



UNIT MEASUREMENT AND DIMENSION

Multiple Choice Questions

1. The quantity having the same unit in all system of unit is
(a) mass (b) time (c) length (d) temperature
2. The SI unit of thermal conductivity is
(a) $\text{J m}^{-1}\text{K}^{-1}$ (b) W-m K^{-1} (c) $\text{Wm}^{-1}\text{K}^{-1}$ (d) Jm K^{-1}
3. The damping force on an oscillator is directly proportional to the velocity. The unit of the constant of proportionality is
(a) kg-ms^{-1} (b) kg-ms^{-2} (c) kgs^{-1} (d) kg-s
4. The density of a material in SI units is 128 kg m^{-3} . In certain units in which unit of length is 25 cm and the unit of mass is 50 g, the numerical value of density of the material is
(a) 40 (b) 16 (c) 640 (d) 410
5. If the value of work done is $10^{10} \text{ g-cm}^2 \text{ s}^{-2}$, then its value in SI units will be
(a) $10 \text{ kg-m}^2\text{s}^{-2}$ (b) $10^2 \text{ kg-m}^2\text{s}^{-2}$ (c) $10^4 \text{ kg-m}^2\text{s}^{-2}$ (d) $10^3 \text{ kg-m}^2\text{s}^{-2}$
6. Amongst the following options, which is a unit of time?
(a) Light year (b) Parsec (c) Year (d) None of these
7. The moon is observed from two diametrically opposite points A and B on earth. The angle θ subtended at the moon by the two directions of observation is $1^\circ 54'$, given that the diameter of the earth to be about $1.276 \times 10^7 \text{ m}$. Compute the distance of the moon from the earth.
(a) $4.5 \text{ } 10 \text{ m } 9'$ (b) $3.83 \text{ } 10 \text{ m } 8'$ (c) $2.5 \text{ } 10 \text{ m } 4'$ (d) $4 \text{ } 10 \text{ m } 7'$
8. The ratio of the volume of the atom to the volume of the nucleus is of the order of
(a) 10^{15} (b) 10^{25} (c) 10^{20} (d) 10^{10}
9. Which of the following measurement is most precise?
(a) 5.00 mm (b) 5.00 cm (c) 5.00 m (d) 5.00 km
10. A student measured the length of a rod and wrote it as 3.50 cm. Which instrument did he use to measure it?
(a) A meter scale
(b) A vernier calliper where the 10 divisions in vernier scale matches with 9 divisions in main scale and main scale has 10 divisions in 1 cm
(c) A screw gauge having 100 divisions in the circular scale and pitch as 1 mm
(d) A screw gauge having 50 divisions in the circular scale and pitch as 1 mm
11. The length, breadth and height of a rectangular block of wood were measured to be $l = 12.13 \pm 0.02 \text{ cm}$, $b = 8.16 \pm 0.01 \text{ cm}$ and $h = 3.46 \pm 0.01 \text{ cm}$.
(a) 0.88% (b) 0.58% (c) 0.78% (d) 0.68%
12. A student measures the time period of 100 oscillations of a simple pendulum four times. The data set is 90s, 91s, 92s and 95s. If the minimum division in the measuring clock is 1s, then the reported mean time should be
(a) $(92 \pm 2)\text{s}$ (b) $(92 \pm 5)\text{s}$ (c) $(92 \pm 1.8)\text{s}$ (d) $(92 \pm 3)\text{s}$
13. In successive experiments while measuring the period of oscillation of a simple pendulum. The readings turn out to be 2.63 s, 2.56 s, 2.42 s, 2.71s and 2.80 s. Calculate the mean absolute error.
(a) 0.11 s (b) 0.42 s (c) 0.92 s (d) 0.10 s

14. The period of oscillation of a simple pendulum is $T = 2\pi \sqrt{L/g}$. Measured value of L is 20 cm known to 1 mm accuracy and time for 100 oscillations of the pendulum is found to be 90 s using a wrist watch of 1 s resolution. What is the percentage error in the determination of g ?
 (a) 5% (b) 3% (c) 4% (d) 7%
15. Calculate the mean percentage error in five observations, 80.0, 80.5, 81.0, 81.5 and 82.
 (a) 0.74% (b) 1.74% (c) 0.38% (d) 1.38%
16. Calculate the relative errors in measurement of two masses $1.02 \text{ g} \pm 0.01 \text{ g}$ and $9.89 \text{ g} \pm 0.01 \text{ g}$.
 (a) $\pm 1\%$ and $\pm 0.2\%$ (b) $\pm 1\%$ and $\pm 0.1\%$ (c) $\pm 2\%$ and $\pm 0.3\%$ (d) $\pm 3\%$ and $\pm 0.4\%$
17. The density of a material in the shape of a cube is determined by measuring three sides of the cube and its mass. If the relative errors in measuring the mass and length are respectively 1.5% and 1%, the maximum error in determining the density is
 (a) 2.5% (b) 3.5% (c) 4.5% (d) 6%
18. Percentage errors in the measurement of mass and speed are 2% and 3%, respectively. The error in the estimation of kinetic energy obtained by measuring mass and speed will be
 (a) 8% (b) 2% (c) 12% (d) 10%
19. If the length of a pendulum is increased by 2%, then in a day, the pendulum
 (a) loses 764 s (b) loses 924 s (c) gains 236 s (d) loses 864 s
20. The length and breadth of a rectangular sheet are 16.2 cm and 10.1 cm, respectively. The area of the sheet in appropriate significant figures and error is
 (a) $164 \pm 3 \text{ cm}^2$ (b) $163.62 \pm 2.6 \text{ cm}^2$ (c) $163.6 \pm 2.6 \text{ cm}^2$ (d) $163.62 \pm 3 \text{ cm}^2$
21. In an experiment, four quantities a , b , c and d are measured with percentage error 1%, 2%, 3% and 4%, respectively. Quantity P is calculated as follows $P = \frac{a^3 b^2}{cd}$, percentage error in P is
 (a) 14% (b) 10% (c) 7% (d) 4%
22. A physical quantity z depends on four observables a , b , c and d , as $z = \frac{a^3 b^{2/3}}{\sqrt{c} d^3}$. The percentages of error in the measurement of a , b , c and d are 2%, 1.5%, 4% and 2.5% respectively. The percentage of error in z is
 (a) 13.5% (b) 16.5% (c) 14.5% (d) 12.25%
23. The respective number of significant figures for the numbers 23.023, 0.0003 and 2.1×10^{-3} are
 (a) 5, 1, 2 (b) 5, 1, 5 (c) 5, 5, 2 (d) 4, 4, 2
24. If 3.8×10^{-6} is added to 42×10^{-6} giving due regard to significant figures, then the result will be
 (a) 4.58×10^{-5} (b) 4.6×10^{-5} (c) 45×10^{-5} (d) None of these
25. The numbers 5.355 and 5.345 on rounding off to 3 significant figures will give
 (a) 5.35 and 5.34 (b) 5.36 and 5.35 (c) 5.35 and 5.35 (d) 5.36 and 5.34
26. The mass and volume of a body are 4.237 g and 2.5 cm^3 , respectively. The density of the material of the body in correct significant figures is
 (a) 1.6048 g cm^{-3} (b) 1.69 g cm^{-3} (c) 1.7 g cm^{-3} (d) 1.695 g cm^{-3}
27. If mass M , distance L and time T are fundamental quantities, then find the dimensions of torque.
 (a) $[ML^2 T^{-2}]$ (b) $[MLT^{-2}]$ (c) $[MLT]$ (d) $[ML^2 T]$
28. Let l , r , c and v , represent inductance, resistance, capacitance and voltage, respectively. The dimension of $\frac{l}{rcv}$ in SI units will be
 (a) $[LT^2]$ (b) $[LTA]$ (c) $[A^{-1}]$ (d) $[LA^{-2}]$

29. Obtain the dimensional formula for universal gas constant.

- (a) $[M L^2 T^{-2} \text{ mol}^{-1} K^{-1}]$ (b) $[ML^3 T^{-1} \text{ mol}^{-2} K^{-2}]$
 (c) $[M^2 LT^{-1} \text{ mol}^{-1} K^{-1}]$ (d) $[M^3 LT^{-2} \text{ mol}^{-1} K^{-2}]$

30. Which two of the following five physical parameters have the same dimensions?

- I. Energy density II. Refractive index
 III. Dielectric constant IV. Young's modulus

V. Magnetic field

- (a) I and IV (b) III and V (c) I and II (d) I and V

31. If P, Q, R are physical quantities, having different dimensions, which of the following combinations can never be a meaningful quantity?

- (a) $(P - Q) / R$ (b) $PQ - R$ (c) PQ / R (d) $(PR - Q) / R^2$

32. The potential energy of a particle varies with distance x from a fixed origin as $U = \frac{A\sqrt{x}}{x+B}$, where A and B are constants. The dimensions of AB are

- (a) $[ML^{5/2} T^{-2}]$ (b) $[ML^2 T^{-2}]$ (c) $[M^{3/2} L^3 T^{-2}]$ (d) $[ML^{7/2} T^{-2}]$

33. In the formula, $X = 3YZ^2$, X and Z have dimensions of capacitance and magnetic induction. The dimensions of Y in MKSQ system are

- (a) $[M^{-3} L^{-2} T^4 Q^4]$ (b) $[ML^2 T^8 Q^4]$ (c) $[M^{-2} L^{-3} T^2 Q^4]$ (d) $[M^{-2} L^{-2} TQ^2]$

34. If the velocity v (in cms^{-1}) of a particle is given in terms of t (in second) by the relation $v = at + \frac{b}{t+c}$ then the dimensions of a, b and c are

- | a | b | c |
|-----------------|--------|-------------|
| (a) $[L]$ | $[LT]$ | $[T^2]$ |
| (b) $[L^2]$ | $[T]$ | $[LT^{-2}]$ |
| (c) $[LT^2]$ | $[LT]$ | $[L]$ |
| (d) $[LT^{-2}]$ | $[L]$ | $[T]$ |

35. A book with many printing errors contains four different formulae for the displacement y of a particle under going a certain periodic motion, where, a = maximum displacement of the particle, v = speed of the particle, T = time period of motion. Which are the correct formulae on dimensional grounds?

- (a) $y = a \sin \frac{2\pi t}{T}$ (b) $y = a \sin vt$ (c) $y = \left(\frac{a}{T}\right) \sin(t/a)$ (d) None of these

36. If speed V , area A and force F are chosen as fundamental units, then the dimensional formula of Young's modulus will be

- (a) $[FA^2 V^{-3}]$ (b) $[FA^{-1} V^0]$ (c) $[FA^2 V^{-2}]$ (d) $[FA^2 V^{-1}]$

37. If dimensions of critical velocity v_c of a liquid flowing through a tube are expressed as $[\eta^x \rho^y r^z]$, where h, r and r are the coefficient of viscosity of liquid, density of liquid and radius of the tube respectively, then the values of x, y and z are given by

- (a) 1, -1, -1 (b) -1, -1, 1 (c) -1, -1, -1 (d) 1, 1, 1

38. The density of a material in CGS system is 10 g cm^{-3} . If unit of length becomes 10 cm and unit of mass becomes 100 g, the new value of density will be

- (a) 10 units (b) 100 units (c) 1000 units (d) 1 unit

39. When 1 m, 1 kg and 1 min are taken as the fundamental units, the magnitude of the force is 36 units. What will be the value of this force in CGS system?

- (a) 10^5 dyne (b) 10^3 dyne (c) 10^8 dyne (d) 10^4 dyne

40. The solid angle subtended by the periphery of an area 1 cm^2 at a point situated symmetrically at a distance of 5 cm from the area is steradian.

- (a) 2×10^{-2} (b) 4×10^{-2} (c) 6×10^{-2} (d) 8×10^{-2}

41. Measure of two quantities along with the precision of respective measuring instrument is $A = 2.5\text{ms}^{-1} \pm 0.5\text{ms}^{-1}$, $B = 0.10\text{s} \pm 0.01\text{s}$. The value of AB will be

- (a) $(0.25 \pm 0.08)\text{m}$ (b) $(0.25 \pm 0.5)\text{m}$ (c) $(0.25 \pm 0.05)\text{m}$ (d) $(0.25 \pm 0.135)\text{m}$

42. It is claimed that two caesium clocks, if allowed to run for 100 yrs. without any disturbance may differ by only about 0.02 s. Then the accuracy of the clock in measuring a time interval of 1 s is

- (a) 10^{-10} (b) 10^{-11} (c) 10^{-5} (d) 10^{-8}

43. Photon is quantum of radiation with energy $E = h\nu$, where ν is frequency and h is Planck's constant. The dimensions of h are the same as that of

- (a) linear impulse (b) angular impulse (c) linear momentum (d) energy

44. Which amongst the following statement is incorrect regarding mass?

- (a) Its SI unit is kilogram.
 (b) It does not depend on the location of the object in space.
 (c) It is the basic property of matter.
 (d) While dealing with atoms, kilogram is a convenient unit for measuring mass.

45. Choose the incorrect statement out of the following.

- (a) Every measurement by any measuring instrument has some errors.
 (b) Every calculated physical quantity that is based on measured values has some errors.
 (c) A measurement can have more accuracy but less precision and *vice-versa*.
 (d) The percentage error is different from relative error.

46. Given that T stands for time period and l stands for the length of simple pendulum. If g is the acceleration due to gravity, then which of the following statements about the relation $T^2 = l/g$ is correct?

- (a) It is correct both dimensionally as well as numerically.
 (b) It is neither dimensionally correct nor numerically.
 (c) It is dimensionally correct but not numerically.
 (d) It is numerically correct but not dimensionally.

47. Match the following columns.

Column I	Column II
A. Capacitance	p. Volt (ampere)
B. Magnetic induction	q. volt-sec (ampere) ⁻¹
C. Inductance	r. newton (ampere) ⁻¹ (meter) ⁻¹
D. Resistance	s. coulomb ² (joule) ⁻¹

Codes

- | | A | B | C | D |
|-----|---|---|---|---|
| (a) | q | r | s | p |
| (b) | s | r | q | p |
| (c) | r | s | p | q |
| (d) | s | p | q | r |

48. Match the Column I (unit) with Column II (value) and select the correct option from the codes given below.

Column I	Column II
A. 1 are	p. 200 mg
B. 1 bar	q. $1.013 \times 10^5\text{Pa}$
C. 1 carat	r. 10^2m^2

Codes

- | | A | B | C | A | B | C | |
|-----|---|---|---|-----|---|---|---|
| (a) | q | p | r | (b) | r | r | p |
| (c) | r | q | p | (d) | r | p | q |

49. Names of units of some physical quantities are given in Column I and their dimensional formulae are given in Column II and select the correct option from the codes given below.

Column I	Column II
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- A. Pa-s p. $[L^2T^{-2}K^{-1}]$
 B. Nm-K⁻¹ q. $[MLT^{-2}A^{-1}K^{-1}]$
 C. J kg⁻¹ K⁻¹ r. $[ML^{-1}T^{-1}]$
 D. Wb m⁻¹ K⁻¹ s. $[ML^2T^{-2}K^{-1}]$

Codes

A B C D

- (a) s r p q
 (b) r q s p
 (c) r p s q
 (d) r s p q

Assertion-Reasoning MCQs

Assertion (A) and the other labelled

Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) are as given below

- (a) Both A and R are true and R is the correct explanation of A.
 (b) Both A and R are true but R is not the correct explanation of A.
 (c) A is true but R is false.
 (d) A is false and R is also false.
50. Assertion Unit chosen for measuring physical quantities should not be easily reproducible.
 Reason Unit should change with the changing physical conditions like temperature, pressure, etc.
51. Assertion The unit used for measuring nuclear cross-section is 'barn'.
 Reason 1 barn = $10^{-14}m^2$.
52. Assertion When we change the unit of measurement of a quantity, its numerical value changes.
 Reason Smaller the unit of measurement smaller is its numerical value.
53. Assertion Parallax method is used for measuring distances of nearby stars only.
 Reason With increase in the distance of star from earth, the parallactic angle becomes too small to be measured accurately.
54. Assertion Out of two measurements $l = 0.7 m$ and $l = 0.70 m$, the second one is more accurate.
 Reason In every measurement, the last digit is not accurately know.
55. Assertion Random errors arise due to random and unpredictable fluctuations in experimental conditions.
 Reason Random errors occurred due to irregularly with respect to sign and size.
56. Assertion When a quantity appears with a power n greater than one in an expression, its error contribution to the final result decreases n times.
 Reason In all mathematical operations, the errors are not additive in nature.
57. Assertion Special functions such as trigonometric, logarithmic and exponential functions are not dimensionless.
 Reason A pure number, ratio of similar physical quantities, such as angle and refractive index, has some dimensions.
58. Assertion Specific gravity of a fluid is a dimensionless quantity.
 Reason It is the ratio of density of fluid to the density of water.
59. Assertion The method of dimensions analysis cannot validate the exact relationship between physical quantities in any equation.
 Reason It does not distinguish between the physical quantities having same dimensions.

Case Based MCQs**Direction Answer the questions from 60-64 on the following case.**

Measurement of Physical Quantity

All engineering phenomena deal with definite and measured quantities and so depend on the making of the measurement. We must be clear and precise in making these measurements. To make a measurement, magnitude of the physical quantity (unknown) is compared.

The record of a measurement consists of three parts, i.e. the dimension of the quantity, the unit which represents a standard quantity and a number which is the ratio of the measured quantity to the standard quantity.

60. A device which is used for measurement of length to an accuracy of about $10^{-5}m$, is

- (a) screw gauge (b) spherometer (c) vernier callipers (d) Either (a) or (b)

61. Which of the technique is not used for measuring time intervals?
 (a) Electrical oscillator (b) Atomic clock
 (c) Spring oscillator (d) Decay of elementary particles
62. The mean length of an object is 5 cm. Which of the following measurements is most accurate?
 (a) 4.9 cm (b) 4.805 cm (c) 5.25 cm (d) 5.4 cm
63. If the length of rectangle $l = 10.5$ cm, breadth $b = 21$ cm and minimum possible measurement by scale = 0.1 cm, then the area is
 (a) 22.0 cm² (b) 21.0 cm² (c) 22.5 cm² (d) 21.5 cm²
64. Age of the universe is about 10^{10} yr, whereas the mankind has existed for 10^6 yr. For how many seconds would the man have existed, if age of universe were 1 day?
 (a) 9.2 s (b) 10.2 s (c) 8.6 s (d) 10.5 s

Direction Answer the questions from 65-69 on the following case.

Significant Digits

Normally, the reported result of measurement is a number that includes all digits in the number that are known reliably plus first digit that is uncertain. The digits that are known reliably plus the first uncertain digit are known as significant digits or significant figures.

e.g. When a measured distance is reported to be 374.5 m, it has four significant figures 3, 7, 4 and

5. The figures 3, 7, 4 are certain and reliable, while the digit 5 is uncertain. Clearly, the digits beyond the significant digits reported in any result are superfluous.

65. In 4700 m, significant digits are
 (a) 2 (b) 3 (c) 4 (d) 5
66. To determine the number of significant figures, scientific notation is
 (a) a^b (b) $a \times 10^b$ (c) $a \times 10^2$ (d) $a \times 10^4$
67. 5.74 g of a substance occupies 1.2 cm³. Express its density by keeping the significant figures in view.
 (a) 4.9 g cm⁻³ (b) 5.2 g cm⁻³ (c) 4.8 g cm⁻³ (d) 4.4 g cm⁻³
68. Choose the correct option.
 (a) Change in unit does not change the significant figure.
 (b) 4.700m=4700mm, here there is a change of significant number from 4 to 2 due to change in unit.
 (c) 4700 = 4.700 × 10³ m, here there is change in numbers of significant numbers.
 (d) Change in unit changes the number of significant figures.
69. Consider the following rules of significant figures.
 I. All the non-zero digits are significant.
 II. All the zeroes between two non-zero digits are significant.
 III. The terminal or trailing zero(s) in a number without a decimal point are significant.

Which of the above statement(s) is/are correct?

- (a) I and II (b) II and III (c) I and III (d) All of these

Direction Answer the questions from 70-74 on the following case.

Combination of Errors Maximum absolute error in the sum or difference of two quantities is equal to sum of the absolute error in the individual quantities,

i.e. $Z = A + B$, then $\pm \Delta Z = \pm \Delta A \pm \Delta B$

Maximum fractional error in a product or division of quantities is equal to the sum of fractional errors in the individual quantities

i.e. AB or $\frac{A}{B}$ then $\frac{\Delta Z}{Z} = \pm \frac{\Delta A}{A} + \frac{\Delta B}{B}$

Two resistors of resistances $R^1 = 100 \pm 3 \Omega$ and $R^2 = 200 \pm 4 \Omega$ are connected (a) in series and (b) in parallel.

70. The percentage error in the value of R^1 is

- (a) 3% (b) 4% (c) 6% (d) 0.3 . %

71. The fractional error in the value of R^2 is

- (a) 1/40 (b) 1/50 (c) 1/100 (d) 1/200

72. Find the equivalent resistance of the series combination.

- (a) $(250 \pm 7) \Omega$ (b) $(320 \pm 6) \Omega$ (c) $(300 \pm 7) \Omega$ (d) $(300 \pm 1) \Omega$

73. The percentage error in equivalent resistance in series combination is

- (a) 2% (b) 2.3% (c) 2.5% (d) 3%

74. Find the equivalent resistance of the parallel combination having error of 1.8Ω .

- (a) $(66 \pm 1) \Omega$ (b) $(66.7 \pm 1.8) \Omega$ (c) $(66.3 \pm 2) \Omega$ (d) $(67 \pm 3) \Omega$

Direction Answer the questions from 75-79 on the following case.

Dimensional analysis and its applications

The expression which shows how and which of the base quantities represent the dimensions of a physical quantity is called the dimensional formula of the given physical quantity. The recognition of concepts of dimensions, which guide the description of physical behaviour is of basic importance as only those physical quantities can be added or subtracted which have the same dimensions. A thorough understanding of dimensional analysis helps us in deducing certain relations among different physical quantities and

checking the derivation, accuracy and dimensional consistency or homogeneity of various mathematical expressions. When magnitudes of two or more physical quantities are multiplied, their units should be treated in the same manner as ordinary algebraic symbols. We can cancel identical units in the numerator and denominator. The same is true for dimensions of a physical quantity. Similarly, physical quantities represented by symbols on both sides of a mathematical equation must have the same dimensions.

75. Statement I The method of dimensions analysis cannot validate the exact relationship between physical quantities in any equation.

Statement II It does not distinguish between the physical quantities having same dimensions.

Which of the following statement(s) is/are correct?

- (a) Only I (b) I and II (c) Only II (d) None of these

76. The quantity having same dimension as that of Planck's constant is

- (a) work (b) linear momentum (c) angular momentum (d) impulse

77. If speed v acceleration A and force F , are considered as fundamental units, the dimension of Young's modulus will be

- (a) $[v^{-4}A^{-2}F]$ (b) $[v^{-2}A^2F^2]$ (c) $[v^{-2}A^2F^{-2}]$ (d) $[v^{-4}A^2F^1]$

78. Given that, the amplitude of the scattered light is

- (i) directly proportional to amplitude of incident light
 (ii) directly proportional to the volume of the scattering dust particle
 (iii) inversely proportional to its distance from the scattering particle and
 (iv) dependent upon the wavelength λ of the light.

Then, the relation of intensity of scattered light with the wavelength is

- (a) $\frac{1}{\lambda^2}$ (b) $\frac{1}{\lambda^4}$ (c) $\frac{1}{\lambda^6}$ (d) $\frac{1}{\lambda^7}$

79. Find the value of power of 60 J/min on a system that has 100 g , 100 cm and 1 min as the base units.

- (a) 2.16×10^4 ' units (b) 2.16×10^6 ' units (c) 3×10^4 ' units (d) 4×10^7 ' units

ANSWER

Multiple Choice Questions

1. (b) 2. (c) 3. (c) 4. (a) 5. (d) 6. (c) 7. (b) 8. (a) 9. (a) 10. (b)
11. (b) 12. (a) 13. (a) 14. (b) 15. (a) 16. (b) 17. (c) 18. (a) 19. (d) 20. (a)
21. (a) 22. (c) 23. (a) 24. (b) 25. (d) 26. (c) 27. (a) 28. (c) 29. (a) 30. (a)
31. (a) 32. (d) 33. (a) 34. (d) 35. (a) 36. (b) 37. (a) 38. (b) 39. (b) 40. (b)
41. (a) 42. (b) 43. (b) 44. (d) 45. (d) 46. (c) 47. (b) 48. (c) 49. (d)

Assertion-Reasoning MCQs

50. (d) 51. (c) 52. (c) 53. (a) 54. (b) 55. (b) 56. (d) 57. (d) 58. (a) 59. (a)

Case Based MCQs

60. (d) 61. (c) 62. (a) 63. (a) 64. (c) 65. (a) 66. (b) 67. (c) 68. (a) 69. (a)
70. (a) 71. (b) 72. (c) 73. (b) 74. (b) 75. (b) 76. (c) 77. (d) 78. (b) 79.