ANSWERS

I. Multiple Choice Questions (Type-I)

1. (iii)	2. (iii)	3. (ii)	4. (i)	5. (ii)	6. (i)
7. (iv)	8. (iii)	9. (iii)	10. (ii)	11. (i)	12. (iii)
13. (i)	14. (ii)	15. (iii)	16. (iv)	17. (ii)	18. (ii)
19. (ii)	20. (ii)				

II. Multiple Choice Questions (Type-II)

21. (i), (iii), (iv)	22. (i), (iv)	23. (i), (ii)	24. (i), (iv)
25. (i), (iii), (iv)	26. (i), (iv)	27. (i), (iii)	28. (i), (iv)
29. (i), (ii)	30. (ii), (iv)	31. (i), (iv)	32. (i), (iv)

III. Short Answer Type

33. Bimolecular reaction becomes kinetically first order when one of the reactants is in excess.

34. Rate = k $[A]^0[B]^0$ or Rate = k

35. See page no. 99 of NCERT textbook for Class XII.

36. If the reaction is an elementary reaction, order is same as molecularity.

37. Three, because rate = k $[A]^3$

38. $[R] = [R]_0 - kt$

for completion $[R] = 0$

$$\therefore \; t = \frac{[R]_0}{k}$$

39. During an elementary reaction, the number of atoms or ions colliding to react is referred to as molecularity. Had this been an elementary reaction the order of reaction with respect to B would have been 1, but in the given rate law it is $\frac{3}{2}$. This indicates that the reaction is not an elementary reaction.

40. Apart from the energy considerations, the colliding molecules should also have proper orientation for effective collision. This condition might not be getting fulfilled in the reaction.

41. No, the molecularity can never be zero or a fractional number.

42. (i) Zero (ii) $-k$ (iii) mol L^{-1} s^{-1}

43. This is because activation energy for the reaction is very high at room temperature.

44. At higher temperatures, larger fraction of colliding particles can cross the energy barrier (i.e. the activation energy), which leads to faster rate.

45. The activation energy for combustion reactions of fuels is very high at room temperature therefore they do not burn by themselves.

46. The probability of more than three molecules colliding simultaneously is very small. Hence possibility of molecularity being three is very low.

47. The rate of a reaction depends on the concentration of reactants. As the reaction progresses, reactants start getting converted to products so the concentration of reactants decreases hence the rate decreases.

48. Thermodynamically the conversion of diamond to graphite is highly feasible but this reaction is very slow because its activation energy is high.

49. The reaction between $KMnO_4$ and oxalic acid is very slow. By raising the temperature we can enhance the rate of reaction.

50. Molecularity is the number of molecules taking part in an elementary step. For this we require at least a single molecule leading to the value of minimum molecularity of one.

51. A complex reaction proceeds through several elementary reactions. Numbers of molecules involved in each elementary reaction may be different i.e., the molecularity of each step may be different. Therefore, discussion of molecularity of overall complex reaction is meaningless. On the other hand, order of a complex reaction is determined by the slowest step in its mechanism and is not meaningless even in the case of complex reactions.

52. Balanced chemical equation often leads to incorrect order or rate law. For example the following reaction seems to be a tenth order reaction.

$$KClO_3 + 6FeSO_4 + 3H_2SO_4 \longrightarrow KCl + 3H_2O + 3Fe_2(SO_4)_3$$

This is actually a second order reaction. Actually the reaction is complex and occurs in several steps. The order of such reaction is determined by the slowest step in the reaction mechanism. Order is determined experimentally and is confined to the dependence of observed rate of reaction on the concentration of reactants.

IV. Matching Type

53. (i) → (a) (ii) → (b) (iii) → (b) (iv) → (a)

54. (i) → (c) (ii) → (a) (iii) → (d) (iv) → (f)
(v) → (b) (vi) → (e)

55. (i) → (b) (ii) → (a) (iii) → (c)

56. (i) → (b) (ii) → (a) (iii) → (d) (iv) → (d)

V. Assertion and Reason Type

57. (ii) 58. (v) 59. (i) 60. (v) 61. (iii)

VI. Long Answer Type

62. **Hint:** Proper orientation of molecule should be explained in detail.

63. **Hint :**
- Flattening of curve and shifting of maxima towards high energy value.
- Area under the curve beyond the activation energy increases.

64. **Hint :**
- Enthalpy is a state function.
- Difference in energy between reactants and product is constant.

65. See NCERT textbook for Class XII.

66. See NCERT textbook for Class XII.