1. Two insulated charged spheres of radii R_1 and R_2 having charges Q_1 and Q_2 respectively are connected to each other; then there is

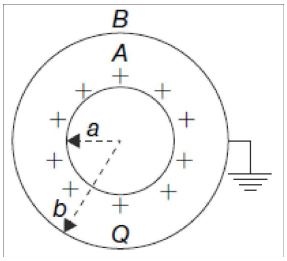
(1) no change in the energy of the system

(2) an increase in the energy of the system

(3) always a decrease in the energy of the system

(4) a decrease in energy of the system unless $q_1R_2 = q_2R_1$

2. Two spherical conductors A and B of radii a and b (b > a) are placed concentrically in air. A is given a charge +Q while B is earthed. Then the equivalent capacitance of the system is



(1) $4\pi\varepsilon_0\left(\frac{ab}{b-a}\right)$ (2) $4\pi\varepsilon_0(a+b)$

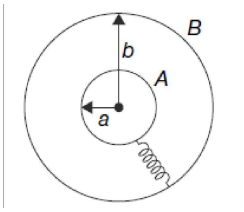
(3) $4\pi\varepsilon_0 b$ (4) $4\pi\varepsilon_0\left(\frac{b^2}{b-a}\right)$

3. Two spherical conductors A and B of radii a and b (b > a) are placed concentrically in air. B is given a charge +Q and A is earthed. The equivalent capacitance of the system is

(1) $4\pi\varepsilon_0\left(\frac{ab}{b-a}\right)$ (2) $4\pi\varepsilon_0(a+b)$

(3) $4\pi\varepsilon_0 b$ (4) $4\pi\varepsilon_0\left(\frac{b^2}{b-a}\right)$

4. Two spherical conductors A and B of radii a and b (b > a) are placed concentrically in air. The two are connected by a copper wire as shown in figure. Then the equivalent capacitance of the system is



(1) $\frac{4\pi\varepsilon_0 ab}{(b-a)}$ (2) $4\pi\varepsilon_0(a+b)$

(3) $4\pi\varepsilon_0 b$ (4) $4\pi\varepsilon_0 a$

5. A spherical drop of capacitance 1 μF is broken into eight drops of equal radius. The radius of each small drop is

(1) $\frac{1}{2}\mu F$ (2) $\frac{1}{4}\mu F$

(3) $\frac{1}{8}\mu F$ (4) $\frac{1}{16}\mu F$

6. 1000 small water drops each of radius r and charge q coalesce together to form one spherical drop. The potential of the bigger drop is larger than that of the smaller one by a factor

(1) 1000 (2) 100

(3) 10 (4) 1

7. The capacitance C of a capacitor is

(1) independent of the charge and potential of the capacitor

(2) dependent on the charge and independent of potential

(3) independent of the geometrical configuration of the capacitor

(4) independent of the dielectric medium between the two conducting surfaces of the capacitor

8. The capacitance of a parallel plate condenser does not depend upon

(1) area of the plates

(2) medium between the plates

(3) distance between the plates

(4) metal of the plates

9. The force between the plates of a parallel plate capacitor of capacitance C and distance of separation of the plates d with a potential difference V between the plates is

(1) $CV^2 / 2d$ (2) $C^2V^2 / 2d^2$

(3) C^2V^2 / d^2 (4) V^2d / C

10. A parallel plate capacitor is made by stacking n equally spaced plates connected alternately. If the capacitance between any two plates is C, then the resulting capacitance is

(1) C (2) nC

(3) (n – 1)C (4) (n + 1)C

11. Two parallel metal plates carry charges +Q and –Q respectively. A test charge q_o placed between them experiences a force F. Now the separation between the plates is doubled, then the force on the test charge will be

(1) F (2) 2F

(3) F/2 (4) F/4

12. Force acting upon a charged particle kept between the plates of a charged capacitor is F. If one of the plates of the capacitor is removed, force acting on the same particle will becomes

(1) 0 (2) F/2

(3) F (4) 2F

13. There is an air-filled 1 pF parallel plate capacitor. When the plate separation is doubled and the space is filled with wax, the capacitance increases to 2 pF. The dielectric constant of wax is

(1) 2 (2) 4

(3) 6 (4) 8

14. A parallel plate capacitor is charged to $60\ \mu C$. Due to a radioactive source, the plate loses charge at the rate of 1.8×10^{-8} C/s. The magnitude of displacement current is

(1) 1.8×10^{-8} C/s

(2) 3.6×10^{-8} C/s

(3) 4.1×10^{-11} C/s

(4) 5.7×10^{-12} C / s

15. An uncharged parallel plate capacitor having a dielectric of constant K is connected to a similar air-cored parallel capacitor charged to a potential V. The two share the charge and the common potential is V' . the dielectric constant K is

(1) $\frac{V'-V}{V'+V}$ (2) $\frac{V'-V}{V'}$

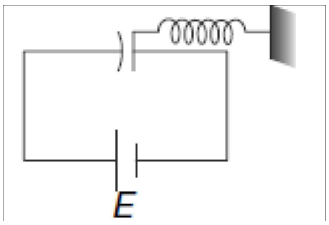
(3) $\frac{V'-V}{V}$ (4) $\frac{V-V'}{V}$

16. A capacitor of capacitance C_1 is charged to a potential V_o. The electrostatic energy stored in it is U_o. It is connected to another uncharged capacitor of capacitance C_2 in parallel. The energy dissipated in the process is

(1) $\frac{C_2}{C_1 + C_2} U_o$ (2) $\frac{C_1}{C_1 + C_2} U_o$

(3) $\left(\frac{C_1 - C_2}{C_1 + C_2}\right)^2 U_o$ (4) $\frac{C_1 C_2}{2(C_1 + C_2)} U_o$

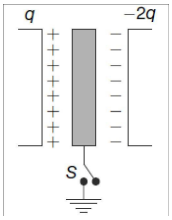
17. One plate of a capacitor is connected to a spring as shown in the figure. Area of both the plates is A. In steady state separation between the plates is 0.8d (spring was unstretched and the distance between the plates was d when the capacitor was uncharged). The force constant of the spring is approximately



(1) $\frac{4\varepsilon_0 AE^2}{d^3}$ (2) $\frac{2\varepsilon_0 AE}{d^2}$

(3) $\frac{6\varepsilon_0 AE^2}{Ad^3}$ (4) $\frac{\varepsilon_0 AE^3}{2d^3}$

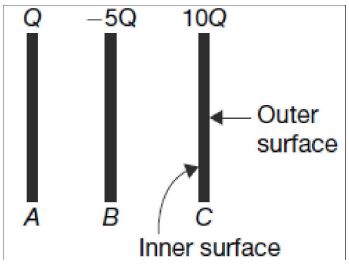
18. The metal plate on the left in the figure carries a charge +q. The metal plate on the right has a charge of –2q. What charge will flow through S when it is closed if the central plate is initially neutral?



(1) zero (2) – q

(3) + q (4) + 2q

19. Three very large plates are given charges as shown in the figure. If the cross-sectional area of each plate is the same, the final charge distribution on plate C is



(1) +5Q on the inner surface, +5Q on the outer surface

(2) +6Q on the inner surface, +4Q on the outer surface

(3) +7Q on the inner surface, +3Q on the outer surface

(4) +8Q on the inner surface, +2Q on the outer surface

20. A gang of capacitor is formed by inter locking a number of plates as shown in the figure. The distance between the consecutive plates is 0.885 cm and the overlapping area of the plates is $5\ cm^2$. The capacity of the unit is

(1) 1.06 pF (2) 4 pF

(3) 6.36 pF (4) 12.72 pF

21. A capacitor is connected to a cell of emf E having some internal resistance r. The potential difference across the

(1) cell is < E (2) cell is E

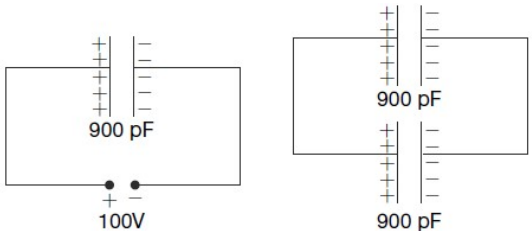
(3) capacitor is > E (4) capacitor is < E

22. The work done in increasing the voltage across the plates of a capacitor from 5 V to 10 V is W. The work done in increasing the voltage from 10 V to 15 V will be

(1) W (2) $\frac{4W}{3}$

(3) $\frac{5W}{3}$ (4) 2W

23. The energy stored in the capacitor as shown in Fig. (1) is 4.5×10^{-6} J. If the battery is replaced by another capacitor of 900 pF as shown in fig. (2), then the total energy of the system is



(1) 4.5×10^{-6} J (2) 2.25×10^{-6} J

(3) zero (4) 9×10^{-6} J

24. The plates of a parallel plate capacitor are not exactly parallel. The surface charge density

(1) is lower at the closer end

(2) will not be uniform

(3) each plate will have the same potential at every point

(4) both (2) and (3)

25. A parallel plate capacitor is charged. If the plates are pulled apart

(1) the capacitance increases

(2) the potential difference increases

(3) the total charge increases

(4) the charge and potential difference remain the same

26. In parallel plate capacitor the distance between plates is d = 0.1 mm. The medium between the plates is air. The maximum potential difference which can be applied to the capacitor is (dielectric strength of air = 3 MV/m)

(1) 3×10^6 volt (2) 300 volt

(3) 3×10^{10} volt (4) infinite

27. A parallel plate capacitor having capacitance C farad is connected with a battery of emf V volts. Keeping the capacitor connected with the battery, a dielectric slab of dielectric constant K is inserted between the plates. The dimensions of the slab are such that it fills the space between the capacitor plates. Then

(1) charge on the capacitor plates remains the same

(2) charge on the plates increases K times

(3) potential difference between the plates decreases to V/K

(4) all of these

28. In order to increase the capacity of a parallel plate condenser one should introduce between the plates a sheet of

(1) mica (2) tin

(3) copper (4) stainless steel

29. Capacitor C_1 of capacitance 1 microfarad and capacitor C_2 of capacitance 2 microfarad are separately charged fully by a common battery. The two capacitors are then separately allowed to discharge through equal resistors at time t = 0. Then

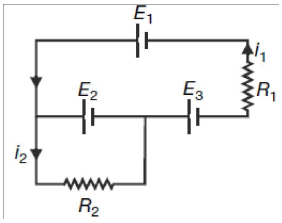
(1) the current in each of the two discharging circuits is zero at t = 0

(2) the current in the two discharging circuits at t = 0 are equal but not zero

(3) the current in the two discharging circuits at t = 0 are unequal

(4) capacitor C_2 loses 50% of its initial charge sooner than C_1 loses 50% of its initial charge

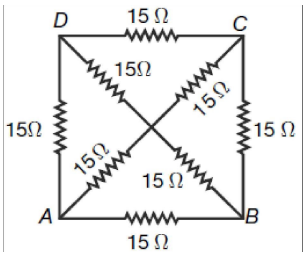
30. The current i_1 and i_2 through the resistors $R_1\ (=\ 10\ \Omega)$ and $R_2\ (=\ 30\ \Omega)$ in the circuit diagram with $E_1\ =\ 3$ V, $E_2\ =\ 3$ V and $E_3\ =\ 2$ V E3 = 2 V are respectively



(1) 0.2 A, 0.1 A (2) 0.4 A, 0.2 A

(3) 0.1 A, 0.2 A (4) 0.2 A, 0.4 A

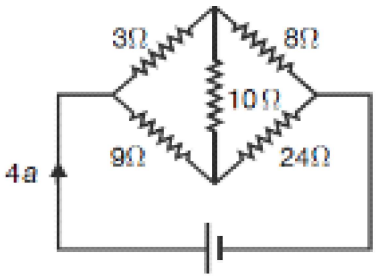
31. The equivalent resistance between the points A and B will be (each resistance is $15\ \Omega$)



(1) $30\ \Omega$ (2) $8\ \Omega$

(3) $10\ \Omega$ (4) $40\ \Omega$

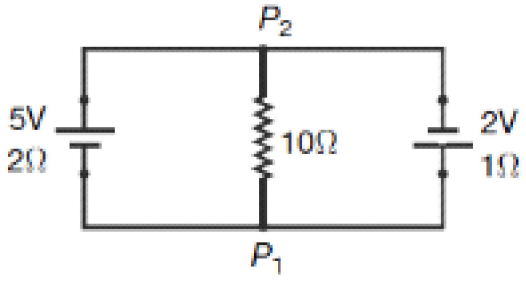
32. In the circuit shown, if the $10\,\Omega$ resistance is replaced by $20\,\Omega$, then what is the amount of current drawn from the battery?



(1) 10 A (2) 4 A

(3) 8 A (4) 2 A

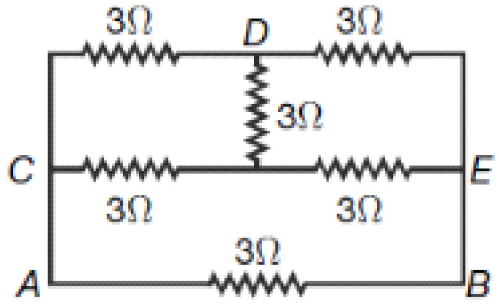
33. A 5 V battery with internal resistance $2\,\Omega$ and a 2 V battery with internal resistance $1\,\Omega$ are connected to a $10\,\Omega$ resistor as shown in the figure. The current in the $10\,\Omega$ resistor is



(1) 0.27 A, P_2 to P_1 (2) 0.03 A, P_1 to P_2

(3) 0.03 A, P_2 to P_1 (4) 0.27 A, P_1 to P_2

34. Six resistors, each of value $3\,\Omega$ are connected as shown in the figure. A cell of emf 3 V is connected across AB. The effective resistance across AB and the current through the arm AB will be



(1) $0.6\,\Omega$, 1 A (2) $1.5\,\Omega$, 2 A

(3) $0.6\,\Omega$, 2 A (4) $1.5\,\Omega$, 1 A

35. The current flowing through a wire depends on time as I = + 2t + 5. the charge flowing through the crosssection of the wire in time from t = 0 to t = 2s is

(1) 22 C (2) 20 C

(3) 18 C (4) 5 C

36. An aluminium (Al) rod with area of cross-section $4 \times 10^{-6}\ m^2$ has a current of 5 A, flowing through it. Find the drift velocity of electron in the rod. Density of Al = $2.7 \times 10^3\ kg^3/m^3$ and atomic wt. = 27. Assume that each Al atom provides one electron

(1) 8.6×10^{-4} m/s (2) 6.2×10^{-4} m/s

(3) 2.8×10^{-2} m/s (4) 0.13×10^{-3} m/s

37. The resistor R_1 dissipates power P when connected to a generator. if a resistor R_2 is inserted in series with R_1, the power dissipated by R_1

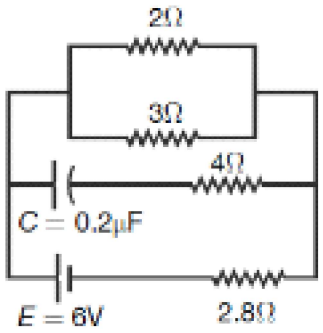
(1) increases

(2) decreases

(3) remains the same

(4) may decrease or increase depending on the values of R_1 and R_2

38. In the circuit shown, the internal resistance of the cell is negligible. the steady state current in the $2\,\Omega$ resistor is



(1) 0.6 A (2) 0.9 A

(3) 1.2 A (4) 1.5 A

39. A circuit whose resistance R is connected to n similar cells. If the current in the circuit is the same whether the cells are connected in series or in parallel, then the internal resistance r of each cell is given by

(1) $r = (R/n)$ (2) $r = nR$

(3) $r = R$ (4) $r = (1/R)$

40. Five cells, each of emf ξ and internal resistance r are connected in series. If due to over sight, one cell is connected wrongly, then the equivalent emf and internal resistance of the combination is

(1) 5ξ and 5r (2) 3ξ and 3r

(3) 3ξ and 5r (4) 5ξ and 3r

41. A cell of emf ξ and internal resistance r is connected in series with an external resistance nr. Then, the ratio of the terminal potential difference to emf is

(1) (1/n) (2) 1/(n + 1)

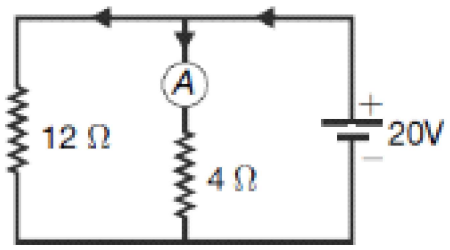
(3) n/(n + 1) (4) (n + 1)/n

42. When a resistance of 2 ohm is connected across the terminals of a cell, the current is 0.5 amp. When the resistance is increased to 5 ohm, the current is 0.25 amp. The emf of the cell is

(1) 1.0 volt (2) 2.0 volt

(3) 1.5 volt (4) 2.5 volt

43. In the following figure, the reading of the ammeter A, when the internal resistance of the battery is zero, is



(1) $\frac{20}{3}$ amp (2) $\frac{20}{12}$ amp

(3) $\frac{20}{4}$ amp (4) $\left(\frac{20}{3}+\frac{20}{12}\right)$ amp

44. To get maximum current through a resistance of $2.5\,\Omega$, one can use m rows of cells, each row having n cells. The internal resistance of each cell is $0.5\,\Omega$ .What are the values of n and m if the total number of cells is 45?

(1) m = 3, n = 15 (2) m = 5, n = 9

(3) m = 9, n = 5 (4) m = 15, n = 3

45. Two identical cells connected in series send 10 amp current through a 5 resistor. When they are connected in parallel, they send 8 amp current through the same resistance. What is the internal resistance of each cell?

(1) Zero (2) $2.5\,\Omega$

(3) $10\,\Omega$ (4) $1.0\,\Omega$

46. For a first order reaction, the plot of log $[A]_t$ Vs t is linear with a :
(1) positive slope and zero intercept
(2) positive slope and non-zero intercept
(3) negative slope and zero intercept
(4) negative slope and non zero intercept

47. Two substances A ($t_{1/2}$ = 5min) and B($t_{1/2}$ = 15 min) are taken in such a way that initially [A] = 4[B].The time after which the concentration of both the substances will be equal is:

(1) 5 min (2) 15 min

(3) 20 min (4) Concentrations can never be equal

48. The reaction, A (g) + 2B (g) $\rightarrow$ C(g) + D (g) is an elementary process. In an experiment, the initial partial pressure of A & B are P_A = 0.6 and P_B = 0.8atm . When P_C = 0.2atm, the rate of the reaction relative to the initial rate is:

(1) $\frac{1}{48}$ (2) $\frac{1}{24}$

(3) $\frac{9}{16}$ (4) $\frac{1}{6}$

49. For a hypothetical reaction, $A + B \rightarrow C + D$, the rate $k[A]^{-1/2}[B]^{3/2}$. On doubling the concentration of A and B, the rate will be (assume that concentration of A and B initially were same):

(1) 4 times (2) 2 times

(3) 3 times (4) none of these

50. For an endothermic reaction where ΔH represents the enthalpy of reaction in kJ/mol, the minimum value for the energy of activation of the forward reaction will be:

(1) less than ΔH
(2) zero
(3) greater than ΔH
(4) equal to ΔH

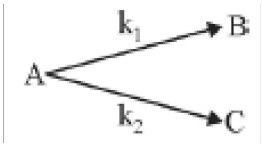
51. A catalyst lowers the activation energy of the forward reaction by 20 kJ mol^{-1}. It also changes the activation energy of the reverse reaction by an amount:
    (1) equal to that of the forward reaction.
    (2) equal to twice that of the forward reaction.
    (3) which is determined only by the average energy of products.
    (4) which is determined by the average energy of products relative to that of reactants.

52. The hydrolysis of ester was carried out separately with 0.05 N HCl and 0.05 N H_2SO_4. Which of the following relation among their rate constant will be true?

(1) $k_{HCl} > kH_2SO_4$ (2) $k_{HCl} = k_{H2SO4}$

(3) $2K_{HCl} = K_{H2SO4}$ (4) $K_{HCl} < k_{H2SO4}$

53. A substance undergoes 1st order decomposition. The decomposition follows two parallel paths as $k_1 = 1.26 \times 10^{-4}$ sec and $k_2 = 3.6 \times 10^{-5}$ sec^{-1}



The percentage distribution of B & C are:

(1) 80% B & 20% C
(2) 76.8% B & 23.2% C
(3) 90% B & 10% C
(4) 60% B & 40% C

54. For a reaction obeying first order kinetics, which of the following statement is correct?
(1) The time taken for the completion of 50% of the reaction is twice of $t_{1/2}$.
(2) A plot of the reciprocal of the concentration of the reactants against time gives a straight line.
(3) The degree of dissociation is equal to $1 - e^{-kt}$
(4) A plot of $[A]_0 / [A]$ versus time gives a straight line.

55. Consider the reaction, X + Y $\rightarrow$ products. If the initial concentration of X is increased to four times its original value, keeping the concentration of Y constant, the rate of reaction increases fourfold. When the concentrations of both X and Y becomes four times their original values, the rate of reaction becomes sixteen times its original value. The observed rate law is:

(1) $k[X]^2[Y]^2$ (2) $k[X]^1[Y]^2$

(3) $k[X]^1[Y]^1$ (4) $k[X]^2[Y]^1$

56. Which of the following changes will increase the emf of the cell Co(s) | $CoCl_2(M_1)$ || $HCl(M_2)$ | $H_2(g)$ | Pt(s)?
(1) Increase M2 from 0.010 to 0.500 M
(2) Increase the pressure of $H_2(g)$ from 1.00 to 2.00 atm
(3) Increase the mass of the Co electrode from 10.0 to 20.0 g
(4) None of these

57. On the electrolysis of an aqueous solution of NaF using one gram equivalents of an electrolyte:
(1) Na is obtained at cathode
(2) F_2 is obtained at anode
(3) H_2 is obtained at cathode
(4) O_2 is obtained at cathode

58. 0.5 Faraday of electricity was passed to deposit all the copper present in 500 ml of $CuSO_4$ solution. What was the molarity of this solution?

(1) 1M (2) 0.5M

(3) 0.25M (4) 2.5M

59. Given:

$A^{2+} + 2e^- \rightarrow A(s)$, E^0 = 0.08 V

$B^+ + e^- \rightarrow B(s)$, E^0 = -0.64 V

$X_2(g) + 2e^- \rightarrow 2X^-$, E^0 = 1.03 V

The incorrect statement among the following is:

(1) $X_2(g)$ will oxidize both A and B

(2) A^{2+} will oxidize B

(3) The reaction: $2X^-_{(1.0\ M)} + A^{2+}_{(1.0\ M)} \rightarrow X_{2(1\ atm)} + A_{(s)}$, will be spontaneous

(4) The oxidizing power of A^{2+}, B^+ and $X_{2(g)}$ is in the order: $X_2 > A^{2+} > B$

60. The correct order of equivalent conductance at infinite dilution of LiCl, NaCl and KCl is:
(1) LiCl > NaCl > KCl
(2) KCl > NaCl > LiCl
(3) NaCl > KCl > LiCl
(4) LiCl > KCl > NaCl

61. The equivalent conductance of monobasic acid at infinite dilution is 400 $ohm^{-1}\ cm^2\ eq^{-1}$. If conductivity of the solution containing 15g of acid (Molecular weight = 50) in 1L is 0.05 mho cm^{-1}. What is the degree of dissociation of acid?

(1) 45.9% (2) 41 %

(3) 60.4% (4) 50.7%

62. A current is passed through 2 voltameters connected in series. The first container contains XSO_4(aq.) and second container contains Y_2SO_4 (aq.). The relative atomic masses of X and Y are in the ratio of 2:1. The ratio of the mass of X liberated to the mass of Y liberated is:

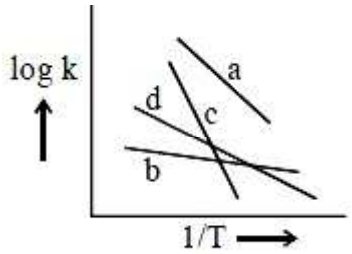
(1) 1:1 (2) 1:2

(3) 2:1 (4) None of these

63. One gm metal M^{+2} was discharged by the passage of 1.81×10^{22} electrons. What is the atomic weight of metal?

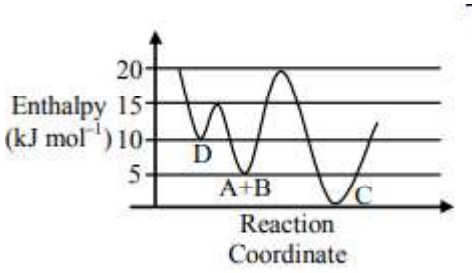
(1) 33.35 (2) 133.4
(3) 66.5 (4) 55

64. Consider the following plots of rate constant versus $\frac{1}{T}$ for four different reactions. Which of the following orders is correct for the activation energies of these reactions?



(1) $E_b > E_d > E_c > E_a$
(2) $E_a > E_c > E_d > E_b$
(3) $E_b > E_a > E_d > E_c$
(4) $E_c > E_a > E_d > E_b$

65. Consider the given plot of enthalpy of the following reaction between A and B.
$A + B \rightarrow C + D$
Identify the incorrect statement.



(1) C is the thermodynamically stable product
(2) Activation enthalpy to form C is 5 KJ mol^{-1} less than that to form D
(3) Formation of A and B from C has highest enthalpy of activation
(4) D is kinetically stable product.

66. The rate constant of the reaction A $\rightarrow$ B is 0.6×10^{-3} mol L^{-1} s^{-1}. If the initial concentration of A is 5M,then concentration of B after 20 minutes is:

(1) 3.60 M (2) 0.36 M

(3) 0.72 M (4) 1.08 M

67. The activation energy of a reaction can be determined from the slope of which of the following graphs?

(1) $\ln k$ vs $\frac{1}{T}$ (2) $\frac{T}{\ln k}$ vs $\frac{1}{T}$

(3) $\ln k$ vs T (4) $\frac{\ln k}{T}$ vs T

68. For a reaction between A and B the order with respect to A is 2 and the order with respect to B is 3. The concentration of both A and B are doubled,the rate will increase by a factor of:
(1) 12
(2) 16
(3) 32
(4) 10

69. In a zero-order reaction, for every 10^{o} C rise of temperature, the rate is doubled. If the temperature is incresed from 10^{o} C to 100^{o} C,the rate of the reaction will become:

(1) 256 times (2) 512 times

(3) 64 times (4) 128 times

70. If the rate of the reaction is equal to the rate constant, the order of the reaction is:

(1) 0 (2) 1

(3) 2 (4) 3

71. Given: $2A \rightarrow B+C$. It would be zero order reaction when:
(1) the rate of reaction is proportional to square of concentration of A.
(2) the rate of reaction remains same at any concentration of A.
(3) the rate remains unchanged at any concentration of B and C.
(4) the rate of reaction doubles if concentration of B is increased to double.

72. For the non-stoichiometric reaction,2A + B $\rightarrow$ C+D, data were obtained in three separate experiments, all at 298 K.

Initial Conc. (A)	**Initial Conc. (B)**	**Initial rate of formation of C ($mol^{-1}s^{-1}$)**
0.1 M	0.1 M	1.2×10^{-3}
0.1 M	0.2 M	1.2×10^{-3}
0.2 M	0.1 M	2.4×10^{-3}

The rate law of the formation of C is:

(1) $\frac{dc}{dt} = k[A][B]$ (2) $\frac{dc}{dt} = k[A^2][B]$

(3) $\frac{dc}{dt} = k[A][B]^2$ (4) $\frac{dc}{dt} = k[A]$

73. The rate of a reaction double when its temperature changes from 300 K to 310 K. Activation energy of such a reaction will be ($R = 8.314\ JK^{-1}mol^{-1}$ and $\log 2 = 0.301$)

(1) 53.6 kJ mol^{-1} (2) 48.6 kJ mol^{-1}

(3) 58.5 kJ mol^{-1} (4) 60.5 kJ mol^{-1}

74. For a first order reaction (A) $\rightarrow$ products the concentration of A changes from 0.1 M to 0.025 M concentration of A is 0.01 M is:

(1) 1.73×10^{-5} M/min
(2) 3.47×10^{-4} M/min
(3) 3.47×10^{-5} M/min
(4) 1.73×10^{-4} M/min

75. The rate of chemical reaction doubles for every 10°C rise of temperature. If the temperature is raised by 50°C,the rate of the reaction increases by about:

(1) 10 times (2) 24 times

(3) 32 times (4) 64 times

76. A reactant (A) forms two products:

$A \xrightarrow{k_1} B$,Activation energy E_{a_1}

and $A \xrightarrow{k_2} C$,Activation energy E_{a_2}

If $E_{a_2} = 2E_{a_1}$, then k_1 and k_2 are related as:

(1) $k_1 = 2k_2 e^{E_{a_2}/RT}$

(2) $k_1 = k_2 e^{E_{a_1}/RT}$

(3) $k_2 = k_1 e^{E_{a_2}/RT}$

(4) $k_1 = Ak_2 e^{E_{a_1}/RT}$

77. The time for half-life period of a certain reaction, A $\rightarrow$ products is 1 h. When the initial concentration of the reactant 'A' is 2.0 mol L^{-1}, how much time does it take for its concentration to come from 0.501 to 0.25 mol L^{-1}, if it is zero order reaction?

(1) 4 h (2) 0.5 h

(3) 0.25 h (4) 1 h

78. Which of the following statement is correct?

(1) E_{cell} and $\Delta_r G$ of cell reaction both are extensive properties

(2) E_{cell} and $\Delta_r G$ of cell reaction both are intensive properties

(3) E_{cell} is an intensive property while $\Delta_r G$ of cell reaction is an extensive property

(4) E_{cell} is an extensive property while $\Delta_r G$ of cell reaction is an intensive property

79. The difference between the electrode potentials of two electrodes when no current is drawn through the cell is called_____
    (1) Cell potential
    (2) Cell emf
    (3) Potential difference
    (4) Cell voltage

80. Which of the following statement is not correct about an inert electrode in a cell?
(1) It does not participate in the cell reaction
(2) It provides surface either for oxidation or for reduction reaction
(3) It provides surface for conduction of electrons
(4) It provides surface for redox reaction

81. An electrochemical cell can behave like an electrolyte cell when_____

(1) $E_{Cell} = 0$

(2) $E_{Cell} > E_{ext}$

(3) $E_{ext} > E_{Cell}$

(4) $E_{Cell} = E_{ext}$

82. Which of the statements about solutions of electrolytes is not correct?
(1) Conductivity of solution depends upon size of ions
(2) Conductivity depends upon viscosity of solution
(3) Conductivity does not depend upon solvation of ions present in solution
(4) Conductivity of solution increases with temperature

83. Using the data given below find out the strongest reducing agent.

$E^{o}_{Cr_2O_7^{2-}/Cr^{3+}} = 1.33V$ $E^{o}_{Cl_2/Cl^-} = 1.36V$ $E^{o}_{MnO_4^-/Mn^{2+}} = 1.51V$ $E^{o}_{Cr^{3+}/Cr} = -0.74V$

(1) Cl^- (2) Cr
(3) Cr^{3+} (4) Mn^{2+}

84. The quantity of charge required to obtain one mole of aluminium from Al_2O_3 is_____

(1) 1 F (2) 6 F

(3) 3 F (4) 2 F

85. While charging the lead storage battery_____
(1) $PbSO_4$ anode is reduced to Pb
(2) $PbSO_4$ cathode is reduced to Pb
(3) $PbSO_4$ cathode is oxidized to Pb
(4) $PbSO_4$ anode is oxidized to PbO_2

86. In the electrolysis of aqueous sodium chloride which of the half cell reactiion will occur at anode?

(1) $Na^+(aq) + e^- \rightarrow Na(s)$; $E^{\ominus}_{Cell} = -2.71$ V

(2) $2H_2O(\ell) \rightarrow O_2(g) + 4H^+(aq) + 4e^-$; $E^{o}_{cell} = -1.23$ V

(3) $H^+(aq) + e^- \rightarrow 1/2H_2(g)$; $E^{\ominus}_{Cell} = 0.00$ V

(4) $Cl^- \rightarrow 1/2Cl_2(g) + e^+$; $E^{o}_{cell} = -1.36$ V

87. Resistance of 0.2 M solution of an electrolyte is 50 Ω .The specific conductance of the solution is1.4Sm^{-1} The resistance of 0.5 M solution of the same electrolyte is 280 Ω .The molar conductivity of 0.5 M solution of the electrolyte is S mol^{-1} is:

(1) 5×10^{-4}

(2) 5×10^{-3}

(3) 5×10^{3}

(4) 5×10^{2}

88. The equivalent conductance of NaCl at concentration C and at infinite dilution are λ_c and λ_∞, respectively. The correct relationship between λ_c and λ_∞ is given as:

(1) $\lambda_c = \lambda_\infty + (B)C$

(2) $\lambda_c = \lambda_\infty - (B)C$

(3) $\lambda_c = \lambda_\infty - (B)\sqrt{C}$

(4) $\lambda_c = \lambda_\infty + (B)\sqrt{C}$

89. The metal that cannot be obtained by the electrolysis of an aqueous solution of its salts is:

(1) Ag (2) Ca

(3) Cu (4) Cr

90. Given below are half-cell reactions:
$Mn^{2+} + 2e^- \rightarrow Mn$, $E^o = 1.18$ V
$2(Mn^{2+} + e^- \rightarrow Mn^{2+})$, $E^o = +1.51$ V
The E^o for $3Mn^{2+} \rightarrow Mn + 2Mn^{3+}$ will be:
(1) - 2.69 V, the reaction will not occur
(2) - 2.69 V, the reaction will occur
(3) - 0.33 V, the reaction will not occur
(4) - 0.33 V, the reaction will occur

91. Who gave experimental proof that hydrogen, methane, water and ammonia gave rise to amino acids :
(1) Stanley Miller (2) Charles Darwin
(3) Lamarck (4) Oparin

92. Life originated in :

(1) Air (2) Earth

(3) Water (4) None of them

93. Stanley Miller synthesized in his experiment :

(1) Virus (2) Protein

(3) Amino acid (4) Cell

94. Nucleoproteins gave first sign of :
(1) Species (2) Evolution
(3) Life (4) None

95. Swan neck flask experiment proved :
(1) biogenesis (2) abiogenesis
(3) special creation (4) both (1) and (2)

96. First organisms to evolve on the earth were:
(1) saprotrophs (2) autotrophs
(3) heterotroph (4) Plants

97. Fossils are dated by :
(1) Amount of calcium residue
(2) Amount of radioactive carbon
(3) Association with other mammals
(4) Structure of bones

98. Dinosaurs originated :
(1) After evolution of mammals
(2) With mammals
(3) Much before mammals
(4) Before mammals and they formed them

99. Archaeopteryx is a connecting link because :
(1) It possessed characters of reptiles and aves
(2) It had characters of reptiles and mammals
(3) It was a reptile not a bird
(4) It had characters of non chordates and chrodates

100. Which of the following organ in man is not vestigial :
(1) Vermiform appendix
(2) Nictitating membrane
(3) Ear muscles
(4) Epiglottis

101. Galapagos islands are connected with which scientist :
(1) Wallace (2) Lamarck
(3) Malthus (4) Darwin

102. A baby has been born with a small tail. It is a case exhibiting :
(1) retrogressive evolution
(2) mutation
(3) atavism
(4) metamorphosis

103. What was the basic principle of Lamarckism :
(1) Inheritance of acquired characters
(2) Survival of the fittest
(3) Natural selection
(4) Variations

104. Which scientist gave the ‘Theory of Continuity of Germplasm’ :
(1) Weismann (2) Mendel
(3) Lamarck (4) Darwin

105. Darwin was influenced by the writings of :
(1) Malthus (2) Wallace
(3) Lyell (4) All of them

106. Book ‘Philosophie Zoologique’ published in the year 1809 was written by :
(1) Darwin (2) Lamarck
(3) De Vries (4) Mendel

107. Genetic drift in mendelian population takes place in :-
(1) Small population
(2) Large population
(3) Oceanic population
(4) Never occurs

108. Industrial melanism is an example of :-
(1) Natural selection
(2) Mutation
(3) Racial difference
(4) Predation

109. Which one is linked to evolution ?

(1) extinction (2) competition

(3) variation (4) reproduction

110. Who called water of primitive sea as pre biotic soup :
(1) Haldane (2) Oparin
(3) Fox (4) Huxley

111. What is most important for origin of life :
(1) Sulphur (2) Oxygen
(3) Water (4) Nitrogen

112. Peripatus is connecting link between :
(1) Mollusca and Arthropoda
(2) Flat worms and annelida
(3) Annelida and Arthropoda
(4) Reptilia and Mammalia

113. According to Haeckel's biogenetic law :
(1) Development of individual metazon shown embryonic characters of ancestors.
(2) Ontogeny repeats phylogeny
(3) Germplasm is immortal
(4) Every organisms is produced by its parents

114. Who was the first to explain recapitulation theory :

(1) Weismann (2) Haeckel

(3) Darwin (4) Malthus

115. Connecting link between annelida and mollusca :
(1) Cuttle fish (2) Octopus
(3) Neopilina (4) Nautilus

116. Birbal Sahni was a :-
(1) zoologist
(2) founder of Central Drug Research Institute (CDRI)
(3) ornithologist
(4) palaeobotanist

117. Theory of evolution is mainly concerned with :
(1) Spontaneous generation
(2) Theory of special creation
(3) Gradual change
(4) Conditions of environment

118. Change with descent is the basis of which theory :
(1) Recapitulation theory
(2) Oparin's theory
(3) Theory of organic evolution
(4) Cell theory

119. Darwin's Theory of Natural Selection was based on:
(1) Inheritance of acquired characters
(2) Mutation
(3) Enormous rate of reproduction in organisms, struggle for existence and survival of the fittest
(4) Changes due to the use and disuse of organs

120. Which of the following is responsible for evolution according to Neo-Darwinism :
(1) Mutation
(2) Natural selection
(3) Mutation and Natural selection
(4) Either (1) or (2)

121. Gene pool is :
(1) Genotype of an individual of a population
(2) Different genes of all individuals of a species found in an area
(3) Pool of artificially synthesised genes
(4) Genes of a genus

122. Genetic drift operates in :-
(1) Small isolated population
(2) Large isolated population
(3) Fast reproductive population
(4) Slow reproductive population

123. De Vries gave his mutation theory on organic evolution while working on .
(1) Oenothera lamarckiana
(2) Drosophila melanogaster
(3) Pisum sativum
(4) Althea rosea

124. The idea not related to the Darwinian evolutionary theory is :
(1) survival of the best
(2) struggle for existence
(3) inheritance of acquired characters
(4) origin of species by natural selection

125. The classical example of adaptive radiation is :
(1) Darwin finches
(2) marsupials of Australia
(3) giant turtle
(4) all of these

126. Struggle for existence and survival of the fittest theories were given by :
(1) Wallace (2) Darwin
(3) Lamarck (4) none of these

127. Which of the following was not given by Darwin's theory of evolution ?
(1) Struggle for existence
(2) Over production
(3) Natural selection
(4) Genetic drift

128. Evolutionary history of an organism is known as.
(1) Phylogeny (2) Ancestry
(3) Palaeontology (4) Ontogeny

129. Sickle cell anemia has not been eliminated from the African population because .
(1) It is controlled by recessive genes
(2) It is not a fatal disease
(3) It provides immunity against malaria
(4) It is controlled by dominant genes

130. An important evidence in favour of organic evolution is the occurence of .
(1) Homologous and vestigial organs
(2) Analogous and vestigial organs
(3) Homologous organs only
(4) Homologous and analogous organs

131. Which one of the following amino acid was not found to be synthesized in Miller's experiment.
(1) Glycine (2) Aspartic acid
(3) Glutamic acid (4) Alanine

132. Adaptive radiation refers to :-
(1) Adaptations due to Geographical isolation
(2) Evolution of different species from a common ancestor
(3) Migration of members of a species to different geographical areas
(4) Power of adaptation in an individual to a variety of environments

133. When two species of different genealogy come to resemble each other as a result of adaptation, the phenomenon is termed :-
(1) Divergent evolution
(2) Microevolution
(3) Co-evolution
(4) Convergent evolution

134. Industrial melanism as observed in peppered moth proves that :-
(1) The true black melanic forms arise by a recurring random mutation
(2) The melanic form of the moth has no selective advantage over lighter form in industrial area
(3) The lighter-form moth has no selective advantage either in polluted industrial area or non-polluted area.
(4) Melanism is pollution-generated feature

135. Which one of the following scientist's name is *correctly* matched with the theory put forth by him?
(1) de Vries . Natural selection
(2) Mendel . Theory of pangenesis
(3) Weismann . Theory of continuity of Germplasm
(4) Pasteur . Inheritance of acquired characters

136. A DNA molecule makes complete turn after every

(1) 3.4 A (2) 20 A

(3) 10 base (4) 340^{o}

137. The diameter of Z-DNA molecule is
(1) 18 A (2) 34 A
(3) 45 A (4) 3.4 A

138. The two stands of DNA are
(1) similar in nature and complementary
(2) antiparallel and complementary
(3) always single stranded
(4) rarely double stranded

139. The similarity between DNA and RNA is that both
(1) are double stranded
(2) have similar sugars
(3) are polymers
(4) have similar pyrimidines

140. In which of the following, double stranded RNA is present?
(1) bacteria (2) chloroplast
(3) mitochondria (4) reovirus

141. In the experiments on the chemistry of DNA Chargaff estimated the base composition of humans sperms and found that adenine constituted 31% and guanine 19%. The quantity of cytosine in DNA of a human somatic cell is likely to be

(1) 19 % (2) 38 %

(3) 31 % (4) 62 %

142. In a given sample of nucleic acid G + A content is not equal to C + T.This indicates that sample is
(1) GC rich
(2) AT rich
(3) single-stranded DNA
(4) double-stranded DNA

143. To prove that DNA is the genetic material,Grffith used
(1) Neurospora crassa
(2) Drosophila melanogaster
(3) Diplococcus pneumoniae
(4) Escherichia coli

144. Nucleic acid was artifically synthesized in vitro by-
(1) Ochoa and Kornberg
(2) Nimberg and Ochoa
(3) Nirenberg and Ochoa
(4) Kornberg and Nirenberg

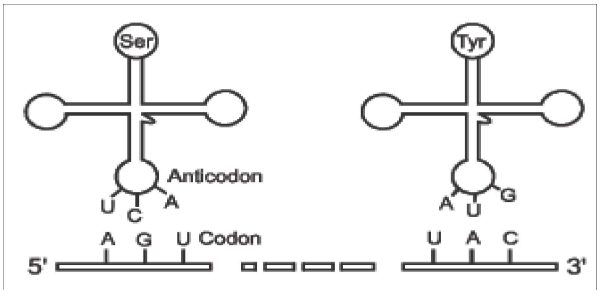
145. Central dogma is proposed by
(1) Mulder (2) Temin
(3) Beri comoner (4) Crick

146. Histone proteins are rich in
(1) Trytophan,Lysine
(2) Arginine, Lysine
(3) Histidine, Arginine
(4) Histidine,Trytophan

147. Bacterial DNA is associated with
(1) few polyamines of basic protein
(2) histone proteins
(3) no proteins
(4) acidic proteins

148. Regarding to features of double helix structure of DNA which of the following is wrong
(1) Two polynucleotide chains have antiparallel polarity
(2) The bases in two strands are paired through phosphodiester bonds
(3) Adenine form two hydrogen bonds with thymine
(4) The pitch of the helix is 3.4 nm

149.



The above diagrams of clover leaf structure of tRNA represent its

(1) Primary structure
(2) Secondary structure
(3) Tertiary structure
(4) Quaternary structure

150. Which RNA occurs abundantly in a cell?

(1) r RNA (2) t RNA

(3) m RNA (4) Primer RNA

151. Radioactive (^{35}S) was detected in?
    (1) Supernatant
    (2) Sediment
    (3) Both 1 and 2
    (4) None of these

152. A DNA strand on which new strand is produced is called
(1) complementary
(2) template
(3) primer
(4) elongating

153. The experimental system used in the studies on the discovery of replication of DNA has been
(1) Drosophila melanogaster
(2) Pneumococcus
(3) Escherichia coli
(4) Neurospora crassa

154. The enzyme which catalyses the formation of RNA from DNA template is known as
(1) reverse transriptase
(2) RNA polymerase
(3) DNA polymerase
(4) nuclease

155. Ligase-an ezyme is used for
(1) joining bits of DNA
(2) splitting DNA thread into small bits
(3) denaturation
(4) none of the above

156. If the base sequence of the strand of DNA is CAT ATC CAT GAC ACT what will be the base sequence of complementary RNA strand?
(1) GUA UAG GUA CUG UGA
(2) GUT TAG GTA GTC TGA
(3) GUA UAG GTA CUG UGA
(4) GTA TAG GTA CTG TGA

157. The protein which help to unwind double helix during replication is
(1) DNA poymerase
(2) DNA gyrase
(3) helicase
(4) DNA topoisomerase

158. Small fragments of DNA synthesised during replication of DNA are called
(1) nucleotides
(2) genes
(3) Okazaki fragemnts
(4) single stranded DNA

159. The strand of DNA which is synthesised continously during replication is called
(1) leading strand (2) lagging strand
(3) sense strand (4) antisense strand

160. DNA polymerase enzyme was discovered by
(1) Komberg (2) Nirenberg
(3) Khorana (4) Ochoa

161. There are 64 codons in genetic code dictionary because
(1) There are 64 types of tRNA found in the cell
(2) There are 44 meaningless and 20 codons for amino acids
(3) There are 64 amino acids to be coded
(4) Genetic code is triplet

162. The DNA chain acting as template for mRNA synthesis has the following order of bases AGCTTCGA. What will be the order of base in mRNA?

(1) TCGT AAGCT (2) UCTG AAG CU

(3) UCG UAG CT (4) UCG AAG CU

163. The first codon discovered by Nirenberg and Mathaei was
(1) GGG (2) CCC
(3) UUU (4) AAA

164. A codon is said to be degenerate because
(1) it degenerates soon after coding
(2) more than one amino acid can be coded by a single codon
(3) the same amino acid can have many codons
(4) all the above

165. Which of the following serves as a termination codon?
(1) AUG (2) CGC
(3) UAG (4) GUG

166. In the genetic dictionary, how many codons are used to code for all the 20 essential amino acids?

(1) 20 (2) 64

(3) 61 (4) 60

167. Which of the following is Pribnow box?

(1) 5'AATAAT3' (2) 5'ATATTA3'

(3) 5'TATAAT3' (4) 5TAATTA3'

168. During elongation occuring in traslation,the enzyme which catalyses the synthesis of peptide bond is
(1) Peptidyl transferase
(2) Peptidyl synthetase
(3) Protease
(4) Amino acyl synthetase

169. Identify the characteristic which is not applicable to the genetic code
(1) Non-Polar (2) Non-overlapping
(3) Commaless (4) Universal

170. In DNA replication, the role of RNA primer is to-
(1) Activate the DNA template
(2) Synthesize DNA nucleotides for the formation of new strand
(3) Initiate the formation of new strand on the template
(4) Perform all these functions

171. Termination of the translation process occurs at the
(1) 5’ end of the DNA template
(2) 3’ end of the mRNA
(3) 3’ end of t-RNA
(4) 5’ end of mRNA

172. The amino acid valine is recognised by the triplets GUU, GUC, GUA and GUG and this character of the code is referred to as
(1) Degeneracy (2) Universality
(3) Non-amibiguity (4) Commalessness

173. The wobble concept was proposed by
(1) Watson and crick
(2) Nirenberg and Lederberg
(3) Nirenberg and Matthaei
(4) Crick

174. Sigma factor is component of
(1) RNA polymerase
(2) Dissociation factor
(3) DNA ligase
(4) DNA polymerase

175. Functional unit of gene that specifies of one polypeptides is
(1) Recon (2) Cistron
(3) Codon (4) Muton

176. The terms cistron,recon and muton were proposed by
(1) Lederberg (2) Benzer
(3) Johannsen (4) Morgan

177. Given below sequence of the processed m-RNA ready for translation:
5'AUG CUA UACCUUUAUCUGUGA-3'.How many different t-RNA molecule require to translate this m-RNA-

(1) 8 (2) 7
(3) 6 (4) 5

178. Which of the following is exclusive property of transcription found in RNA-polymerase
(1) Initiation (2) Elongation
(3) Termination (4) Processing

179. Operon hypothesis proposed by
(1) Watson and Crick
(2) Jacob and Monod
(3) Bateson
(4) Garrod

180. Inducer of lac operon is

(1) Permease (2) Transacetylase

(3) Galactosidase (4) Lactose