is converted into energy
B) Particles move fast
C) Gamma rays are emitted
D) Atoms disappear
✅ **Correct Answer: A**

Q99. Which of these is NOT a use of radioisotopes?
A) Tracing
B) Cancer treatment
C) Time travel
D) Sterilization
✅ **Correct Answer: C**

Q100. Which of the following instruments detects radiation?
A) Microscope
B) Geiger-Müller counter
C) Telescope
D) Calorimeter
✅ **Correct Answer: B**

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