ATOMIC ENERGY CENTRAL SCHOOL NO.4

RAWATBHATA

CLASS 11 - CHEMISTRY

MOCK TEST JANUARY- 2021

Time Allowed: 30 minutes **Maximum Marks: 40**

1. In an adiabatic process, no transfer of heat takes place between system and surroundings. Choose the correct option for free expansion of an ideal gas under adiabatic condition from the following. **[1]**

   a) q = 0, ΔT < 0, w $\neq$ 0 b) q $\neq$ 0, ΔT = 0, w = 0

   c) q = 0, ΔT = 0, w = 0 d) q = 0, ΔT $\neq$ 0, w = 0

2. Suppose a 10.00 kg mass drops through a height difference of 3.00 m, and the resulting work is used to turn a paddle in 200.0 g water, initially at 15.00°C. The final water temperature is found to be 15.35°C. Assuming that the work is done is used entirely to increase the water temperature, calculate the conversion factor between joules and calories. **[1]**

   a) 1 calorie $\approx$ 5.2J b) 1 calorie $\approx$ 4.2J

   c) 1 calorie $\approx$ 6.1J d) 1 calorie $\approx$ 3.2J

3. For an isolated system, ΔU = 0, what will be ΔS? **[1]**

   a) ΔS > 0 b) ΔS will increase for some time and then reduce

   c) ΔS < 0 d) ΔS = 0

4. The equilibrium constant for a reaction is 10. What will be the value of ΔG^0? R = 8.314 JK^{-1}, T= 300 K, T = 300 K? **[1]**

   a) -5.744 kJ mol^{-1} b) -5.456 kJ mol^{-1}

   c) -6.132 kJ mol^{-1} d) -5.978 kJ mol^{-1}

5. Thermodynamics is the branch of physical science concerned with **[1]**

   a) mass and its transformations to and from other forms of energy. b) heat and its transformations to and from other forms of energy.

   c) kinetic energy and its transformations to and from other forms of energy. d) potential and its transformations to and from other forms of energy.

6. Enthalpy of combustion of carbon to CO_2 is 393.5 kJ mol^{-1}. Calculate the heat released upon formation of 35.2 g of CO_2 from carbon and dioxygen gas. **[1]**

   a) -275 kJ b) -375 kJ

   c) -398 kJ d) -315 kJ

7. Thermodynamics is applicable to: **[1]**

   a) homogeneous system only b) microscopic system only

   c) macroscopic system only. d) heterogeneous system only

8. For a cyclic process, the change in internal energy of the system is_____. **[1]**

   a) always + ve b) always - ve

   c) none of these d) zero

9. During complete combustion of one mole of butane, 2658 kJ of heat is released. The thermochemical reaction for above change is **[1]**

   a) $C_4H_{10}(g) + O_2(g) \rightarrow 4CO_2(g) + 5H_2O(l)\ \Delta_c H = -2658.0\ kJ\ mol^{-1}$ b) $2C_4H_{10}(g) + 13O_2(g) \rightarrow 8CO_2(g) + 10H_2O(l)\ \Delta_c H = -2658.0$

   c) $C_4H_{10}(g) + O_2(g) \rightarrow 4CO_2(g) + 5H_2O(l)\ \Delta_c H = -2658.0\ kJ\ mol^{-1}$ d) $C_4H_{10}(g) + \frac{13}{2}O_2(g) \rightarrow 4CO_2(g) + 5H_2O(l)\ \Delta_c H = +2658.0\ kJ\ r$

10. Which of the following relationship is true? **[1]**

    a) $C_p = C_v$ b) $C_p > C_v$

    c) $C_p = C_v = 0$ d) $C_v > C_p$

11. A reaction, A+B $\rightarrow$ C+D+q is found to have a positive entropy change reaction will be: **[1]**

    a) spontaneous at high temperature b) spontaneous only at low temperature

c) spontaneous at all temperature

d) nonspontaneous at all temperature

12. Red phosphorus reacts with liquid bromine in an exothermic reaction $2P(s) + 3Br_2(l) \rightarrow 2PBr_3(g)\ ;\ \triangle H = -243kJ$ **[1]**
Calculate the enthalpy change when 2.63 g phosphorus reacts with an excess of bromine in this way.

a) −6.8 kJ

b) −8.3 kJ

c) −12.3 kJ

d) −10.3 kJ

13. A layer of copper welded to the bottom of a skillet weighs 125 g. How much heat is needed to raise the temperature of the copper layer from 25°C to 300°C? The specific heat capacity (C) of Cu is 0.387J/g K. **[1]**

a) 1.33×10^4J

b) 1.11×10^4J

c) 1.55×10^4J

d) 1.76×10^4J

14. Calculate the number of kJ of heat necessary to raise the temperature of 60.0 g of aluminium from 35^o C to 55^o C. [Molar heat capacity of Al is 24 J $mol^{-1}K^{-1}$] **[1]**

a) 1.52 kJ

b) 1.067 kJ

c) 1.78 kJ

d) 1.34 kJ

15. Which one is the correct unit for entropy? **[1]**

a) JK^{-1} mol

b) kJ mol

c) JK^{-1} mol^{-1}

d) KJ mol^{-1}

16. $\Delta_f U^0$ of formation of CH_4 (g) at certain temperature is –393 $kJmol^{-1}$. The value of $\Delta_f H^0$ is **[1]**

a) $< \Delta_f U^0$

b) zero

c) $> \Delta_f U^0$

d) equal to $\Delta_f U^0$

17. In a closed system, which of the following take place? **[1]**

a) The boundaries permit the flow of matter into it but not vice versa.

b) The boundaries permit the flow of matter into or out of it.

c) The boundaries prevent the flow of matter into or out of it.

d) The boundaries prevent the flow of matter out of it but not vice versa.

18. On the basis of thermochemical equations (A), (B) and (C), find out which of the algebraic relationships given in options (i) to (iv) is correct: **[1]**

A. C(graphite) + O_2(g) $\rightarrow$ CO_2(g); $\triangle_r H$ = x KJ mol^{-1}

B. C(graphite) + $\frac{1}{2}O_2(g) \rightarrow CO(g)$; $\Delta_r H$ = y KJ mol^{-1}

C. $CO(g) + \frac{1}{2}O_2(g) \rightarrow CO_2(g); \Delta_r H = zkJmol^{-1}$

a) x = y + z

b) y = 2z – x

c) z = x + y

d) x = y – z

19. The reaction of cyanamide, NH_2CN (s), with dioxygen was carried out in a bomb calorimeter, and ΔU was found to be 742.7 kJ mol^{-1} at 298 K. Calculate enthalpy change for the reaction at 298 K. **[1]**
$NH_2CN(s) + \frac{3}{2}O_2(g) + N_2(g) + CO_2(g) + H_2O(l)$?

a) -741.5 kJ

b) -767.8 kJ

c) +741.5 kJ mol^{-1}

d) -702.2 kJ

20. Calculate the standard enthalpy of formation of $CH_3OH(l)$ from the following data: **[1]**

$CH_3OH\ (l)\ + O_2\ (g)\ \rightarrow\ CO_2\ (g)\ +\ 2H_2O\ (l)$; $\Delta_r H^0$ = -726 kJ mol^{-1}

C(graphite) + $O_2\ (g)\ \rightarrow\ CO_2\ (g)$; $\Delta_c H^0$ = -393 kJ mol^{-1}

$H_2\ (g)\ + O_2\ (g)\ \rightarrow\ H_2O\ (l)$; $\Delta_c H^0$ = -286 kJ mol^{-1}

a) -209 kJ mol^{-1}

b) -339 kJ mol^{-1}

c) -269 kJ mol^{-1}

d) -239 kJ mol^{-1}

21. In a closed system; **[1]**

$A(s) \rightleftharpoons 2B(g) + 3C(g)$

If the partial pressure of C is doubled, then the partial pressure of B will be:

a) $2\sqrt{2}$ times the original value

b) $\frac{1}{2}$ times the original value

c) 2 times of the original value

d) $\frac{1}{2\sqrt{2}}$ times of the original value

22. In which of the following solvents is silver chloride most soluble? **[1]**

a) $0.1 \text{ mol dm}^{-3}\text{HCl solution}$

b) H_2O

c) Aqueous ammonia solution

d) 0.1 mol dm^{-3} $AgNO_3$

23. For the reaction $\text{H}_2\,(\text{g}) + \text{I}_2\,(\text{g}) \rightleftharpoons$ 2HI (g), the standard free energy is $\Delta G^- > 0$ The equilibrium constant (K) would be _____. **[1]**

a) K < 1

b) K > 1

c) K = 0

d) K = 1

24. K_a for CH_3COOH is 1.8×10^{-5} and K_b for NH_4OH is 1.8×10^{-5}. The pH of ammonium acetate will be **[1]**

a) 4.75

b) Between 6 and 7

c) 7.005

d) 7.0

25. Acidity of BF_3 can be explained on the basis of which of the following concepts? **[1]**

a) Lewis concept

b) Bronsted Lowry as well as Lewis concept

c) Arrhenius concept

d) Bronsted Lowry concept

26. One of the reaction that takes place in producing steel from iron ore is the reduction of iron (II) oxide by carbon monoxide to give iron metal and CO_2. FeO(s) + CO (g) $\rightarrow$ Fe (s) + CO_2 (g) K_p = 0.265 at 1050 K. What are the equilibrium partial pressures of CO and CO_2 at 1050 K if the initial partial pressures are: P_{CO} = 1.4 atm and P_{CO_2} = 0.80 atm? **[1]**

a) P_{CO_2} and P_{CO} = 1.557atm and 2.739 atm

b) P_{CO_2} and P_{CO} = 0.461atm and 1.739 atm

c) P_{CO_2} and P_{CO} = 0.416 atm and 1.135 atm

d) P_{CO_2} and P_{CO} = 0.461atm and 0.739 atm

27. It has been found that the pH of a 0.01M solution of an organic acid is 4.15. Calculate the ionization constant of the acid, the concentration of the anion, and its pK_a. **[1]**

a) $K_a = 5.01 \times 10^{-7}$, $[A^-] = 7.08 \times 10^{-5}$ and pK_a = 5.3007

b) $K_a = 5.01 \times 10^{-7}$, $[A^-] = 7.08 \times 10^{-5}$ and pK_a = 6.3001

c) $K_a = 5.01 \times 10^{-7}$, $[A^-] = 7.99 \times 10^{-5}$ and pK_a = 7.5009

d) $K_a = 5.01 \times 10^{-7}$, $[A^-] = 7.39 \times 10^{-5}$ and pK_a = 6.3001

28. The K_{sp} for $Cr(OH)_3$ is 1.6×10^{-30}. The molar solubility of this compound in water is: **[1]**

a) $1.6 \times 10^{-30}/27$

b) $\sqrt[4]{1.6 \times 10^{-30}/27}$

c) $\sqrt[2]{1.6 \times 10^{-30}}$

d) $\sqrt[4]{1.6 \times 10^{-30}}$

29. On increasing the pressure, in which direction will the gas phase reaction proceed to re-establish equilibrium is predicted by applying the Le Chatelier's principle. Consider the reaction. $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3$ (g) Which of the following is correct, if the total pressure at which the equilibrium is established, is increased without changing the temperature? **[1]**

a) K will remain same

b) K will increase

c) K will decrease

d) K will increase initially and decrease when pressure is very high

30. The pH of a saturated solution of $Ba(OH)_2$ is 12. The value of the solubility product (K_{sp}) of $Ba(OH)_2$ is: **[1]**

a) 3.3×10^{-7}

b) 5×10^{-7}

c) 4.0×10^{-6}

d) 5.0×10^{-6}

31. What is the best description of the change that occurs when Na_2O(s) is dissolved in water? **[1]**

a) Oxide ion donates a pair of electrons.

b) Oxidation number of oxygen increases.

c) Oxide ion accepts sharing in a pair of electrons.

d) Oxidation number of sodium decreases.

32. We know that the relationship between K_c and K_p is $K_p = K_c(RT)^{\triangle n_{gas}}$ What would be the value of $\triangle$n gas for the reaction $\text{NH}_4\text{Cl}\,(\text{s}) \rightarrow \text{NH}_3\,(\text{g}) + \text{HCl}\,(\text{g})$ **[1]**

a) 1.5

b) 2.0

c) 0.5 d) 1

33. pH value of which one of the following is NOT equal to one? **[1]**

a) 50 $cm^3$0.4M HCl + 50 $cm^3$0.2 M NaOH b) 0.1 M CH_3COOH

c) 0.05 MH_2SO_4 d) 0.1 M HNO_3

34. Which of the following is not a general characteristic of equilibria involving physical processes? **[1]**

a) The opposing processes occur at the same rate and there is dynamic but stable condition b) Equilibrium is possible only in a closed system at a given temperature.

c) All the physical processes stop at equilibrium. d) All measurable properties of the system remain constant.

35. Amines behave as: **[1]**

a) Lewis acids b) Lewis base

c) aprotic acid d) neutral compound

36. At a particular temperature and atmospheric pressure, the solid and liquid phases of a pure substance can exist in equilibrium. Which of the following term defines this temperature? **[1]**

a) Boiling point b) Phase change temperature

c) Normal melting point and Freezing point d) Equilibrium temperature

37. What will be the value of pH of 0.01 mol dm^{-3} CH_3COOH $\left(K_a = 1.74 \times 10^{-5}\right)$ **[1]**

a) 3.6 b) 3.4

c) 3.0 d) 3.9

38. Arrange the following in increasing order of pH KNO_3 (aq),CH_3COONa (aq), NH_4Cl(aq),$C_6H_5COONH_4$(aq). **[1]**

a) $C_6H_5COONH_4$ < KNO_3 < CH_3COONa < NH_4Cl b) NH_4Cl < $C_6H_5COONH_4$ < KNO_3 < CH_3COONa

c) KNO_3 < CH_3COONa < NH_4Cl < $C_6H_5COONH_4$ d) NH_4Cl < KNO_3 < CH_3COONa < $C_6H_5COONH_4$

39. A vessel at 1000 K contains CO_2 with a pressure of 0.5 atm. Some of the CO_2 is converted into CO on the addition of graphite. If the total pressure at equilibrium is 0.8 atm, the value of K is _____. **[1]**

a) 0.18 atm b) 3 atm

c) 1.8 atm d) 0.3 atm

40. When hydrochloric acid is added to cobalt nitrate solution at room temperature, the following reaction takes place and the reaction mixture becomes blue. On cooling the mixture it becomes pink. On the basis of this information mark the correct answer. **[1]**

$$\underset{pink}{[\mathrm{Co}\ (\mathrm{H_2O})\,6]^{3+}(\mathrm{aq})}\ +\ 4\mathrm{Cl}^{-}(aq) \rightleftharpoons \underset{Blue}{[\mathrm{CoCl_4}]^{2-}(\mathrm{aq})}\ +\ 6\mathrm{H_2O}(l)$$

a) $\Delta H = 0$ for the reaction b) $\Delta H < 0$ for the reaction

c) The sign of ΔH cannot be predicted on the basis of this information. d) ΔH > 0 for the reaction

Solution

Class 11 - Chemistry

MOCK TEST JANUARY- 2021

1. **(c)** q = 0, ΔT = 0, w = 0
   Explanation: For free expansion $P_{ext} = 0$. So w=0 and for adiabatic process q=0 ; Now from from 1st law of thermodynamics,
   $\triangle U = \ q + w = 0 + 0 = \ 0$
   therefore ΔU =0

   Since, there is no change of internal energy, and temperature will also remain constant, making ΔT=0
2. **(b)** 1 calorie ≈ 4.2J
   Explanation: Total work done on the water = w = - mg Δh = - (10) × (9.8) × (-3) = 294J
   The heat required to increase the temperature of water by the same amount = q = mc ΔT = 200 × 1 × 0.35 = 70cal
   Because the work is done has the same effect on water as a direct transfer of heat, The two expression can be set equal to each other, giving
   70cal = 294J
   1 cal ≈ 4.2J
3. **(a)** ΔS > 0
   $$\triangle U = \ 0$$
   Explanation: For an isolated system, and for a spontaneous process, Total entropy change must be positive.

   $$\triangle S = \ \frac{q_{rev}}{T} = \frac{\triangle H}{T} = \ \frac{\triangle U \ + p \triangle V}{T} = \ \frac{0 + p \triangle V}{T}$$
   $$i.e. \ T \triangle S > 0$$
   Moreover, $Or \quad \triangle S > 0$

4. **(a)** -5.744 kJ mol^{-1}
   Explanation: $\Delta_r G^0$ = -RTln K_c.
   ΔG^0 = -2.303 × 8.314 × 300 × log10 = -5744.14 Jmol^{-1} = -5.74414 kJmol^{-1}
5. **(b)** heat and its transformations to and from other forms of energy.
   Explanation: Thermodynamics deals with heat and its transformation from one form to another. The branch of physical science that deals with the relations between heat and other forms of energy (such as mechanical, electrical, or chemical energy) and by extension of the relationships between all forms of energy.
6. **(d)** -315 kJ
   Explanation: When 1 mole of CO_2 is produced energy released is –393.5 kJ mol^{-1}. Moles of CO_2 given = $\frac{35.2}{44}$ = 0.8 moles
   So energy released = 0.8 × -393.5 kJ/mol = -315 kJ/mol
7. **(c)** macroscopic system only.
   Explanation: Thermodynamics does not deal with the properties of the individual atoms and molecules but deals with the matter in bulk.
8. **(d)** zero
   Explanation: For a cyclic process, the initial state is the same as that of the final state. As internal energy is a state function, its value at the initial point is the same as that at the final point and enthalpy change is zero.
9. **(b)** $2C_4H_{10}\left(g\right) + 13O_2\left(g\right) \rightarrow 8CO_2\left(g\right) + 10H_2O\left(l\right) \Delta_c H = -2658.0 \ kJ \ mol^{-1}$
   Explanation: Enthapy of combustion is the energy released when 1mole of a hydrocarbon (butane) reacts completely in presence of excess of oxygen. The chemical equation for exothermic reaction for combustion of one mole of butane is represented as;
   $2C_4H_{10}\left(g\right) + 13O_2\left(g\right) \rightarrow 8CO_2\left(g\right) + 10H_2O\left(l\right) \Delta_c H = -2658.0 \ kJ \ mol^{-1}$
10. **(b)** $C_p > C_v$
    Explanation: We know, $C_p - C_v = R$
    Hence, $C_p > C_v$
11. **(c)** spontaneous at all temperature
    Explanation: We know, Δ G = Δ H - TΔ S
    Δ H = -ve (as reaction is exothermic)
    Δ S = +ve
    so, Δ G = - Δ H - TΔ S
    Δ G will be negative at all temperature hence reaction will be spontaneous at all temperature.
12. **(d)** −10.3 kJ
    Explanation: The given reaction is, $2P(s) + 3Br_2(l) \rightarrow 2PBr_3(g); \Delta H = -243kJ$

moles of $P(s) = \frac{2.63}{31} = 0.084$ moles.
Heat liberated, when 2 mol of P(s) reacted = -243 kJ
Heat liberated, when 0.084 mol of P(s) reacted $= \frac{243}{2} \times 0.084 = -10.206kJ$

13. **(a)** 1.33 $\times$ 10^4J
Explanation: q = mc ΔT
q = (125 g) $\times \left(\frac{0.387\ J}{gK}\right)$ $\times$ (300 - 25)K = 1.33 $\times$ 10^4J

14. **(b)** 1.067 kJ
Explanation: Given, Mass of Al = 60.0g
Molar mass = 27 g/mol
Molar heat capacity, C = 24 J mol^{-1} K^{-1}. ΔT = 55^{o}C - 35^{o}C = 20^{o}C or 20 K.
Heat, q = nC ΔT = $\frac{60}{27} \times 24 \times 20$ = 1066.66 J = 1.067 kJ, where n = 60.0/27 mole

15. **(c)** JK^{-1} mol^{-1}
Explanation: As $\triangle\ S = \frac{q_{rev}}{T}$
It is an extensive entropy, therefore, the SI unit of entropy change is Joule K^{-1} mol^{-1}.

16. **(a)** <$\Delta_f U^0$
Explanation:
$The\ combustion\ of\ metahne\ is\ given\ as\ follows:\ CH_4(g)\ + 2O_2(g) \rightarrow\ CO_2(g) + 2H_2O(l)$
$Since\ \triangle_f H^\circ\ =\ \triangle_f U^\circ + \triangle n_g RT\ and\ \triangle_f U^\circ\ = -393\ kJ\ mol^{-1}\ ,\ \triangle_f H^\circ\ =\ (-393\ )\ +\ \triangle n_g RT.\ (Here,\ \triangle n_g < 0)$
$\Rightarrow\ \triangle_f H^\circ\ <\ \triangle_f U^\circ$

17. **(c)** The boundaries prevent the flow of matter into or out of it.
Explanation: In a closed system, there is no flow of matter from system to surrounding or vice versa. For example, a certain quantity of fluid bounded within a closed cylinder constitutes a closed system.

18. **(a)** x = y + z
Explanation: We have, C(graphite) + O_2(g) $\rightarrow$ CO_2(g); $\triangle_r H$ = x KJ mol^{-1} ..... (1)
C(graphite) $+\frac{1}{2}O_2(g) \rightarrow CO(g); \Delta_r H = ykJmol^{-1}$ .... (2)
Subtacting (1) and (2), we get;
$CO(g) + \frac{1}{2}O_2(g) \rightarrow CO_2(g)$; $\triangle_r H$ = (x-y) $kJmol^{-1}$
$\therefore$ z = x - y $\Rightarrow$ x = y + z

19. **(a)** -741.5 kJ
Explanation: Here, Δn_g = 2 - ($\frac{3}{2}$) = $\frac{1}{2}$
ΔH° = ΔU° + Δn_gRT
ΔH° = - 742.7 kJ/mol + (0.5 mol $\times$ 8.314 $\times$ 10^{-3}kJ/mol $\times$ 298K)
$\Rightarrow$ ΔH° = (- 742.7 kJ + 1238.786 $\times$ 10^{-3}kJ) mol^{-1}
$\Rightarrow$ ΔH° = - 741.46 kJ mol^{-1}

20. **(d)** -239 kJ mol^{-1}
Explanation: Required reaction for the formation of methanol is as follows:
C(s) + 2H_2(g) + $\frac{1}{2}O_2$ (g) $\rightarrow$ CH_3OH(l) Δ_fH° = ?
Given, enthalpy for the combustion of methanol;
a. CH_3OH (l) + $\frac{3}{2}O_2$(g) $\rightarrow$ CO_2(g) + 2H_2O (l) Δ_f H° = - 726 kJ mol^{-1}.....(1)
Enthalpy for the formation of 1 mole of CO_2(g)
b. C(s) + O_2 (g) $\rightarrow$ CO_2(g) Δ_fH° = - 393 kJ mol^{-1}.....(2)
Enthalpy for the formation of 2 moles of H_2O(l)
c. H_2(g) + $\frac{1}{2}O_2$ (g) $\rightarrow$ H_2O(l) Δ_fH° = - 286 kJ mol^{-1}.....(3)
Now, [equation(3) $\times$ 2 + equation (2) + [by reversing equation(1)] we get]
C(s) + 2H_2(g) + $\frac{1}{2}O_2$ (g) $\rightarrow$ CH_3OH (l) Δ_fH° = - 239 kJ mol^{-1}

21. **(d)** $\frac{1}{2\sqrt{2}}$ times of the original value
Explanation: For the closed system A(s) $\rightleftharpoons$ 2B(g)+3C(g)
K_p = (P_B)^2(P_C)^3.....(1)
Thus, K_p is constant, if we double the partial pressure of C, P'$_C$ =2P_C
K_p= (P'$_B$)^2(P'$_C$)^3 = (P'$_B$)^2(2P_C)^3 = 8(P'$_B$)^2(P_C)^3 .....(2)

From (1) and(2), we get

$8(P'_B)^2 = (P_B)^2$

$\Rightarrow (P'_B) = \frac{1}{2\sqrt{2}}(P_B)$

22. **(c)** Aqueous ammonia solution

Explanation: AgCl is soluble in ammonia due to the formation of complex $[Ag(NH_3)_2]^+Cl^-$

23. **(a)** K < 1

Explanation: $\Delta G0 = -RTlnK$

• If $\Delta G0 > 0$, then $-\Delta G0/RT$ is negative, and $e-\Delta G0/RT < 1$, that is , $K < 1$, which implies a non-spontaneous reaction or a reaction which proceeds in the forward direction to such a small degree that only a very minute quantity of product is formed.

24. **(c)** 7.005

Explanation: Ammonium acetate is a salt of weak acid and weak base.

pH = 1/2[pK_w + pK_a - pKb].

$= 1/2[14 - \log(1.8 \times 10^{-5}) + \log(1.8 \times 10^{-5}) = 7.0$

25. **(a)** Lewis concept

Explanation: GN lewis in 1923 defined an acid as a species which accepts an electron pair and base which donates an electron pair. as BF3 is a electron deficient compounds, hence it is a lewis acid.

BF_3 does not have a proton but still acts as an acid and reacts with NH_3 by accepting its lone pair of electrons.

The reaction can be represented by,

BF_3 + :NH_3→ BF_3 :NH_3

26. **(b)** P_{CO_2} and P_{CO} = 0.461atm and 1.739 atm

Explanation: For the given reaction; $\underset{1.4atm}{FeO} + CO(g) = \underset{0.80atm}{Fe(s)} + CO_2(g)$

$Q_p = \frac{P_{CO_2}}{P_{CO}} = \frac{0.80}{1.4} = 0.571$

It is given that K_p = 0.265

Since $Q_P > K_p$

The reaction will proceed in the backward reaction.

Therefore, we can say that the pressure of CO will increase while the pressure of CO_2 will decrease.

Now, let the increase in pressure of CO = decrease in pressure of CO_2 be P.

Then we can write

$K_p = \frac{P_{CO_2}}{P_{CO}} = \frac{0.80-P}{1.4+P}$

$\Rightarrow 0.265 = \frac{0.80-P}{1.4+P}$

$\Rightarrow$ 0.265 (1.4 + P) = 0.80 - P

$\Rightarrow$ 0.371 + 0.265P = 0.80 - P

$\Rightarrow$ 1.265P = 0.429 $\Rightarrow$ p = 0.339atm

Therefore, equilibrium partial pressure of CO_2 = 0.80 - 0.339= 0.461 atm

Also, equilibrium partial pressure of CO = 1.4 + 0.339 = 1.739 atm

27. **(b)** $K_a = 5.01 \times 10^{-7}$, $[A^-] = 7.08 \times 10^{-5}$ and pK_a = 6.3001

Explanation: pH = -log[H^+]

4.15 = -log[H^+]

[H^+] = 7.08×10^{-5} = [A^-]

K_a = [H^+][A^-][HA]

$K_a = 5.01 \times 10^{-7}$

pK_a = - log [5.01×10^{-7}] = 6.3001

28. **(b)** $\sqrt[4]{1.6 \times 10^{-30}/27}$

Explanation: $\underset{s}{Cr(OH)_3} = \underset{s}{Cr^{3+}} + \underset{3s}{3\ OH^-}$

$K_{sp} = (s)(3s)^3 = 27s^4$

Now, $1.6 \times 10^{-30} = 27s^4$

$\Rightarrow s^4 = \frac{1.6\times10^{-30}}{27}$

$\Rightarrow s = \sqrt[4]{\frac{1.6\times10^{-30}}{27}}$

29. **(a)** K will remain same

Explanation: In the reaction $Na(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

According to the the Le Chatelier's principle, at constant temperture, the equilibrium constant will change but K will remain same.

30. **(b)** 5×10^{-7}
Explanation: pH + pOH = 14
pOH = 14 - 12 = 2
pOH = -log[OH^-]
OH^- = 10 - pOH = 10^{-2} ..... (1)
At equilibrium, $Ba(OH)_2 = Ba^{+2} + 2OH^-$
let [OH^-] = x , therefore, From above equation; 2[OH^-] = 2x = 10^{-2} (from equation 1)
Therefore $x = \frac{10^{-2}}{2} = 0.5 \times 10^{-2}$
$K_{sp} = [Ba^{+2}] [OH^-]^2 = [0.5 \times 10^{-2}][10^{-2}]^2 = 0.5 \times 10^{-6} = 5 \times 10^{-7}$

31. **(a)** Oxide ion donates a pair of electrons.
Explanation: In water Na_2O dissociates as -
$Na_2O + H_2O \rightarrow 2Na^+ + O_2^-$
The oxide ion formed can form hydrogen bonds with water and is stabilized. Thus it is easy for Na_2O and all other oxides to dissolve in water as it brings about further stability in the system.

32. **(b)** 2.0
Explanation: Δn_{gas} = 2 = $n_{gas}(\text{Product})$ - $n_{gas}(reactant)$

33. **(b)** 0.1 M CH_3COOH
Explanation: $CH_3COOH + H_2O \rightleftharpoons CH_3COO^- + H_3O^+$
Since the dissociation constant of acetic acid is so small, we can assume that the concentration of acetic acid is still approximately 0.1 M even after dissociating.
Also [CH_3COO^-] = [H_3O^+]
Therefore,
$K_a = \frac{[CH_3COO^-][H_3O^+]}{[CH_3COOH]}$
$K_a = \frac{[CH_3COO^-][H_3O^+]}{[CH_3COOH]} = \frac{[H_3O^+]^2}{[CH_3COOH]}$
$\Rightarrow 1.7 \times 10^{-5} = \frac{[H_3O^+]^2}{0.1}$
$\Rightarrow [H_3O^+] = \sqrt{1.7 \times 10^{-6}}$
$\Rightarrow [H_3O^+] = 1.32 \times 10^{-3}$
$now,\ pH = -\log[H_3O^+] = -\log 1.32 \times 10^{-3} = 2.88$

34. **(c)** All the physical processes stop at equilibrium.
Explanation: This is a wrong statement that all the physical processes stop at equilibrium, the processes never stops at equilibrium i.e. the rate of formation of products and rate of formation of reactants become equal.

35. **(b)** Lewis base
Explanation: Amines behave as lewis base because they have a lonepair of electrons.

36. **(c)** Normal melting point and Freezing point
Explanation: These are normal melting point and freezing point since they are measured at atmospheric pressure.

37. **(b)** 3.4
Explanation: Acetic acid is a weak acid with $K_a = 1.74 \times 10^{-5}$ and in this case cweak acid >>> K_0,
that is the equation to use is: [H^+] = (Ka.Cweakacid)$^{1/2}$ $= (1.7 \times 10^{-5} \times 0.01)^{1/2} = 4.3 \times 10^{-4}$
$pH = -\log[H^+] = -\log(4.3 \times 10^{-4}) = -[\log 4.3 + (-4)\log 10]$ = -[0.633^{-4}] = 3.367

38. **(b)** $NH_4Cl < C_6H_5COONH_4 < KNO_3 < CH_3COONa$
Explanation: KNO_3: Salt of strong acid-strong base, solution is neutral, ph = 7
CH_3COONa salt of weak acid - strong base, solution is basic, ph > 7
NH_4Cl: Salt of strong acid-weak base , solution is acidic pH < 7
$C_6H_5COONH_4$ both weak put NH_4OH is slightly stronger than C_6H_5COOH, pH close to 7 but slightly > 7
Hence in order of pH is $NH_4Cl < C_6H_5COONH_4 < KNO_3 < CH_3COONa$

39. **(c)** 1.8 atm
Explanation: $CO_2 + C \rightarrow 2CO$
t = 0, 0.5, 0
t = t, 0.5-x, 2x
P_{total} = 0.5 - x + 2x = 0.8

i.e. x = 0.3 atm

i.e. $K = \frac{(P_{co})^2}{P_{co2}} = \frac{0.6 \times 0.6}{0.2} = 1.8atm$

40. **(d)** $\Delta H > 0$ for the reaction

Explanation: For an endothermic reaction - If temperature is decreased reaction will shift to backward direction

$$\underset{pink}{[Co(H_2O)_6]^{3+}(aq)} + \underset{colourless}{4Cl^-(aq)} \rightleftharpoons \underset{Blue}{[CoCl_4]^{2-}(aq)} + 6H_2O(l)$$

At room temperature, the equilibrium mixture is blue due to [CoCl 4]$^{2-}$. When cooled in a freezing mixture, the colour of the mixture turns pink due to [Co(H2O)6]$^{3+}$.

ATOMIC ENERGY CENTRAL SCHOOL NO.4 Rawatbhata

MCQ Examination September (2020-2021)

CLASS 11 - ENGLISH CORE

English

Time Allowed: 30 minutes **Maximum Marks: 40**

1. What did Wu Daozi tell the Emperor about the cave? **[1]**

   a) There was a spirit in the cave
   b) The cave was full of bushes
   c) There were animals in the cave
   d) The cave was full of water

2. Describe the Chinese view of art? **[1]**

   a) The landscape is inner and spiritual
   b) The landscape is real
   c) The landscape is mesmerizing
   d) The landscape is awful

3. Why was master blacksmith rejected by the painter? **[1]**

   a) Because of his high vocation
   b) Because he was ugly
   c) Because of his low vocation
   d) Because of his middle vocation

4. Which element is often overlooked? **(Landscape of the Soul)** **[1]**

   a) Fourth element
   b) First element
   c) Third element
   d) Second element

5. What was the motive of the Chinese philosophers to write their storybook? **[1]**

   a) To guide their disciples in the right direction
   b) To guide their disciples in opposite direction
   c) To guide their disciples in the wrong direction
   d) To guide their disciples in a similar direction

6. What is compared to Pranayama? **[1]**

   a) Heaven and Earth
   b) The Middle void
   c) Universe
   d) Mountain Water

7. Why a famous painter of Flanders wouldn't draw the eye of a dragon he had painted? **[1]**

   a) He had a fear that with open eyes, the dragon would fly out of the painting.
   b) The painter was not skilled enough to draw the dragon's eye.
   c) He had a fear that with open eyes, the dragon would destroy the world.
   d) He had a fear that with open eyes, the dragon would burn the humanity.

8. The writer is contrasting which two arts in the lesson **Landscape of the Soul**? **[1]**

   a) Chinese Art and European Art
   b) Fabric Art and Visual Art

c) Conceptual Art and Chinese Art
d) European Art and Japnese Art

9. What are **Yang** and **Yin** stand for? **[1]**

a) Yang - Sun, Yin - Earth
b) Yang - Mountain, Yin - Water
c) Yang - Water, Yin - Soil
d) Yang - River, Yin - Land

10. What is the concept of Shanshui? **[1]**

a) Pond Water
b) Mountain Water
c) Sea Water
d) River Water

11. Which art is conveyed by Wu Daozi's story? **[1]**

a) Christian Art
b) Wu Daozi Art
c) Chinese Art
d) European Art

12. What is the unique feature of a horizontal scroll?**(Landscape of the soul)** **[1]**

a) It doesn't give an integrated view of the scene.
b) It allows users to scroll horizontally.
c) It is not used often and usually not visible.
d) It gives an integrated view of the scene.

13. What do you understand by **the eye of the landscape** suggested by Francois Cheng? **[1]**

a) It refers to the man and the fundamental role he plays
b) It refers to Yang and the role played by it
c) It refers to the beauty of the landscape
d) It refers to the animals and the fundamental role played by them

14. How did Wu Daozi get into the cave? **[1]**

a) By reciting some words
b) By clapping his hands
c) By opening the door
d) By removing the stones

15. Who can play a crucial role in keeping air, water and soil clean? **[1]**

a) Industries
b) Buildings
c) Animals
d) Trees

16. What should be our ethical obligation towards the ailing planet? **[1]**

a) Save animals
b) Protect and safeguard the Earth
c) Generate more factories
d) Increase more population

17. Which Article of the Indian Constitution vows to protect the environment and safeguard the flora and wildlife of the country, according to the text **The Ailing Planet**? **[1]**

a) Article 48A
b) Article 48
c) Article 35A
d) Article 49

18. Which planet is ailing, according to the narrator? **[1]**

a) Earth
b) Venus

c) Saturn
d) Mars

19. Who had taught mankind about the revolution of planets in the sixteenth century according to the prose **The Ailing Planet**? **[1]**

a) Aryabhatta
b) Galileo Galilei
c) Archimedes
d) Copernicus

20. Who has made earth's condition exactly like a patient in need of immediate treatment? **[1]**

a) All of these
b) Man's recklessness
c) Indifference
d) Humanly desires

21. In which year did New Zealand start the Green Movement? (Hornbill The Ailing Planet) **[1]**

a) 1975
b) 1980
c) 1968
d) 1972

22. Who made the following statement in the prose **The Ailing Planet** that read: We were saying that we are losing the forests at an acre a second, but it is much closer to an acre-and-a-half to a second. **[1]**

a) Margaret Thatcher
b) Lester Brown
c) Edgar S. Woolard
d) James Speth

23. Where was the green movement started? (Hornbill The Ailing Planet) **[1]**

a) New Zealand
b) America
c) London
d) India

24. According to scientists, with how many living species does mankind share the earth, as mentioned in the text **The Ailing Planet**? **[1]**

a) 5.7 billion
b) 3.7 million
c) 1.4 million
d) 3.7 billion

25. Who is the author of the prose **The Ailing Planet**? **[1]**

a) Khushwant Singh
b) Nani Palkhivala
c) Terence Rattigan
d) Nick Middleton

26. In a zoo in Lusaka, what is kept in one of the cages? **[1]**

a) mirror
b) white lion
c) whale
d) water

27. What does the mirror kept within a cage at a zoo of Lusaka in Zambia signify, as mentioned in the prose **The Ailing Planet**? **[1]**

a) The world's most smartest animal
b) The world's most dangerous animal
c) The world's most beautiful animal
d) The world's most harmless animal

28. What made the narrator visit Mrs. Dorling's house twice? **[1]**

a) The narrator wanted to take away the vauable things
b) The narrator wanted to give more valuable things to Mrs. Dorling

c) The narrator wanted to see and touch the valuable things of her mother

d) The narrator wanted to destroy the valuable things

29. Why did the narrator go to Mrs. Dorling's house? **[1]**

a) To collect her valuable belongings

b) To stay with Mrs. Dorling

c) To see Mrs. Dorling's house

d) To see the valuable things of her mother

30. How was the narrator able to recognize her own familiar woolen table-cloth? **[1]**

a) With the help of the length

b) With the help of a burn mark

c) With the help of the colour

d) With the help of the stitching pattern

31. What reason did Mrs. Dorling give for taking away the precious belongings of the narrator's mother? **[1]**

a) She would use her belongings

b) She would never return her belongings back

c) She would sell her belongings in the market

d) She would store her belonging's at a safer place

32. What was the status of Mrs. S after the war? **[1]**

a) She became a trust worthy lady

b) She got her own house

c) She became very rich

d) She became very poor

33. What was the status of Mrs. S before the war? **[1]**

a) She was rich

b) She was poor

c) She was not having her own house

d) She was very selfish

34. Why did the narrator wait for a long time before going to the address number 46, Marconi Street? **[1]**

a) She wasn't sure about the address

b) She was not interested

c) She was not able to recognize Mrs. Dorling

d) She was very excited

35. How did the narrator get Mrs. Dorling's address? **[1]**

a) Given by Mrs. Dorling

b) She had visited Mrs. Dorling's house many times

c) Given by Mrs. S (Mother)

d) Got it from her neighbours

36. What was Mrs. S's opinion about Mrs. Dorling? **[1]**

a) She was very innocent

b) She was a very kind and generous lady

c) She was very smart and beautiful

d) She was very clever

37. How was the atmosphere of Mrs. Dorling's house strange for the narrator? **[1]**

a) The interior of the house was attractive

b) The things were arranged in a tasteless way

c) The things were antique

d) The things were so ugly

38. How did Mrs. Dorling's daughter treat the narrator? **[1]**

a) By exhibiting her anger

b) By offering her a cup of tea

c) By not opening the door

d) By showing her the house

39. What did the narrator see as she followed the girl along the passage? **(The Address)** **[1]**

a) Iron candle-holder

b) Antique plates

c) Silver cutlery

d) Vases

40. What was Mrs. Dorling trying to hide from the protagonist when she visited her house for the first time? **[1]**

a) The furniture

b) The green cardigan

c) The brown coat

d) The silver cutlery

Solution

Class 11 - English Core

English

1. **(a)** There was a spirit in the cave
   Explanation: The painter told the Emperor that a spirit lived in the cave which was at the foot of the mountain by this he wanted to show the mysterious work of the universe.
2. **(a)** The landscape is inner and spiritual
   Explanation: Chinese artist doesn't choose a single viewpoint. His landscape is not real and his art requires the active participation of the viewer.
3. **(c)** Because of his low vocation
   Explanation: A blacksmith 'Quinten Metsys', fell in love with the painter's daughter but the painter was not accepting their relationship because of his low vocation.
4. **(c)** Third element
   Explanation: The middle void is the third element which is often overlooked because the interaction between 'Yang' and 'Yin' takes place there.
5. **(a)** To guide their disciples in the right direction
   Explanation: The two Chinese philosophers' motive was to guide their disciples in the right direction and they also revealed the spirit in which art was considered in ancient China.
6. **(b)** The Middle void
   Explanation: The Middle void is compared to Pranayama because it is the space where meditation takes place.
7. **(a)** He had a fear that with open eyes, the dragon would fly out of the painting.
   Explanation: The famous painter feared if he drew the eye of the dragon he had painted come alive and would fly out of the painting. Since the painting was so actual and the vision of the artist is spiritual.
8. **(a)** Chinese Art and European Art
   Explanation: The Writer is contrasting 'European Art' which creates an actual view whereas 'Chinese Art' is not creating a real landscape.
9. **(b)** Yang - Mountain, Yin - Water
   Explanation: The interaction of Yin (the receptive and feminine aspect of universal energy) and its counterpart Yang (active and masculine) is a fundamental notion of Daoism.
10. **(b)** Mountain Water
    Explanation: The concept of Shanshui is Mountain Water as it represents Landscape and the two complementary poles.
11. **(c)** Chinese Art
    Explanation: Wu Daozi conveys the idea that the emperor could only rule over his territory, and not understand the spirit of art. Only the artist alone can understand the mysterious work of the universe. This is an identification mark of Chinese art as it achieves the essence of inner life and spirit.
12. **(a)** It doesn't give an integrated view of the scene.
    Explanation: As there is a gap between one picture and another, It leaves scope for the viewer to use his mind and imagination. The landscape is not realistic but an inner one. It adds a dimension of time which is unknown in any other form of painting.
13. **(a)** It refers to the man and the fundamental role he plays
    Explanation: Francois refers to the man and the fundamental role he plays because man is not frightened of high mountains as depicted in a natural landscape. He links the two poles and he alone has got the eye to understand the landscape.
14. **(b)** By clapping his hands
    Explanation: The painter clapped his hands and the entrance of the cave opened. The painter went inside and disappeared from the world. This shows the mysterious work of the universe.

15. **(a)** Industries
Explanation: Industries can play a crucial role in keeping air, water and soil clean.

16. **(b)** Protect and safeguard the Earth
Explanation: We should safeguard our earth in order to protect it from sickness and deterioration. Earth is our habitat and it is our moral duty to conserve our environment.

17. **(a)** Article 48A
Explanation: Article 48A of the Constitution of India had provided that "the State shall endeavor to protect and improve the environment and to safeguard the forests and wildlife of the country".

18. **(a)** Earth
Explanation: According to the narrator, the earth is ailing or sick. Our planet is currently a patient with its health declining every day. So, It is need of the hour to safeguard our habitat.

19. **(d)** Copernicus
Explanation: In the sixteenth century, Copernicus had taught mankind that the earth and the other planets revolved around the sun.

20. **(a)** All of these
Explanation: Man's recklessness, greed, and indifference towards the needs of the planet have made its condition similar to a patient in need of immediate treatment.

21. **(d)** 1972
Explanation: New Zealand started the Green Movement in 1972.

22. **(d)** James Speth
Explanation: James Speth, the President of the World Resources Institute had said that we are losing about an acre-and-half-a-land per second with each devastating step that we take towards nature. It is time that we should think of the ailing planet, the earth which provides us with the basics of life in the very first place.

23. **(a)** New Zealand
Explanation: Green Movement was started in New Zealand.

24. **(c)** 1.4 million
Explanation: The author had stated that scientists have catalogued about 1.4 million living species with which mankind had always shared the earth.

25. **(b)** Nani Palkhivala
Explanation: The enlightening and enriching piece of work has been authored by the well-known Indian jurist and liberal economist Nani Palkhivala.

26. **(a)** mirror
Explanation: In a zoo, in Lusaka, there is a mirror kept in one of the cages.

27. **(b)** The world's most dangerous animal
Explanation: A zoo in Lusaka, Zambia had a notice outside a cage that said "The world's most dangerous animal" with a mirror inside the cage. It reflected the image of human beings and signified the degree of harm that we, as human beings can cause to the planet. It satirically indicated human beings as the world's most dangerous animal.

28. **(c)** The narrator wanted to see and touch the valuable things of her mother
Explanation: As in her first visit, Mrs. Dorling refused to recognise the narrator, but the next time Mrs. Dorling's daughter opened the door and allowed her to enter. The narrator wanted to see and touch those things.

29. **(a)** To collect her valuable belongings
Explanation: She went to collect her mother's valuable belongings which were given to Mrs. Dorling during the war-time.

30. **(b)** With the help of a burn mark
Explanation: The narrator found a burn mark on the table cloth which had not been repaired and it was still there on the table cloth.

31. **(d)** She would store her belonging's at a safer place
Explanation: Mrs Dorling explained that they would lose everything if they had to leave the place suddenly during the war. So, she suggested that she would carry and store Mrs S's belongings at a safer place.

32. **(d)** She became very poor
Explanation: When the war started, Mrs Dorling established contact with Mrs S and started visiting her quite frequently. She started taking the possessions with her whenever she would visit Mrs S's home as she believed if they would leave the place, such things should not be wasted. The narrator suffered a lot, her mother died and she had to live in a rented place.

33. **(a)** She was rich
Explanation: The family of Mrs. S was rich and leading a stable life before the war. They had numerous valuable possessions in their house.

34. **(b)** She was not interested
Explanation: Initially, after the liberation, she was not at all interested in her mother's belongings lying stored in Mrs. Dorling's home.

35. **(c)** Given by Mrs. S (Mother)
Explanation: Mrs. S introduced the narrator to her old acquaintance, Mrs. Dorling, and told her Mrs. Dorling's address. Mrs. S asked the narrator to remember the address for the future.

36. **(b)** She was a very kind and generous lady
Explanation: Every time Mrs. Dorling came to Mrs. S's house, she took the beautiful antique plates, crockery, cutlery, and silverware on the pretext of storing them safely. So, Mrs. S felt obliged towards her.

37. **(b)** The things were arranged in a tasteless way
Explanation: The narrator found the things kept in a strange atmosphere as everything was arranged in a very tasteless manner. The ugly furniture and the muggy smell created the feeling of strangeness.

38. **(b)** By offering her a cup of tea
Explanation: Mrs Dorling was out doing some errands, so, her daughter welcomed the narrator by offering her a cup of tea.

39. **(a)** Iron candle-holder
Explanation: The narrator saw an old fashioned iron candle-holder hanging next to a mirror which they never used. It belonged to the narrator's mother.

40. **(b)** The green cardigan
Explanation: The green cardigan belonged to the protagonist's mother. The protagonist recognized her mother’s green knitted cardigan that was worn by Mrs Dorling. The wooden buttons had become pale because of washing.

ATOMIC ENERGY CENTRAL SCHOOL NO.4

RAWATBHATA

CLASS 11 - PHYSICS

PHYSICS

Time Allowed: 30 minutes **Maximum Marks: 40**

1. You may have seen in a circus a motorcyclist driving in vertical loops inside a death well' (a hollow spherical chamber with holes, so the spectators can watch from outside). What is the minimum speed required at the uppermost position to perform a vertical loop if the radius of the chamber is 25 m? **[1]**

   a) 18 m/s
   b) 15.65 m/s
   c) 14.5 m/s
   d) 26 m/s

2. Force is required: **[1]**

   a) only to keep an object moving
   b) only to stop a moving object
   c) to start a stationary object and to stop a moving object
   d) only to start a stationary object moving

3. Inertia refers to: **[1]**

   a) resistance to change
   b) dullness
   c) ease of motion
   d) slow motion

4. According to the first law of motion: **[1]**

   a) body acted on by no net force moves with constant velocity (which may be zero) and zero acceleration
   b) body acted on by zero net force moves with non zero acceleration
   c) body acted on by no net force moves with increasing velocity and negative acceleration
   d) body acted on by net force moves with constant velocity (which may be zero)

5. The second law of motion in terms of acceleration $\vec{a}$ and mass m of a body is: **[1]**

   a) $\vec{F} = m\vec{a}$
   b) $\vec{F} = m\vec{a}\vec{a}$
   c) $\vec{F} = k\, m^{-1}\vec{a}$
   d) $\vec{F} = m^2\vec{a}$

6. A bob of mass 0.1 kg hung from the ceiling of a room by a string 2 m long is set into oscillation. The speed of the bob at its mean position is 1 m s^{-1}. What is the trajectory of the bob if the string is cut when the bob is at its mean position? **[1]**

   a) bob will fall vertically downwards
   b) bob will fall vertically upwards
   c) bob will go down in a parabolic path
   d) bob will go upwards

7. A truck starts from rest and accelerates uniformly at 2.0 ms^{-2}. At t = 10 s, a stone is dropped by a person standing on the top of the truck (6 m high from the ground). What is the magnitude **[1]**

of the velocity (in ms^{-1}) of the stone at t = 11s? (Neglect air resistance.)

a) 22.4 m/s

b) 19.6 m/s

c) 18.5 m/s

d) 21.0 m/s

8. A train runs along an unbanked circular track of radius 30 m at a speed of 54 km/h. The mass of the train is 106 kg. What is the angle of banking required to prevent wearing out of the rail? ($g = 10 m/s^2$) **[1]**

a) 37^o

b) 32^o

c) 27^o

d) 42^o

9. The momentum of a body is: **[1]**

a) a vector equal in magnitude to the product of mass and instantaneous velocity and direction being that of instantaneous velocity

b) a scalar equal in magnitude to the product of mass and velocity

c) a vector equal in magnitude to the product of mass and average speed and direction being that of velocity

d) a vector equal in magnitude to the product of mass and acceleration and direction being that of velocity

10. The force acting on a freely falling body in terms of mass m and acceleration due to gravity g is: **[1]**

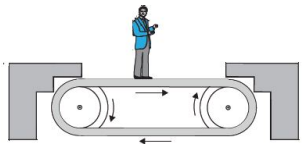
a) $F = m^{-2}g$

b) $F = m^2g$

c) F = mg

d) $F = mg^2$

11. The figure shows a man standing stationary with respect to a horizontal conveyor belt that is accelerating with 1 ms^{-2}. What is the net force on the man? Mass of the man = 65 kg **[1]**



a) 70 N

b) 55 N

c) 65 N

d) 60 N

12. According to Newton's second law of motion: **[1]**

a) The momentum of a body is directly proportional to the applied force and takes place in the direction in which the force acts

b) The integration of the momentum of a body is directly proportional to the applied force and takes place in the direction in which the force acts

c) The momentum of a body is directly proportional to the applied force and takes place in the direction opposite to the force

d) The rate of change of momentum of a body is directly proportional to the applied force and takes place in the direction in which the force acts

13. A helicopter of mass 1000 kg rises with a vertical acceleration of 15 ms^{-2}. The crew and the **[1]**

passengers weigh 300 kg. Give the magnitude and direction of the force on the floor by the crew and passengers. ($g = 10ms^{-2}$)

a) 4500 N upward
b) 1500 N vertically downwards
c) 3000 N upward
d) 7500 N vertically downwards

14. A stream of water flowing horizontally with a speed of 15 ms^{-1} gushes out of a tube of cross-sectional area 10^{-2} m^2 and hits a vertical wall nearby. What is the force exerted on the wall by the impact of water, assuming it does not rebound? **[1]**

a) 2.55×10^3 N
b) 2.75×10^3 N
c) 2.45×10^3 N
d) 2.25×10^3 N

15. A man of mass 70 kg stands on a weighing scale in a lift which is moving downwards with a uniform acceleration of 5 ms^{-2}. What would be the reading on the scale? **[1]**

a) 350 N
b) 380 N
c) 450 N
d) 530 N

16. State true or false: **[1]**
Action and reaction acts on the same body.

17. State true or false: **[1]**
Newton's third law of motion states that for every action there is always an equal and opposite reaction.

18. State true or false: **[1]**
Velocity is not uniform along a straight line.

19. State true or false: **[1]**
According to Newton's second law of motion, F = k $\frac{dp}{dt}$ = ma

20. State true or false: **[1]**
Acceleration of a body or system is always in the direction of force.

21. A mass of 5 kg is moving along a circular path of radius 1 m. If the mass moves with 300 revolutions per minute, its kinetic energy would be **[1]**

a) 0
b) $250\pi^2$ J
c) $5\pi^2$
d) $100\pi^2$

22. In which case is the work done zero? **[1]**

a) Force and displacement are perpendicular to each other
b) Force and displacement are in the same direction
c) Force and displacement are at an angle of 45°
d) Force and displacement are at an angle of 75°

23. A proton is kept at rest. A positively charged particle is released from rest at a distance d in its field. Consider two experiments; one in which the charged particle is also a proton and in another, a positron. In the same time t, the work done on the two moving charged particles is **[1]**

a) less for the case of a positron, as the positron moves away more rapidly
b) more for the case of a positron, as the positron moves away a larger

and the force on it weakens.

distance.

c) same, as the same force law is involved in the two experiments.

d) more for the case of a positron, as the positron moves away from a larger distance.

24. You are asked to design spring bumpers for the walls of a parking garage. A freely rolling 1200-kg car moving at 0.65 m/s is to compress the spring no more than 0.090 m before stopping. What should be the force constant of the spring? Assume that the spring has negligible mass. **[1]**

a) 5.3×10^4 N/m

b) 5.8×10^4 N/m

c) 6.6×10^4 N/m

d) 6.25×10^4 N/m

25. A body of mass 0.5 kg travels in a straight line with velocity v = $ax^{\frac{3}{2}}$ where a = $5m^{\frac{-1}{2}}s^{-1}$. What is the work done by the net force during its displacement from x = 0 to x = 2 m is: **[1]**

a) 50 J

b) 100 J

c) 10 J

d) 1.5 J

26. The scalar product of two vectors A and B is **[1]**

a) a tensor

b) vector

c) a scalar

d) a complex number

27. A 6.0-kg box moving at 3.0 m/s on a horizontal, frictionless surface runs into a light spring of force constant 75 N/cm Use the work–energy theorem to find the maximum compression of the spring. **[1]**

a) 7.5 cm

b) 8.5 cm

c) 9.5 cm

d) 6.5 cm

28. A block having a mass of 0.80 kg is given an initial velocity of 1.2 m/s to the right and collides with a spring of negligible mass and force constant k = 50 N/m. Assuming the surface to be frictionless, calculate the maximum compression of the spring after the collision. **[1]**

a) 0.15 m

b) 0.20 m

c) 0.10 m

d) 0.25 m

29. A person trying to lose weight (dieter) lifts a 10 kg mass, one thousand times, to a height of 0.5 m each time. Assume that the potential energy lost each time she lowers the mass is dissipated. How much work does she do against the gravitational force? **[1]**

a) 49000 J

b) 55000 J

c) 59000 J

d) 45000 J

30. A man squatting on the ground gets straight up and stand. The force of reaction of ground on the man during the process is **[1]**

a) variable but always greater than mg.

b) constant and equal to mg in magnitude.

c) at first, greater than mg, and later

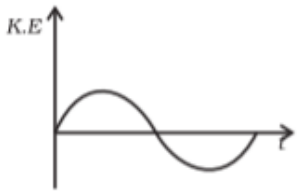
d) constant and greater than mg in

becomes equal to mg.

magnitude.

31. Which of the diagrams shown in Fig. most closely shows the variation in kinetic energy of the earth as it moves once around the sun in its elliptical orbit? **[1]**

a)



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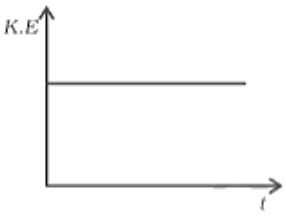

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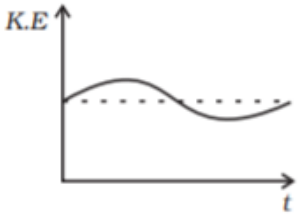
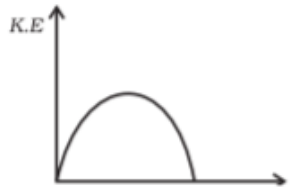


d)



32. Two billiard balls each with a mass of 150g collide head-on in an elastic collision. Ball 1 was travelling at a speed of 2 m /s and ball 2 at a speed of 1.5 m /s. After the collision, ball 1 travels away from ball 2 at a velocity of 1.5 m /s .What is the velocity of ball 2? **[1]**

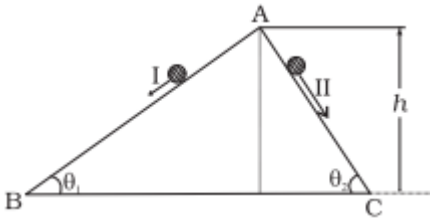
a) ball 2 moves with a velocity of 3.5 m/s

b) ball 2 moves with a velocity of 2 m/s

c) ball 2 moves with a velocity of 2.5 m /s

d) ball 2 moves with a velocity of 3.7 m/s

33. Two inclined frictionless tracks, one gradual and the other steep meet at A from where two stones are allowed to slide down from rest, one on each track as shown in Fig. **[1]**



Which of the following statement is correct?

a) Both the stones reach the bottom with the same speed and stone I reach the bottom earlier than stone II.

b) Both the stones reach the bottom at different times and at different speeds.

c) Both the stones reach the bottom at the same time but not at the same speed.

d) Both the stones reach the bottom with the same speed and stone II reaches the bottom earlier than stone I.

34. Adult cheetahs, the fastest of the great cats, have a mass of about 70 kg and have been clocked running at up to 72 mph (32 m/s). How many joules of kinetic energy does such a swift cheetah have? **[1]**

a) 34,000 J

b) 32,000 J

c) 29,000 J

d) 35840 J

35. The scalar product of vectors is **[1]**

a) non commutative and not distributive

b) non commutative and distributive

c) commutative and not distributive

d) commutative and distributive

36. **Assertion:** According to the law of conservation of mechanical energy change in potential energy is equal and opposite to the change in kinetic energy. **[1]**
Reason: Mechanical energy is not a conserved quantity.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

37. **Assertion:** If two bodies of equal masses undergo elastic collision in one dimension, then after the collision the bodies will exchange their velocities. **[1]**
Reason: In elastic collision, velocity of approach is equal and opposite of velocity of separation.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

38. **Assertion:** No particle may have a speed as large as speed of light. **[1]**
Reason: Infinite energy of any substance or system is not possible.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

39. **Assertion:** Power of machine gun is determined by both, the number of bullets fired per second and kinetic energy of bullets. **[1]**
Reason: Power of any machine is defined as work done (by it) per unit time.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

40. **Assertion:** In a one dimensional perfectly elastic collision between two moving bodies of equal masses, the bodies merely exchange their velocities after collision. **[1]**

Reason: If a lighter body at rest suffers perfectly elastic collision with a very heavy body moving with a certain velocity, then after collision both travel with same velocity.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

Solution

Class 11 - Physics

PHYSICS

1. **(b)** 15.65 m/s
   Explanation: As the centripetal force is equal to weight (mg) and normal reaction (R), we have
   $\frac{mv^2}{r}$ = R + mg
   At a minimum speed, R= 0, Therefore, we have
   $\frac{mv^2}{r}$ = mg
   v = $\sqrt{rg} = \sqrt{25 \times 9.8}$ = 15.65ms^{-1}
2. **(c)** to start a stationary object and to stop a moving object
   Explanation: Force is required to start a stationary object and to stop a moving object due to inertia.
3. **(a)** resistance to change
   Explanation: Inertia is the resistance of any physical object to any change in its state of motion; this includes changes to its speed, direction, or state of rest. It is the tendency of objects to keep moving in a straight line at a constant velocity. Inertia is a property of matter by which it continues in its existing state of rest or uniform motion in a straight line unless that state is changed by an external force.
4. **(a)** body acted on by no net force moves with constant velocity (which may be zero) and zero acceleration
   Explanation: If net force act on a body then the acceleration of the body will also be zero. Hence velocity will not be changed i.e. it continues in its existing state of rest or uniform motion in a straight line.
5. **(a)** $\vec{F} = m\vec{a}$
   Explanation: The second law states that the rate of change of momentum of a body is directly proportional to the force applied, and this change in momentum takes place in the direction of the applied force.
   $\vec{F} = \frac{d\vec{p}}{dt} = \frac{d(m\vec{v})}{dt}$
   $\vec{F} = m\frac{d\vec{v}}{dt} + \vec{v}\frac{dm}{dt}$
   if mass is constant, then
   $\frac{dm}{dt} = 0$
   $\vec{F} = m\frac{d\vec{v}}{dt}$
   $\vec{F} = m\vec{a}$
6. **(c)** bob will go down in a parabolic path
   Explanation: At the mean position, the bob has a horizontal velocity. So when the string is cut, it will fall along a parabolic path under the effect of gravity.
7. **(a)** 22.4 m/s
   Explanation: During first 10 s , the horizontal component of the velocity is v_x = u + at = 0 + 2 $\times$ 10 = 20 m/s
   at t= 11s ,the horizontal component of velocity , in the absence of air resistance remains constant hence,
   From 10 to 11 s, the vertical component of the velocity is v_y = u + gt = 0 + 10 $\times$ 1 = 10m/s
   Relative velocity is,
   $v = \sqrt{v_x^2 + v_y^2}$
   $= \sqrt{20^2 + 10^2}$
   $= \sqrt{500}$
   = 22.4 m/s
8. **(a)** 37^o
   Explanation: Here, we have:
   r = 30m and v = 54 km/h = 15 m/s
   Let angle of banking = θ

For safe turn $\tan\theta = \frac{v^2}{rg}$

$\tan\theta = \frac{v^2}{rg} = \frac{(15)^2}{30\times10} = \frac{15\times15}{30\times10} = \frac{3}{4}$

Hence, angle of banking is:-

$\theta = \tan^{-1}\left(\frac{3}{4}\right) = 37^o$

9. **(a)** a vector equal in magnitude to the product of mass and instantaneous velocity and direction being that of instantaneous velocity
Explanation: $\vec{p} = m\vec{v}$

10. **(c)** F = mg
Explanation: according to newton's second law of motion
F = ma
here acceleration is due to gravity and is equal to g.
So that for a freely falling body
F = mg

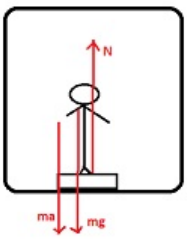
11. **(c)** 65 N
Explanation: Net force on the man = ma = 65 $\times$ 1 = 65 N

12. **(d)** The rate of change of momentum of a body is directly proportional to the applied force and takes place in the direction in which the force acts
Explanation: If the mass does not change then the acceleration of a particle is dependent on the forces acting upon the particle and the particle's mass. For a given particle, if the net force is increased, the acceleration is increased. For a given net force, the more mass a particle has, the less acceleration it has.
$\mathbf{F} = m\mathbf{a} = m\frac{\mathrm{d}\mathbf{v}}{\mathrm{d}t} = \frac{\mathrm{d}(m\mathbf{v})}{\mathrm{d}t} = \frac{\mathrm{d}\mathbf{p}}{\mathrm{d}t}.$
hence the rate of change of momentum of a body is directly proportional to the applied force.

13. **(d)** 7500 N vertically downwards
Explanation: m = 300Kg
a = 15ms^{-2}
Reaction on the floor by the system
R = m(g + a)
= 300(10 + 15)
= 7500 N
The helicopter is accelerating vertically upward, therefore reaction force will also be directed upward. Hence according to newton's third law of motion force on the floor by the crew and passengers is 7500N and directed downward.

14. **(d)** 2.25 $\times$ 10^3 N
Explanation: Here, u = 15ms^{-1}, v = 0, t = 1 s, A = 10^{-2}m^{-2}
m = mass of water gushed out per second
$= \frac{\text{Volumexdensity}}{\text{Time}}$
$= \frac{\text{Area}\times\text{distance}\times\text{density}}{\text{Time}}$
=Area $\times$ velocity $\times$ density
= Auρ
= 10^{-2} $\times$ 15 $\times$ 1000 = 150kg
Force exerted by the wall on water,
F = ma = $m\frac{v-u}{t} = 150 \times \frac{0-15}{1}$ = -2250 N
So the force exerted on the wall by the impact of water,
F_1 = -F = 2250 N

15. **(a)** 350 N
Explanation: When the lift moves downward with acceleration = 5 ms^{-2} the net force acting downward. hence,



mg - R = ma
R = mg - ma
R = m(g - a)
R = 70(10 - 5)
R = 350 N
R = 350 N

16. **(b)** False
Explanation: False

17. **(a)** True
Explanation: True

18. **(a)** True
Explanation: True

19. **(a)** True
Explanation: True

20. **(b)** False
Explanation: False

21. **(b)** $250\pi^2$J
Explanation: Here, we have given that
mass = 5 kg, radius = 1 m
$\omega = \frac{300}{60}$ rps = 5 rps = $5 \times 2\pi rads^{-1}$
K.E. = $\frac{1}{2}mv^2 = \frac{1}{2}m(r\omega)^2 = \frac{1}{2} \times 5(1 \times 10\pi)^2$ = $250\pi^2$J

22. **(a)** Force and displacement are perpendicular to each other
Explanation: Work done, W = Fdcosθ
where θ is the angle between F and d. If both are perpendicular then θ = 90 degrees, so cosθ = 0 and thus work done is zero.

23. **(d)** more for the case of a positron, as the positron moves away from a larger distance.
Explanation: The force between two protons is equal to the force between a proton and a positron. As positron is much lighter than a proton, it moves away from a larger distance compared to a proton. As work done = force $\times$ distance, therefore at the same time t, work done for the case of the positron is more than that in case of the proton.

24. **(d)** 6.25 $\times$ 10^4 N/m
Explanation: The kinetic energy of the car will be converted into the potential energy of spring.
$\frac{1}{2}kx^2 = \frac{1}{2}mv^2$
$k = \frac{mv^2}{x^2}$
m = 1200Kg
v = 0.65m/s
x = 0.09m
$k = \frac{1200 \times 0.65 \times 0.65}{0.09 \times 0.09}$ = 6.25 $\times$ 10^4N/m

25. **(a)** 50 J
Explanation: Mass of the body, m = 0.5 kg
The velocity of the body v = $ax^{\frac{3}{2}}$
a = 5 $m^{\frac{-1}{2}}$ s^{-1}

Initial velocity at x = 0 is u = 0
Final velocity at x = 2 m is v = $10\sqrt{2}$ m/s
work done = Change in kinetic energy
W = K_f - K_i

W = $\frac{1}{2}mv^2$ - 0

W = $\frac{1}{2} \times 0.5 \times (10\sqrt{2})^2 = \frac{1}{2} \times 0.5 \times 200$ = 50J

26. **(c)** a scalar
Explanation: Scalar product means dot product and the dot product of 2 vectors gives a scalar. For example dot product of force and displacement gives work which is scalar.

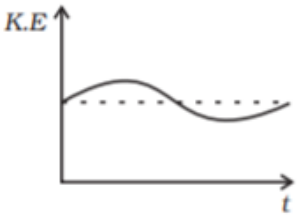
27. **(b)** 8.5 cm
Explanation: For maximum compression of spring, kinetic energy will be converted into the potential energy of spring.
$\frac{1}{2}kx^2 = \frac{1}{2}mv^2$
$x^2 = \frac{mv^2}{k} = \frac{6 \times 3 \times 3}{75 \times 10^2}$
$x = \sqrt{\frac{6 \times 3 \times 3}{75 \times 10^2}}$ = 0.085m = 8.5cm

28. **(a)** 0.15 m
Explanation: for maximum compression
$\frac{1}{2}kx^2 = \frac{1}{2}mv^2$
x = $\sqrt{\frac{mv^2}{k}} = \sqrt{\frac{0.8 \times 1.2 \times 1.2}{50}}$ = 0.15m
the maximum compression of the spring after the collision = 0.15m.

29. **(a)** 49000 J
Explanation: Work done by force applied against gravity for one lift will be
W = Fs = mgh = 10 $\times$ 9.8 $\times$ 0.5 = 49J
So work done for 1000 lifts = 49 $\times$ 1000 = 49000 J

30. **(c)** at first, greater than mg, and later becomes equal to mg.
Explanation: In the process of squatting on the ground, he gets straight up and stands. Then he is tilted somewhat, the man exerts a variable force on the ground to balance his weight, hence he also has to balance frictional force besides his weight in this case.
N = Normal reaction force = friction + mg $\Rightarrow$ N > mg
Once the man gets straight up that variable force = 0
$\Rightarrow$ Normal reaction force = mg

31. **(c)**



Explanation: As the earth moves once around the sun in its elliptical orbit, when the earth is closest to the sun, speed of the earth is maximum, hence KE is maximum. When the earth is farthest from the sun speed is minimum, hence KE is minimum but never zero and negative.

32. **(b)** ball 2 moves with a velocity of 2 m/s
Explanation: In the elastic collision (e = 1) if the mass of colliding bodies is the same then their velocities after collision interchanged.
m_1 = 150gm
m_2 = 150gm
u_1 = 2m/s

u_2 = −1.5m/s

$v_1 = \left(\frac{m_1-m_2}{m_1+m_2}\right)u_1 + \left(\frac{2m_2}{m_1+m_2}\right)u_2$ = $-u_2$ = −1.5m/s

$v_2 = \left(\frac{2m_1}{m_1+m_2}\right)u_1 + \left(\frac{m_2-m_1}{m_1-m_2}\right)u_2$ = u_1 = 2 m/s

so that ball 2 moves with a velocity of 2 m/s

33. **(d)** Both the stones reach the bottom with the same speed and stone II reaches the bottom earlier than stone I.

Explanation: In the figure, AB and AC are two smooth planes inclined to the horizontal at $\angle\theta_1$ and $\angle\theta_2$ respectively.

As the height of both the planes is the same, therefore, both the stones will reach the bottom with the same speed.

According to the law of conservation of mechanical energy,

PE at the top = KE at the bottom

$\therefore$ mgh = $\frac{1}{2}mv_1^2$ ...(i)

and mgh = $\frac{1}{2}mv_2^2$ ...(ii)

from (i) and (ii), we get $v_1 = v_2$

As is clear from the figure, acceleration of the two stones is a_1 =gsinθ_1 and a_2 = g sinθ_2 respectively.

As $\theta_2 > \theta_1$

$\therefore$ $a_2 > a_1$

From v = u + at = 0 + at or t = $\frac{v}{a}$

As t $\propto \frac{1}{a}$ and $a_2 > a_1$

$\therefore$ $t_2 < t_1$

Hence, stone II will take lesser time and reach the bottom earlier than stone I.

34. **(d)** 35840 J

Explanation: The kinetic energy of a cheetah

K = $\frac{1}{2}mv^2$

m = 70Kg

v = 32m/s

K = $\frac{1}{2} \times 70 \times 32 \times 32$ = 35840J

35. **(d)** commutative and distributive

Explanation: The scalar product is:

a) Commutative:

$\vec{A}.\vec{B} = \vec{B}.\vec{A}$

$|A||B|\cos\theta = |B||A|\cos\theta$

b) Distributive

$\vec{A}.(\vec{B}+\vec{C}) = \vec{A}.\vec{B} + \vec{A}.\vec{C}$

36. **(c)** Assertion is correct statement but reason is wrong statement.

Explanation: For conservative forces, the sum of kinetic and potential energies at any point remains constant throughout the motion. It does not depend upon time, this is known as law of conservation of mechanical energy. According to this rule,

Kinetic energy + Potential Energy = E = Constant

or $\Delta T + \Delta U = 0$ or $\Delta T = -\Delta U$

37. **(b)** Assertion and reason both are correct statements but reason is not correct explanation for assertion.

Explanation: If m_1 - m_2 = m

Then, from equations

$v_1' = \frac{(m_1-m_2)v_1+2m_2v_2}{m_1+m_2}$

= $\frac{(m-m)v_1+2mv_2}{m+m} = v_2$

Also, from second equation $v_2' = \frac{(m_2-m_1)v_2+2m_1v_1}{m_1+m_2}$

= $\frac{(m-m)v_2+2mv_1}{m+m}$ = v_1

Therefore, from these equations it is proved that if bodies of equal mass collides then their velocities are exchanged.

38. **(b)** Assertion and reason both are correct statements but reason is not correct explanation for assertion.
Explanation: At sufficiently high speed (comparable to the speed of light) the law of newtonian mechanics are no longer precisely correct but must be replaced by the more general relations predicted by the special relativity. The relativistic kinetic energy K is given by:

K = $\frac{mc^2}{\sqrt{1-\frac{v^2}{c^2}}} - mc^2$

The expression becomes very large as v becomes equal to c and predicts an infinitely large energy at v = c. This suggest physically would require an infinite quantity of energy which is not possible.

39. **(a)** Assertion and reason both are correct statements and reason is correct explanation for assertion.
Explanation: Kinetic energy of one bullet = K
Kinetic energy of n bullets = nK
According to law of conservation of energy, the kinetic energy of bullets be equal to the work done by machine gun per sec.
Power = $\frac{\text{Work}}{\text{Time}}$ = nk

40. **(c)** Assertion is correct statement but reason is wrong statement.
Explanation: For (A): Using the laws of conservation of linear momentum and energy, the velocities of two bodies after perfectly elastic collision are given by:

$v_1 = \frac{(m_1-m_2)u_1+2m_2u_2}{m_1+m_2}$ ....(i)

$v_2 = \frac{(m_2-m_1)u_2+2m_1u_1}{m_1+m_2}$ .....(ii)

If m_1 - m_2, we find that;

$v_1 = u_2$ and $v_2 = u_1$

i.e in perfectly elastic collision of two moving bodies of equal masses, the bodies merely exchange their velocities after collision. Thus, statement (A) is true.
For (R): In eqn. (i) and (ii), if $m_2 << m_1$, then $v_1 = u_1$, $u_2 = 2u_1$. Thus statement (R) is false.

ATOMIC ENERGY CENTRAL SCHOOL NO.4

RAWATBHATA

CLASS 11 - CHEMISTRY

Chemistry

Time Allowed: 30 minutes **Maximum Marks: 40**

1. The enthalpies of elements in their standard states are taken as zero. The enthalpy of formation of a compound is: **[1]**

   a) is never negative. b) may be positive or negative.

   c) is always negative. d) is always positive.

2. When gasoline burns in a car engine, the heat released causes the products CO_2 and H_2O to expand, which pushes the pistons outward. Excess heat is removed by the car's cooling system. If the expanding gases do 451J of work on the pistons and the system loses 325 J to the surroundings as heat, calculate the change in energy (ΔE). **[1]**

   a) -702 J b) -745 J

   c) -776 J d) -797 J

3. The volume of gas is reduced to half from its original volume. The specific heat will be **[1]**

   a) reduce to half b) be doubled

   c) remain constant d) increase four times

4. Choose the correct answer. A thermodynamic state function is a quantity: **[1]**

   a) used to determine pressure volume work. b) whose value depends on temperature only.

   c) used to determine heat changes. d) whose value is independent of path.

5. The pressure-volume work for an ideal gas can be calculated by using the expression w = $-\int_{V_i}^{V_f} p_{ex} dV$. **[1]**

   The work can also be calculated from the pV–plot by using the area under the curve within the specified limits. When an ideal gas is compressed (a) reversibly or (b) irreversibly from volume Vi to Vf. choose the correct option.

   a) w (reversible) < w (irreversible) b) w (reversible) > w (irreversible)

   c) w (reversible) = w (irreversible) d) w (reversible) = w (irreversible) + $p_{ex} . \Delta V$

6. Comment on the thermodynamic stability of NO(g), Given: **[1]**

   $\frac{1}{2}N_2$ (g) + $\frac{1}{2}$ O_2(g) $\rightarrow$ NO (g); $\Delta_r H^0$ = 90 kJ mol^{-1}

   NO(g) + $\frac{1}{2}$ O_2(g) $\rightarrow$ NO_2 (g); $\Delta_r H^0$ = -74 kJ mol^{-1}

   a) NO(g) is unstable, but NO_2 (g) is formed b) NO_2 (g) is unstable, but NO(g) is formed

   c) NO_2 (g) is stable, but NO(g) is formed d) NO(g) is stable, but NO_2 (g) is formed

7. Given $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$; $\Delta_r H°$ = -92.4 kJ mol^{-1}. What is the standard enthalpy of formation of NH_3 gas? **[1]**

a) -41.3 kJ mol^{-1} b) -36.9 kJ mol^{-1}

c) -56.5 kJ mol^{-1} d) -46.2 kJ mol^{-1}

8. Enthalpy of sublimation of a substance is equal to **[1]**

a) enthalpy of fusion b) enthalpy of fusion + enthalpy of vapourisation

c) twice the enthalpy of vapourisation d) enthalpy of vapourisation

9. An isochoric process takes place at constant: **[1]**

a) temperature b) pressure

c) volume d) concentration

10. Suppose that 1.00 kJ of heat is transferred to 2.00 mol argon (at 298 K, 1 atm). What will the final temperature T_f, if the heat is transferred at constant volume? **[1]**

a) 308 K b) 347 K

c) 313 K d) 338 K

11. Calculate the heat and the work associated with a process in which 5 mol of gas expands reversibly at constant temperature T = 298 K from a pressure of 10.00 to 1.00 atm **[1]**

a) 27.0 kJ, -28.5 kJ b) 30.5 kJ, -28.5 kJ

c) 28.5 kJ, -28.5 kJ d) 25.5 kJ, -28.5 kJ

12. On the basis of thermochemical equations (A), (B) and (C), find out which of the algebraic relationships given in options (i) to (iv) is correct: **[1]**

A. C(graphite) + $O_2(g) \rightarrow CO_2(g)$; $\triangle_r H$ = x KJ mol^{-1}

B. C(graphite) + $\frac{1}{2}O_2(g) \rightarrow CO(g)$; $\Delta_r H$ = y KJ mol^{-1}

C. $CO(g) + \frac{1}{2}O_2(g) \rightarrow CO_2(g); \Delta_r H = zkJmol^{-1}$

a) x = y + z b) y = 2z – x

c) z = x + y d) x = y – z

13. Suppose a 10.00 kg mass drops through a height difference of 3.00 m, and the resulting work is used to turn a paddle in 200.0 g water, initially at 15.00°C. The final water temperature is found to be 15.35°C. Assuming that the work is done is used entirely to increase the water temperature, calculate the conversion factor between joules and calories. **[1]**

a) 1 calorie $\approx$ 5.2J b) 1 calorie $\approx$ 4.2J

c) 1 calorie $\approx$ 6.1J d) 1 calorie $\approx$ 3.2J

14. For the reaction 2A(g) + B(g) $\rightarrow$ 2D(g) ΔU^0 = - 10.5kJ and ΔS^0 = - 44.1J K^{-1}. Calculate ΔG^0 for the reaction, and predict whether the reaction may occur spontaneously? **[1]**

a) 0.165 kJ, the reaction is not spontaneous b) 0.225 kJ, the reaction is spontaneous

c) 0.164 kJ, the reaction is spontaneous d) 0.225 kJ, the reaction is not spontaneous

15. Suppose that 1.00 kJ of heat is transferred to 2.00 mol argon (at 298 K, 1 atm). What will the final temperature T_f be if the heat is transferred at constant pressure? **[1]**

a) 301 K b) 335 K

c) 322 K d) 376 K

16. For the process depicted by the equation: **[1]**

H_2O (s) $\longrightarrow$ H_2O (l)

Δ H = + 1.43 kcal mol^{-1}. It represents:

a) Enthalpy of vaporization
b) Enthalpy of sublimation
c) Enthalpy of condensation
d) Enthalpy of fusion

17. To vaporize 100.0 g carbon tetrachloride at its normal boiling point, 349.9 K, and P =1 atm, 19.5 kJ of heat is required. Calculate ΔH_{vap} for CCl_4? **[1]**

a) 30.0 kJ
b) 42.0 kJ
c) 34.0 kJ
d) 23.0 kJ

18. **Assertion (A):** A liquid crystallises into a solid and is accompanied by decrease in entropy. **[1]**
Reason (R): In crystals, molecules organise in an ordered manner.

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 but R is true.

19. **Assertion (A):** Spontaneous process is an irreversible process and may be reversed by some external agency. **[1]**
Reason (R): Decrease in enthalpy is a contributory factor for spontaneity.

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 but R is true.

20. **Assertion (A):** Combustion of all organic compounds is an exothermic reaction. **[1]**
Reason (R): The enthalpies of all elements in their standard state are zero.

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 but R is true.

21. For the reaction $H_2\,(g)\ +\ I_2\,(g) \rightleftharpoons$ 2HI (g), the standard free energy is $\Delta G^- > 0$ The equilibrium constant (K) would be _____. **[1]**

a) K < 1
b) K > 1
c) K = 0
d) K = 1

22. The ionization constant of HF is $3.2\ x10^{-4}$.Calculate the degree of dissociation of HF in its 0.02 M solution. The concentrations of all species present i.e. H_3O^+ , F^- and HF in the solution and its pH respectively are. **[1]**

a) $5.9 \times 10^{-3}\ M$,$5.9\ \times 10^{-3}\ M$, $19.6 \times 10^{-3}\ M$, 2.45
b) $2.5 \times 10^{-3}\ M$,$2.5\ \times 10^{-3}\ M$, $17.6 \times 10^{-3}\ M$, 2.62
c) $3.6 \times 10^{-3}\ M$,$3.6\ \times 10^{-3}\ M$, $18.6 \times 10^{-3}\ M$, 2.62
d) $1.4 \times 10^{-3}\ M$,$1.4\ \times 10^{-3}\ M$, $16.6 \times 10^{-3}\ M$, 2.6

23. On increasing the pressure, in which direction will the gas phase reaction proceed to re-establish equilibrium is predicted by applying the Le Chatelier's principle. Consider the reaction. **[1]**
$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3$ (g) Which of the following is correct, if the total pressure at which the equilibrium is established, is increased without changing the temperature?

a) K will remain same
b) K will increase

c) K will decrease

d) K will increase initially and decrease when pressure is very high

24. What will be the correct order of vapour pressure of water, acetone and ether At $30^{\circ}\mathrm{C}$. Given that among these compounds, water has maximum boiling point and ether has minimum boiling point? **[1]**

a) Water < acetone < ether

b) Acetone < ether < water

c) Water < ether < acetone

d) Ether < acetone < water

25. We know that the relationship between $\mathrm{K_c}$ and $\mathrm{K_p}$ is $K_p = K_c(RT)^{\triangle n_{gas}}$ What would be the value of $\triangle$n gas for the reaction $\mathrm{NH_4Cl\ (s)\ \rightarrow NH_3\,(g)\ +\ HCl\ (g)}$ **[1]**

a) 1.5

b) 2.0

c) 0.5

d) 1

26. The pH of a saturated solution of $Ba(OH)_2$ is 12. The value of the solubility product (K_{sp}) of $Ba(OH)_2$ is: **[1]**

a) 3.3×10^{-7}

b) 5×10^{-7}

c) 4.0×10^{-6}

d) 5.0×10^{-6}

27. Amines behave as: **[1]**

a) Lewis acids

b) Lewis base

c) aprotic acid

d) neutral compound

28. Which of the following will produce a buffer solution when mixed in equal volumes? **[1]**

a) $0.1\ \mathrm{mol\ dm^{-3}NH_4OH}$ and $0.1\ \mathrm{mol\ dm^{-3}HCl}$

b) $0.1\ \mathrm{mol\ dm^{-3}NH_4OH}$ and $0.05\ \mathrm{mol\ dm^{-3}HCl}$

c) $0.1\ \mathrm{mol\ dm^{-3}CH_4COONa}$ and $0.1\ \mathrm{mol\ dm^{-3}HCl}$

d) $0.1\ \mathrm{mol\ dm^{-3}NaOH}$ and $0.1\ \mathrm{mol\ dm^{-3}NH_4OH}$ and $0.1\ \mathrm{mol\ dm^{-3}HCl}$

29. Calculate the hydrogen ion concentration in the human blood whose pH is 7.38. **[1]**

a) 5.16×10^{-8} M

b) 3.19×10^{-8} M

c) 4.17×10^{-8} M

d) 6.33×10^{18} M

30. It has been found that the pH of a 0.01M solution of an organic acid is 4.15. Calculate the ionization constant of the acid, the concentration of the anion, and its pK_a. **[1]**

a) $K_a = 5.01 \times 10^{-7}$, $[A^-] = 7.08 \times 10^{-5}$ and $pK_a = 5.3007$

b) $K_a = 5.01 \times 10^{-7}$, $[A^-] = 7.08 \times 10^{-5}$ and $pK_a = 6.3001$

c) $K_a = 5.01 \times 10^{-7}$, $[A^-] = 7.99 \times 10^{-5}$ and $pK_a = 7.5009$

d) $K_a = 5.01 \times 10^{-7}$, $[A^-] = 7.39 \times 10^{-5}$ and $pK_a = 6.3001$

31. pH of a solution of a strong acid is 5.0. What will be the pH of the solution obtained after diluting the given solution a 100 times? **[1]**

a) 6.0090

b) 7.6907

c) 5.6999

d) 6.699

32. The solubility of $\mathrm{Ca_3(PO_4)_2}$ in water is y moles/litre. Its solubility product is: **[1]**

a) $6y^4$

b) $64y^5$

c) $36y^4$

d) $108y^5$

33. Which of the following statements is correct? **[1]**

a) In equilibrium mixture of ice and water kept in perfectly insulated flask mass of ice and water does not change with time.

b) On addition of catalyst the equilibrium constant value is not affected.

c) The intensity of red colour increases when oxalic acid is added to a solution containing iron (III). nitrate and potassium thiocyanate.

d) Equilibrium constant for a reaction with negative ΔH value decreases as the temperature increases

34. **Assertion (A):** The ionisation of hydrogen sulphide in water is low in the presence of hydrochloric acid. **[1]**
Reason (R): Hydrogen sulphide is a weak acid.

a) Both A and R are true but R is not correct explanation of A.

b) Both A and R are true and R is correct explanation of A.

c) A is true but R is false.

d) Both A and R are false.

35. **Assertion (A):** Aqueous solution of ammonium carbonate is basic. **[1]**
Reason (R): Acidic/basic nature of a salt solution of a salt of a weak acid and weak base depends on the Ka and Kb value of the acid and the base forming it.

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 correct explanation of A.

c) A is true but R is false.

d) Both A and R are false.

36. **Assertion (A):** For any chemical reaction at a particular temperature, the equilibrium constant is fixed and is a characteristic property. **[1]**
Reason (R): Equilibrium constant is independent of temperature.

a) A is true but R is false.

b) Both A and R are true and R is the correct explanation of A.

c) Both A and R are true but R is not the correct explanation of A.

d) Both A and R are false.

37. **Assertion (A):** A solution containing a mixture of acetic acid and sodium acetate maintains a constant value of pH on the addition of small amounts of acid or alkali. **[1]**
Reason (R): A solution containing a mixture of acetic acid and sodium acetate acts as a buffer solution around pH 4.75.

a) Both A and R are true but R is not the correct explanation of A.

b) Both A and R are true and R is correct explanation of A.

c) A is true but R is false.

d) Both A and R are false.

38. **Assertion (A):** An aqueous solution of ammonium acetate can act as a buffer. **[1]**
Reason (R): Acetic acid is a weak acid and NH_4OH is a weak base.

a) A is false but R is true.

b) Both A and R are true and R is the correct explanation of A.

c) Both A and R are true but R is not the correct explanation of A.

d) Both A and R are false.

39. **Assertion (A):** Increasing order of acidity of hydrogen halides is HF < HCl < HBr < HI **[1]**

Reason (R): While comparing acids formed by the elements belonging to the same group of the periodic table, H–A bond strength is a more important factor in determining the acidity of acid than the polar nature of the bond.

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) Both A and R are false.

40. **Assertion (A):** In the dissociation of PCl_5 at constant pressure and temperature addition of helium at equilibrium increases the dissociation of PCl_5. **[1]**

Reason (R): Helium removes Cl_2 from the field of action.

a) A is true but R is false.

b) Both A and R are true and R is the correct explanation of A.

c) Both A and R are true but R is not the correct explanation of A.

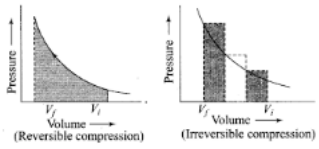
d) Both A and R are false.

Solution

Class 11 - Chemistry

Chemistry

1. **(b)** may be positive or negative.
   Explanation: Standard molar enthalpy of formation of a compound from its elements can be +ve or –ve.
   For example: $C + O_2(g) \rightarrow CO_2(g); \Delta_r H$ = 393.5 kJ mol^{-1}
   $N_2(g) + \frac{1}{2}O_2(g) \rightarrow N_2O(g); \Delta_r H$ = +92 k J mol^{-1}
2. **(c)** -776 J
   Explanation: q = - 325J w = - 415J
   Now, ΔU = q + w = - 325 + (- 451J) = - 776J
3. **(c)** remain constant
   Explanation: Specfic heat (c) of a substance is defined as the amount of heat required to raise the temperature of 1 gram of substance through 1^{0}C.
   $C = \frac{q}{\triangle T}$
   ,Specific heat is independent of volume, so it will remain constant.
4. **(d)** whose value is independent of path.
   Explanation: A state function value depends only on the state of the system and is independent of path.
5. **(a)** w (reversible) < w (irreversible)
   Explanation:
   w (reversible) < w (irreversible) (for compression process)
   Justification: Area under the curve is always more in irreversible compression as can be seen from Fig (a) and (b).



6. **(a)** NO(g) is unstable, but NO_2 (g) is formed
   Explanation: NO(g) is unstable because the formation of NO is endothermic, but NO_2(g) is formed because its formation is exothermic. Therefore, unstable NO(g) converts into stable NO_2(g).
7. **(d)** -46.2 kJ mol^{-1}
   Explanation: Given, N_2(g) + 3H_2(g) $\rightarrow$ 2NH_3(g) ; Δ_rH° = –92.4 kJ mol^{-1}.
   Chemical reaction for the enthalpy of formation of NH_3 (g) is as follows:
   $\frac{1}{2}N_2\ (g)\ + \frac{3}{2}H_2(g)\ \rightarrow NH_3(g)$
   Therefore, $\Delta_f H^\circ = \frac{-92.4}{2}$ = - 46.2 kJ/mol
8. **(b)** enthalpy of fusion + enthalpy of vapourisation
   Explanation: The process of sublimation involves the change of solid into vapour. Though in sublimation a solid does not pass through the liquid phase on its way to the gas phase, the enthalpy change is equal to the sum of enthalpy of fusion and enthalpy of vaporization because enthalpy is a state function.
9. **(c)** volume
   Explanation: An isochoric process is a thermodynamic process in which the volume remains constant.
10. **(d)** 338 K
    Explanation: Argon is monoatomic, Here, $C_v = \frac{3}{2}R = \ \frac{3}{2} \times 8.314 JK^{-1}mol^{-1}$ = 12.47J K^{-1} mol^{-1}
    As volume is kept constan t, q_v = nC_v ΔT
    $\Rightarrow$ 1000J = (2.00mol) $\times$ (12.47JK^{-1} mol^{-1}) $\times$ ΔT
    $\Rightarrow \Delta$ T = 40.09K
    $\Rightarrow T_f$ = 298 + 40.1 = 338K
11. **(c)** 28.5 kJ, -28.5 kJ
    Explanation:
    $Work\ done\ for\ an\ isothermal\ process,\ w = -2.303nRT\ \log\frac{P_1}{P_2} = -2.303 \times 5 \times 8.314 \times 298 \times \log\frac{10}{1} = -2.303 \times 5 \times 8.314 \times 298 \times 1 = -28529.24J =$
    $Acoording\ to\ equation\ of\ first\ law\ of\ thermodynamics,\ \triangle U = \ q + w$
    $For\ isothermal\ process, \triangle U = 0;$
    $\Rightarrow Heat,\ q = -w = -(-28.5\ kJ) = 28.5\ kJ$
12. **(a)** x = y + z
    Explanation: We have, C(graphite) + O_2(g) $\rightarrow$ CO_2(g); $\triangle_r H$ = x KJ mol^{-1} ..... (1)
    C(graphite) $+\frac{1}{2}O_2(g) \rightarrow CO(g); \Delta_r H = ykJmol^{-1}$ .... (2)
    Subtacting (1) and (2), we get;
    $CO(g) + \frac{1}{2}O_2(g) \rightarrow CO_2(g); \triangle_r H$ = (x-y) kJmol^{-1}
    $\therefore$ z = x - y $\Rightarrow$ x = y + z
13. **(b)** 1 calorie $\approx$ 4.2J
    Explanation: Total work done on the water = w = - mg Δh = - (10) $\times$ (9.8) $\times$ (-3) = 294J
    The heat required to increase the temperature of water by the same amount = q = mc ΔT = 200 $\times$ 1 $\times$ 0.35 = 70cal
    Because the work is done has the same effect on water as a direct transfer of heat, The two expression can be set equal to each other, giving
    70cal = 294J
    1 cal $\approx$ 4.2J
14. **(a)** 0.165 kJ, the reaction is not spontaneous
    Explanation: $\Delta G^0 = \Delta H^0 - T\Delta S^0$
    and $\Delta H^0 = \Delta U^0 + \Delta n_g RT$
    Here $\Delta n_g = -1$,

$\Delta H°$ = - 10.5 kJ + (-1 × 8.314 × 10^{-3} kJ $K^{-1}mol^{-1}$ × 298K = - 10.5 (-2.477) kJ mol^{-1}

$\Delta H°$ = - 12.977 kJ mol^{-1}

Now, $\Delta G°$ = - 12.977 - (298 × 44.1 × 10^{-3}) = - 12.977 + 13.14 = + 0.165 kJ mol^{-1}
The reaction will not occur spontaneously because $\Delta G°$is positive.

15. **(c)** 322 K
Explanation: Argon is monoatomic, Here, $C_p = \frac{5}{2}R = \frac{5}{2} \times 8.314 JK^{-1}mol^{-1} = 20.79 JK^{-1}mol^{-1}$
As pressure is kept constant, $q_p = nC_p\Delta T$
$\Rightarrow 1000J = (2.00mol) \times \left(20.79 JK^{-1}mol^{-1}\right) \times \Delta T$
$\Rightarrow \Delta T = 24.05K$
$\Rightarrow T_f = 298 + 24.05 = 322.05K$

16. **(d)** Enthalpy of fusion
Explanation: In this process 1 mole of solid water is converted to liquid state. Fusion or melting is endothermic, so all enthalpies of fusion are positive.

17. **(a)** 30.0 kJ
Explanation: Number of moles of CCl_4 = $\frac{100}{154}$ = 0.6493 moles.
Heat required for 0.6493 moles = 19.5kJ
$\Rightarrow$ Heat required for 1.00 moles = $\frac{19.5}{0.6493}$ = 30.032kJ

18. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation: When a liquid crystallizes, its entropy decreases, since, in crystalline form, the molecules are more ordered.

19. **(b)** Both A and R are true but R is not the correct explanation of A.
Explanation: For spontaneous process, energy factor should be favourable means ΔH = -ve and randomness should be positive.

20. **(b)** Both A and R are true but R is not the correct explanation of A.
Explanation: In combustion reaction, enthalpy of the reactants is always greater than the enthalpy of the product.

21. **(a)** K < 1
Explanation: $\Delta G0 = -RTlnK$
• If $\Delta G0 > 0$, then $-\Delta G0/RT$ is negative, and $e-\Delta G0/RT < 1$, that is , $K < 1$, which implies a non-spontaneous reaction or a reaction which proceeds in the forward direction to such a small degree that only a very minute quantity of product is formed.

22. **(b)** $2.5 \times 10^{-3}\ M, 2.5 \times 10^{-3}\ M$, 17.6×10^{-3}, 2.62
Explanation:

$$\begin{array}{lccc} & HF \rightleftharpoons & H^+ + & F^- \\ Initial\ Concentration; & 1 & 0 & 0 \\ Equilibrium\ concentration; & C(1-\alpha) & C\alpha & C\alpha \end{array}$$

$Now,\ K_a = \frac{[H^+][F^-]}{[HF]} = \frac{[\ C\alpha][\ C\alpha]}{[C(1-\alpha)\ ]} = \frac{C\alpha^2}{(1-\alpha)} \approx C\alpha^2 \qquad (Since\ \alpha\ is\ less,\ (1-\ \alpha)\ can\ be\ written\ as\ 1)$

$\Rightarrow \alpha = \sqrt{\frac{K_a}{C}} = \sqrt{\frac{3.2 \times 10^{-4}}{0.02}} = 12.65 \times 10^{-2}$

[H^+] = $C\alpha = 0.02 \times 0.1265 = 2.53 \times 10^{-3}$

[F^-] =$C\alpha = 0.02 \times 0.1265 = 2.53 \times 10^{-3}$

[HF]= $C(1-\alpha) = 0.02 \times (1 - 0.1265) = 1.7 \times 10^{-2}$

Now,

$pH = -\log[H_3O^+] = -\log\left(2.53 \times 10^{-3}\right) = 3 - 0.4031 = 2.5969$

23. **(a)** K will remain same
Explanation: In the reaction $Na(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$
According to the the Le Chatelier's principle, at constant temperture, the equilibrium constant will change but K will remain same.

24. **(a)** Water < acetone < ether
Explanation: Greater the boiling point, less is the vapour pressure. Hence, the correct order of vapour pressure will be water < acetone < ether.

25. **(b)** 2.0
Explanation: Δn_{gas} = 2 = $n_{gas}(\text{Product})$ - $n_{gas}(reactant)$

26. **(b)** 5 × 10^{-7}
Explanation: pH + pOH = 14
pOH = 14 - 12 = 2
pOH = -log[OH^-]
OH^- = 10 - pOH = 10^{-2} ..... (1)
At equilibrium, $Ba(OH)_2$ = Ba^{+2} + $2OH^-$
let [OH^-] = x , therefore, From above equation; 2[OH^-] = 2x = 10^{-2} (from equation 1)
Therefore $x = \frac{10^{-2}}{2} = 0.5 \times 10^{-2}$
K_{sp} = [Ba^{+2}] [OH^-]^2 = [0.5 × 10^{-2}][10^{-2}]^2 = 0.5 × 10^{-6} = 5 × 10^{-7}

27. **(b)** Lewis base
Explanation: Amines behave as lewis base because they have a lonepair of electrons.

28. **(b)** 0.1 mol $dm^{-3}NH_4OH$ and 0.05 mol $dm^{-3}HCl$
Explanation:

$$\begin{array}{lccc} & NH_4OH + & HCl \rightarrow NH_4Cl & + H_2O \\ at,\ t = 0 & 0.1 & 0.05 & \\ at,\ t = t & 0.05 & 0 \quad 0.05 & \end{array}$$

At the end of the reaction we will get the mixture of weak base (NH_4OH) and salt of weak base and strong acid (NH_4Cl).

29. **(c)** 4.17 × 10^{-8} M
Explanation: pH = -log[H^+]
7.38 = -log[H^+]
$\log[H^+] = -7.38 = \bar{8}.62$
Taking antilog on both sides, we get [H^+] = 4.17 × 10^{-8} M

30. **(b)** $K_a = 5.01 \times 10^{-7}$, $[A^-] = 7.08 \times 10^{-5}$ and $pK_a = 6.3001$

Explanation: $pH = -\log[H^+]$

$4.15 = -\log[H^+]$

$[H^+] = 7.08 \times 10^{-5} = [A^-]$

$K_a = [H^+][A^-][HA]$

$K_a = 5.01 \times 10^{-7}$

$pK_a = -\log [5.01 \times 10^{-7}] = 6.3001$

31. **(d)** 6.699
Explanation: pH=5 means the solution is acidic. On dilution, it will remain acidic. However, acidic character decreases so much that it is almost neutral (pH=5 means $[H^+] = 10^{-5}$M). After dilution, $[H^+] = \frac{10^{-5}}{100} = 10^{-7} M$; $[H^+]$ from H_2O cannot be neglected.

Hence total $[H^+] = 10^{-7} + 10^{-7} = 2 \times 10^{-7}$ M

$\Rightarrow$ $pH=-\log(2 \times 10^{-7}) = 7-0.3010=6.699$

32. **(d)** $108y^5$
Explanation: $\underset{y}{Ca_3}\left(PO_4\right)_2 = 3\underset{3y}{Ca^{2+}} + 2\underset{2y}{PO_4^{3-}}$

Solubility product = $K_{sp} = \ [Ca^{2+}]^3[PO_4^{3-}]^2 \ = (3y)^3 \ (2y)^2 \ = 108y^5$

33. **(a)** In equilibrium mixture of ice and water kept in perfectly insulated flask mass of ice and water does not change with time.
Explanation: Ice and water kept in a perfectly insulated thermos flask (no exchange of heat between its contents and the surroundings) at 273K and the atmospheric pressure are in equilibrium state and the system shows interesting characteristic features. We observe that the mass of ice and water do not change with time and the temperature remains constant.

34. **(a)** Both A and R are true but R is not correct explanation of A.
Explanation: In the presence of H^+ ion, equilibrium shifts in the backward direction.

35. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation: Ka and Kb values are responsible for acidic and basic characters of substances.

36. **(a)** A is true but R is false.
Explanation: Explanation:
    - The equilibrium constant for an exothermic reaction (negative ΔH) decreases as the temperature increases.
    - The equilibrium constant for an endothermic reaction (positive ΔH) increases as the temperature increases.

37. **(a)** Both A and R are true but R is not the correct explanation of A.
Explanation: The solutions which resist change in pH on dilution or with the addition of small amounts of acid or alkali are called buffer solutions.

38. **(a)** A is false but R is true.
Explanation: Salt of a weak acid and weak base can form a buffer solution.

39. **(a)** Both A and R are true and R is the correct explanation of A
Explanation: H-A bond strength is a more important factor in determining acidity than its polar nature. As the size of A increases down the group, H-A bond strength decreases.

40. **(a)** A is true but R is false.
Explanation: If the volume is kept constant and an inert gas such as argon is added which does not take part in the reaction, the equilibrium remains undisturbed.

ATOMIC ENERGY CENTRAL SCHOOL NO.4

RAWATBHATA

CLASS 11 - MATHEMATICS

Mathematics MCQ January (2020-21)

Time Allowed: 40 minutes **Maximum Marks: 40**

1. Solve the system of inequalities $4x + 3 \geq 2x + 17$, $3x - 5 < -2$, for the values of x, then **[1]**

   a) no solution
   b) $(-\frac{3}{2}, \frac{2}{5})$
   c) $(-4, 12)$
   d) (-2 , 2)

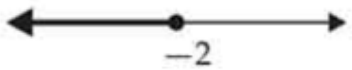
2. The solution set of the inequation 3x < 5, when x is a natural number is **[1]**

   a) {1, 2}
   b) {1}
   c) {4}
   d) {0, 1}

3. Find all pairs of consecutive even positive integers, both of which are larger than 5, such that their sum is less than 23. **[1]**

   a) (3, 5), (5, 7), (7, 9)
   b) (6, 8),(8, 10), (10, 12)
   c) none of these
   d) (4, 6), (6, 8), (8, 10)

4. Solution of a linear inequality in variable x is represented on number line as follow: **[1]**



   a) x ∈ (–∞, – 2)
   b) x ∈ (– 2, ∞]
   c) x ∈ (–∞, – 2]
   d) x ∈ [– 2, ∞)

5. The solution set of the inequation: $\frac{2x-1}{3} - \frac{3x}{5} + 1 < 0, x \in W$ is: **[1]**

   a) none of these
   b) x ∈ N
   c) null set
   d) x ∈ W

6. If $|x - 1| > 5$, then **[1]**

   a) $x \in [6, \infty)$
   b) $x \in (6, \infty)$
   c) $x \in (-\infty, -4) \cup (6, \infty)$
   d) $x \in (-\infty, -4) \cup (6, \infty]$

7. If $\frac{|x-2|}{x-2} \geq 0$, then **[1]**

   a) x ∈ $(-\infty, 2)$
   b) x ∈ $(-\infty, 2]$
   c) x ∈ $[2, \infty)$
   d) x ∈ $(2, \infty)$

8. solution set of the inequations $x \geq 2$, $x \leq -3$ is **[1]**

   a) { }
   b) [-3, 2]
   c) (-3, 2)
   d) [2 , -3]

9. Region represented by the system $x \geq 0$, $y \geq 0$ of inequations is **[1]**

a) none of these

b) 3^{rd} quadrant

c) 2^{nd} quadrant

d) 1^{st} quadrant

10. The solution set for (x + 3) + 4 > -2x + 5: **[1]**

a) none of these

b) $\left(\frac{-2}{3}, \infty\right)$

c) (- ∞, - 2)

d) (2, ∞)

11. There are 13 players of cricket, out of which 4 are bowlers. In how many ways a team of eleven be selected from them so as to include at least two bowlers? **[1]**

a) 72

b) 42

c) 78

d) None of these

12. In how many ways can we select 9 balls out of 6 red balls, 5 white balls and 5 blue balls if 3 balls of each colour are selected? **[1]**

a) 2000

b) 40

c) 400

d) 200

13. The number of words which can be formed out of the letters of the word ARTICLE, so that vowels occupy the even place is **[1]**

a) 1440

b) 144

c) 7!

d) ${}^{4}C_{4} \times {}^{3}C_{3}$

14. How many 4-digit numbers can be formed with no digit repeated by using the digits 3, 4, 5, 6, 7, 8 and 0? **[1]**

a) 720

b) 280

c) 560

d) 840

15. How many 3-digit numbers are there with no digit repeated? **[1]**

a) 648

b) 729

c) 720

d) None of these

16. ${}^{5}\mathrm{C}_{1} + {}^{5}\mathrm{C}_{2} + {}^{5}\mathrm{C}_{3} + {}^{5}\mathrm{C}_{4} + {}^{5}\mathrm{C}_{5}$ is equal to **[1]**

a) 33

b) 30

c) 31

d) 32

17. If ${}^{20}C_{r} = {}^{20}C_{r-10}$, then ${}^{18}C_{r}$ is equal to **[1]**

a) 4896

b) 816

c) 1632

d) None of these

18. In how many ways can 4 different books be arranged on a shelf **[1]**

a) 8

b) 24

c) 4

d) 16

19. 0! is always taken as **[1]**

a) 1 b) 2

c) ∞ d) 0

20. If ${}^{n}C_{12} = {}^{n}C_{8}$, then n is equal to **[1]**

a) 12 b) 6

c) 30 d) 20

21. Find r if ${}^{10}P_r = 2.{}^{9}P_r$ **[1]**

a) 6 b) 4

c) 3 d) 5

22. How many words beginning with T and ending with E can be made with no letter repeated out of the letters of the word 'TRIANGLE'? **[1]**

a) 722 b) ${}^{8}P_{6}$

c) 720 d) 1440

23. How many words can be formed from the letters of the word 'DAUGHTER' so that the vowels always come together? **[1]**

a) 2160 b) 720

c) None of these d) 4320

24. How many even numbers can be formed by using all the digits 2, 3, 4, 5, 6? **[1]**

a) 72 b) none of these

c) 120 d) 24

25. How many diagonals are there in a polygon of n sides? **[1]**

a) $\frac{1}{2}n(n+1)$ b) $\frac{1}{2}n(n-2)$

c) $\frac{1}{2}n(n-1)$ d) $\frac{1}{2}n(n-3)$

26. The 2nd, 31st and the last terms of an AP are $7\frac{3}{4}, \frac{1}{2}$ and $-6\frac{1}{2}$ respectively How many terms are there in this AP? **[1]**

a) 62 b) 53

c) 56 d) 59

27. In a GP it is given that a = 3, T_n = 96 and S_n = 189 . The value of n is **[1]**

a) 5 b) 6

c) 7 d) 8

28. How many terms of the AP 6, 12, 18, 24, ... must be taken to make the sum 816? **[1]**

a) 14 b) 18

c) 16 d) 22

29. The third term of G.P. is 4. The product of its first 5 terms is **[1]**

a) 4^4 b) 4^3

c) 4^5 d) None of these

30. The sum of first 10 terms of a G.P. is equal to 244 times the sum of its first five terms. Then the common ratio is **[1]**

a) 7 b) 5

c) 4 d) 3

31. The first and 5th terms of an AP are -14 and 2 respectively and the sum of its n terms is 40. Then, n = ? **[1]**

a) 12 b) 13

c) 10 d) 8

32. The sum of first n terms of the series 1 – 1 + 1 – 1 + ... is **[1]**

a) - 1 b) 1 if n is odd and 0 when n is even

c) ± 1 d) $(-1)^n$

33. The nth term of a G.P. is 128 and the sum of its n terms is 225. If its common ratio is 2, then its first term is **[1]**

a) 8 b) 1

c) None of these d) 3

34. The AM between two positive numbers a and b (a > b) is twice their GM. Then,a : b = ? **[1]**

a) None of these b) $(2+\sqrt{3}) : (2-\sqrt{3})$

c) 2 : 3 d) $(3+\sqrt{2}) : (3-\sqrt{2})$

35. If 9 times the 9th term of an A.P. is equal to 13 times the 13th term, then the 22nd term of the A.P. is **[1]**

a) 0 b) 198

c) 220 d) 22

36. Sum of all two digit numbers which when divided by 4 yield unity as remainder is: **[1]**

a) None of these b) 1210

c) 1200 d) 1250

37. The A.M. between two positive numbers a and b is twice the G.M. between them. The ratio of the numbers is **[1]**

a) none of these b) $(\sqrt{3}+1) : (\sqrt{3}-1)$

c) $(2+\sqrt{3}) : (2-\sqrt{3})$ d) $(2+3) : (\sqrt{2}-3)$

38. The nth term of the sequence 5 + 55 + 555 + ... is **[1]**

a) none of these b) $\frac{5}{9}(10^n - 1)$

c) $5 \times 10^{n-1}$ d) $5 \times 11^{n-1}$

39. How many terms of the AP -5, $\frac{-9}{2}$ -4, ... will give the sum 0? **[1]**

a) 21 b) 18

c) 16 d) 23

40. The first and last terms of an A.P. are 1 and 11. If the sum of its terms is 36, then the number of terms will be **[1]**

a) 7 b) 6

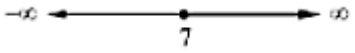
c) 8 d) 5

Solution

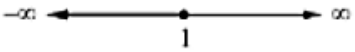
Class 11 - Mathematics

Mathematics MCQ January (2020-21)

1. **(a)** no solution
   Explanation:
   We have given: $4x + 3 \geq 2x + 17$
   $\Rightarrow 4x - 2x \geq 17 - 3 \Rightarrow 2x \geq 1$
   $\Rightarrow \quad x \geq \frac{14}{2}$ [Dividing by 2 on both sides]
   $\Rightarrow x \geq 7$ ..... (i)

   Also we have 3x - 5 < -2
   $\Rightarrow \quad 3x < -2 + 5 \Rightarrow 3x < 3$
   $\Rightarrow \quad x < 1$

   On combining (i) and (ii), we see that solution is not possible because nothing is common between these two solutions.(i.e., x < 1, x $\geq$ 7)

2. **(b)** {1}
   Explanation: 3x < 5
   $\Rightarrow x < \frac{5}{3}$
   $\Rightarrow x < 1\frac{2}{3}$
   Hence solution set = $\{x : x < 1\frac{2}{3}, x \in N\}$ = {1}

3. **(b)** (6, 8),(8, 10), (10, 12)
   Explanation: Let the consecutive even positive integers be x and x + 2.
   By data, x > 5 and x + (x + 2) < 23
   Now x + (x + 2) < 23
   $\Rightarrow$ 2x + 2 < 23
   $\Rightarrow$ 2x < 21
   $\Rightarrow$ x < $\frac{21}{2}$ = $10\frac{1}{2}$
   So we have the least possible value of x is 6 and the maximum value of x is 10.
   Therefore the possible pairs of consecutive even positive integers are (6, 8), (8, 10), (10, 12).

4. **(c)** x $\in$ (–∞, – 2]
   Explanation: The given graph represents all real values of x less than and equal to -2
   So, x $\in$ (–∞, – 2]

5. **(c)** null set
   Explanation: $\frac{2x-1}{3} - \frac{3x}{5} + 1 < 0$
   $\Rightarrow 15.\frac{2x-1}{3} - 15.\frac{3x}{5} + 15$ < 0 [Multiply the inequality throughout by the L.C.M]
   $\Rightarrow$ 5(2x - 1) - 3(3x) + 15 < 0
   $\Rightarrow$ 10x - 5 - 9x + 15 < 0
   $\Rightarrow$ x + 10 < 0
   $\Rightarrow$ x < -10, but given x $\in$ W
   Hence the solution set will be null set.

6. **(c)** $x \in (-\infty, -4) \cup (6, \infty)$
   Explanation: $|x - 1| > 5$
   $\Rightarrow x - 1 < -5 \quad or \quad x - 1 > 5 \qquad [\because |x| > a \Leftrightarrow x < -a \quad or \quad x > a]$
   $\Rightarrow x - 1 + 1 < -5 + 1 \quad or \quad x - 1 + 1 > 5 + 1$
   $\Rightarrow x < -4 \quad or \quad x > 6$
   $\Rightarrow x \in (-\infty, -4) \cup (6, \infty)$

7. **(d)** $x \in (2, \infty)$

Explanation: Since $\frac{|x-2|}{x-2} \geq 0$, for $|x - 2| \geq 0$, and $x - 2 \neq 0$ solution set $(2,\infty)$

8. **(a)** { }

Explanation: $x \geq 2 \Rightarrow x \epsilon [2, \infty)$

$x \leq -3 \Rightarrow x \epsilon (-\infty, -3]$

Hence solution set of $x \geq 2$ and $x \leq -3$ is $[2, \infty) \cap (-\infty, -3] = \Phi$

9. **(d)** 1st quadrant

Explanation: The solution region of $x \geq 0$ will be the half of XY –plane which lies on the right of y-axis, including the points on y-axis. [First and Fourth quadrants]

The solution region of $y \geq 0$ will be the half of XY –plane which lies above x-axis, including the points on x-axis. [First and Second quadrants]

Hence the solution region of $x \geq 0$, $y \geq 0$ will be the intersection of the above two regions, which is the first quadrant.

10. **(b)** $\left(\frac{-2}{3}, \infty\right)$

Explanation: (x + 3) + 4 > -2x + 5

$\Rightarrow$ x + 7 > -2x + 5

$\Rightarrow$ x + 7 + 2x > -2x + 5 + 2x

$\Rightarrow$ 3x + 7 > 5

$\Rightarrow$ 3x + 7 - 7 > 5 - 7

$\Rightarrow$ 3x > -2

$\Rightarrow$ x > $\frac{-2}{3}$

$\Rightarrow x \in \left(\frac{-2}{3}, \infty\right)$

11. **(c)** 78

Explanation: 4 out of 13 players are bowlers.

In other words, 9 players are not bowlers.

A team of 11 is to be selected so as to include at least 2 bowlers.

$\therefore$ Number of ways = ${}^4C_2 \times {}^9C_9 + {}^4C_3 \times {}^9C_8 + {}^4C_4 \times {}^9C_7$

= 6 + 36 + 36

= 78

12. **(a)** 2000

Explanation: Required number of ways $= \left({}^6C_3 \times {}^5C_3 \times {}^5C_3\right)$

$= \left({}^6C_3 \times {}^5C_2 \times {}^5C_2\right) = \left(\frac{6\times5\times4}{3\times2\times1} \times \frac{5\times4}{2\times1} \times \frac{5\times4}{2\times1}\right)$ = 2000

13. **(b)** 144

Explanation: Total number of letters in the 'ARTICLE' is 7 out which A, E, I are vowels and R, T, C, L are consonants

Given that vowels occupy even place

$\therefore$ possible arrangement can be shown as below

C, V, C, V, C, V, C i.e.on 2nd, 4th and 6th places

Thus, number of arrangement = ${}^3P_3$ = 3! = 6 ways

Now consonants can be placed at 1, 3, 5 and 7th place

$\therefore$ Number of arrangement = ${}^4P_4$ = 4! = 24

Thereforethe total number of arrangements = 6 $\times$ 24 = 144

14. **(a)** 720

Explanation: Thousands place can be filled by any of the 6 nonzero digits.

So, there are 6 ways to fill this place.

Hundreds place can be filled by any of the remaining 6 digits.

So, there are 6 ways to fill this place.

Tens place can be filled by any of the remaining 5 digits.

So, there are 5 ways to fill this place.

Units place can be filled by any of the remaining 4 digits.
So, there are 4 ways to fill this place.
Required number of numbers $= (6 \times 6 \times 5 \times 4)$ = 720

15. **(a)** 648
Explanation: The hundreds place can be filled by any of the 9 nonzero digits.
So, there are 9 ways of filling the hundreds place.
The tens digit can be filled by any of the remaining 9 digits.
So, there are 9 ways of filling the tens place.
The units place can now be filled by any of the remaining 8 digits.
So, there are 8 ways of filling the units digit
Required number of numbers $= (9 \times 9 \times 8)$ = 648

16. **(c)** 31
Explanation: ${}^5C_1 + {}^5C_2 + {}^5C_3 + {}^5C_4 + {}^5C_5$
= ${}^5C_1 + {}^5C_2 + {}^5C_2 + {}^5C_1 + {}^5C_5$
= $2 \times {}^5C_1 + 2 \times {}^5C_2 + {}^5C_5$
= $2 \times 5 + 2 \times \frac{5!}{2!3!} + 1$
= 10 + 20 + 1
= 31.

17. **(b)** 816
Explanation: r + r - 10 = 20 [$\because {}^nC_x = {}^nC_y \Rightarrow$ n = x + y or x = y]
$\Rightarrow$ 2r - 10 = 20
$\Rightarrow$ 2r = 30
$\Rightarrow$ r = 15
Now,
${}^{18}C_r = {}^{18}C_{15}$
$\therefore {}^{18}C_{15} = {}^{18}C_3$
$\therefore {}^{18}C_3 = \frac{18}{3} \times \frac{17}{2} \times 16$ = 816.

18. **(b)** 24
Explanation: Required number of ways = 4! $= (4 \times 3 \times 2 \times 1)$ = 24.

19. **(a)** 1
Explanation: We have ${}^nP_r = \frac{n!}{(n-r)!}$ .....(i)
Number of ways you can arrange n thing in n available spaces = n!
$\Rightarrow {}^nP_n$ = n! ....(ii)
But from (i) we get ${}^nP_n = \frac{n!}{(n-n)!} = \frac{n!}{0!}$ .....(iii)
Now from (ii) and (iii) we get $\frac{n!}{0!}$ = n! $\Rightarrow$ 0! = 1

20. **(d)** 20
Explanation: Here, it is given
${}^nC_{12} = {}^nC_8$ [$\because {}^nC_r = {}^nC_{n-r}$]
${}^nC_{12} = {}^nC_{n-8}$
$\therefore$ n - 8 = 12
$\Rightarrow$ n = 12 + 8 = 20

21. **(d)** 5
Explanation: Given ${}^{10}P_r = 2.{}^9P_r$
$\Rightarrow \frac{10!}{(10-r)!} = 2 \cdot \frac{(9)!}{(9-r)!}$
$\Rightarrow \frac{10 \times 9!}{(10-r) \times (9-r)!} = 2 \cdot \frac{(9)!}{(9-r)!}$
$\Rightarrow \frac{10}{(10-r)}$ = 2
$\Rightarrow$ 10 = 20 - 2r

$\Rightarrow$ 2r = 10

$\Rightarrow$ r = 5

22. **(c)** 720

Explanation: Fixing T at the beginning and E at the end, the remaining 6 letters can be arranged in 6 places in 6 ! = 720 ways.

$\therefore$ required number of words = 720

23. **(d)** 4320

Explanation: Take all the vowels A U E together and take them as one letter.

Then, the letters to be arranged are D, G, H, T, R, (A U E).

These 6 letters can be arranged in 6 places in 6 ! ways.

Now, 3 letters A, U, E among themselves can be arranged in 3 ! = 6 ways,

$\therefore$ required number of words $= (6!) \times 6 = (6 \times 5 \times 4 \times 3 \times 2 \times 1 \times 6)$ = 4320

24. **(a)** 72

Explanation: To form an even number the last number can only be an even digit, therefore the number of impossibility for the last digit of number = 3

Now the ten's place can be filled by any of the remaining 4 digits, and hence the no. of ways for ten's place = 4

Then there remain three digits, so no. of ways of filling hundred's place = 3

Similarly no. of ways of filling thousand's place = 2 and of ten thousand = 1

Therefore, the total possibilities are = $3 \times 4 \times 3 \times 2 \times 1$ = 72

25. **(d)** $\frac{1}{2}n(n-3)$

Explanation: In a polygon of n sides, number of diagonals $= \frac{1}{2}n(n-3)$

26. **(d)** 59

Explanation: $a + d = \frac{31}{4}$...(i) and

$a + 30d = \frac{1}{2}$...(ii)

On solving (i) and (ii), we obtain a = 8 and d = $\frac{-1}{4}$

$T_n = \frac{-13}{2} \Rightarrow a + (n-1)d = \frac{-13}{2}$

$\Rightarrow 8 + (n-1) \times \left(\frac{-1}{4}\right) = \frac{-13}{2} \Rightarrow (n-1) \times \frac{(-1)}{4} = \left(\frac{-13}{2} - 8\right) = \frac{-29}{2}$

$\Rightarrow (n-1) = \frac{-29}{2} \times \frac{4}{(-1)} = 58 \Rightarrow$ n = 59

$\therefore$ the given AP has 59 terms.

27. **(b)** 6

Explanation: Let the common ratio be r. Then,

$S_n = \frac{(lr-a)}{(r-1)} \Rightarrow \frac{(96r-3)}{(r-1)} = 189$

$\therefore$ (96r - 3) = 189r - 189 $\Rightarrow$ (189r - 96r) = 186 $\Rightarrow$ 93r = 186 $\Rightarrow$ r -2

Now, we have l= $ar^{n-1} \Rightarrow 3 \times 2^{(n-1)} = 96 \Rightarrow 2^{(n-1)} = 32 = 2^5 \Rightarrow$ n - 1 = 5 $\Rightarrow$ n = 6.

Therefore, n = 6

28. **(c)** 16

Explanation: Here a = 6 and d = 6.

Let S_n = 816. then,

$\frac{n}{2} \cdot [2a + (n-1)d] = 816 \Rightarrow \frac{n}{2} \cdot [2 \times 6 + (n-1) \times 6] = 816$

n(n + 1) = 272 $\Rightarrow n^2 + n - 272 = 0$

$\Rightarrow n^2 + 17n - 16n - 272 = 0$

$\Rightarrow$ n(n+ 17) - 16(n + 17) = 0

$\Rightarrow$ (n + 17)(n - 16) = 0

$\Rightarrow$ n = 16.

Required number of terms = 16

29. **(c)** 4^5

Explanation: Suppose a and r the first term and common ratio, respectively.

Given that the third term is 4.

$\therefore ar^2 = 4$

Product of first 5 terms = $a.ar.ar^2.ar^3.ar^4. = a^5r^{10} = (ar^2)^5 = 4^5$

30. **(d)** 3

Explanation: Let r be the common ratio of the G.P.

Given $S_{10} = 244\ S_5$

$\Rightarrow \frac{S_{10}}{S_5} = 244$

We have $S_n = \frac{a(r^n-1)}{r-1}$

$\Rightarrow \frac{\frac{a\left(r^{10}-1\right)}{r-1}}{\frac{a\left(r^5-1\right)}{r-1}} = 244, r-1 \neq 0$

$\Rightarrow \frac{r^{10}-1}{r^5-1} = 244$

$\Rightarrow r^{10} - 1 - 244r^5 + 244 = 0$

$\Rightarrow (r^5)^2 - 244r^5 + 243 = 0$

$\Rightarrow (r5)^2 - 243r^5 - 1r^5 + 243 = 0$

$\Rightarrow r^5(r^5 - 1) - 243(r^5 - 1) = 0$

$\Rightarrow r^5 = 243$ or $r^5 = 1$

Since $r - 1 \neq 0$, r cannot be 1

$\Rightarrow r = \sqrt[5]{243} = 3$

31. **(c)** 10

Explanation: Here, a = -14 and a_5 = a+ 4d = 2 $\Rightarrow$ - 14 + 4d = 2 $\Rightarrow$ 4d = 16 $\Rightarrow$ d = 4

$\therefore$ a = -14 and d = 4.

$\Rightarrow \frac{n}{2} \cdot [2 \times (-14) + (n-1) \times 4] = 40$

$\Rightarrow n(4n- 32) = 80$

$\Rightarrow n(n - 8) = 20$

$\Rightarrow n(n- 10) + 2(n - 10) = 0$

$\Rightarrow (n - 10)(n + 2) = 0$

$\Rightarrow$ n = 10

32. **(b)** 1 if n is odd and 0 when n is even

Explanation: 1 - 1 + 1 - 1 + ... + ... upto n terms

= [1 - 1] + [1 - 1] + [1 - 1] + ...+ [1 - 1] = 0 when n is even

= [1 - 1] + [1 - 1] + [1 - 1] + ... + [1 - 1] + 1 = 1 when n is odd

33. **(c)** None of these

Explanation: We have, $a_n = 128$, $S_n = 225$ and r = 2

$a_n = 128$

$\therefore ar^{(n-1)} = 128$

$\Rightarrow 2^{(n-1)}a = 128$

$\Rightarrow \frac{2^n a}{2} = 128$

$\Rightarrow 2^n = \frac{256}{a}$ .... (i)

Also, $S_n = 225$

$\Rightarrow a\left(\frac{r^n-1}{r-1}\right) = 225$

$\Rightarrow a\left(\frac{2^n-1}{2-1}\right) = 225$

$\Rightarrow a\left(\frac{256}{a} - 1\right) = 225$ [Using (i)]

$\Rightarrow 256 - a = 225$

$\Rightarrow a = 256 - 225$

$\Rightarrow a = 31$, which is the required first term.

34. **(b)** $(2+\sqrt{3}) : (2-\sqrt{3})$

Explanation: Given,AM = 2 × GM = $\frac{1}{2}(a+b) = 2\sqrt{ab} \Rightarrow \frac{a+b}{2\sqrt{ab}} = \frac{2}{1}$

$\Rightarrow \frac{a+b+2\sqrt{ab}}{a+b-2\sqrt{ab}} = \frac{2+1}{2-1} = \frac{3}{1}$

$\Rightarrow \frac{(\sqrt{a}+\sqrt{b})^2}{(\sqrt{a}-\sqrt{b})^2} = \frac{(\sqrt{3})^2}{(1)^2} \Rightarrow \frac{\sqrt{a}+\sqrt{b}}{\sqrt{a}-\sqrt{b}} = \frac{\sqrt{3}}{1}$

$\Rightarrow \frac{(\sqrt{a}+\sqrt{b})+(\sqrt{a}-\sqrt{b})}{(\sqrt{a}+\sqrt{b})-(\sqrt{a}-\sqrt{b})} = \frac{\sqrt{3}+1}{\sqrt{3}-1} \Rightarrow \frac{2\sqrt{a}}{2\sqrt{b}} = \frac{\sqrt{3}+1}{\sqrt{3}-1}$

$\Rightarrow \frac{\sqrt{a}}{\sqrt{b}} = \frac{\sqrt{3}+1}{\sqrt{3}-1} \Rightarrow \frac{a}{b} = \frac{(\sqrt{3}+1)^2}{(\sqrt{3}-1)^2} = \frac{2+\sqrt{3}}{2-\sqrt{3}}$.

35. **(a)** 0

Explanation: Suppose the first term and common difference of given A.P. be a and d, respectively.

Since, 9. t_9 = 13 $t._{13}$

$\Rightarrow$ 9(a + 8d) = 13(a + 12d)

⇒ 9a + 72d = 13a + 15d

$\Rightarrow$ 4a + 84d = 0 $\Rightarrow$ 4(a + 21d) = 0

$\Rightarrow$ t_{22} = 0.

36. **(b)** 1210

Explanation: From the given series we can write,

a_1 = 13, a_2 = 17, a_n = 97

d = a_2 − a_1 = 7 − 3 = 4

a_n = 97

$\Rightarrow$ a + (n − 1) d = 97

$\Rightarrow$ 13 + (n − 1)4 = 97

$\Rightarrow$ n = 22

Sum of the above series:

S_{22} = $\frac{22}{2}${2 × 13 + (22 − 1)4} = 11{26 + 84} = 1210

37. **(c)** $(2+\sqrt{3}) : (2-\sqrt{3})$

Explanation: Given a and b are two positive numbers

Also given A.M=2.G.M

$\frac{a+b}{2} = 2\sqrt{ab}$

$\Rightarrow \frac{a+b}{2\sqrt{ab}} = \frac{2}{1}$

Applying componendo dividendo

$\frac{a+b+2\sqrt{ab}}{a+b-2\sqrt{ab}} = \frac{2+1}{2-1}$

$\Rightarrow \frac{(\sqrt{a}+\sqrt{b})^2}{(\sqrt{a}-\sqrt{b})^2} = \frac{3}{1}$

$\Rightarrow \frac{\sqrt{a}+\sqrt{b}}{\sqrt{a}-\sqrt{b}} = \frac{\sqrt{3}}{1}$

Applying componendo dividendo again we get

$\Rightarrow \frac{2\sqrt{a}}{2\sqrt{b}} = \frac{\sqrt{3}+1}{\sqrt{3}-1}$

$\Rightarrow \frac{a}{b} = \frac{(\sqrt{3}+1)^2}{(\sqrt{3}-1)^2} = \frac{4+2\sqrt{3}}{4+2\sqrt{3}} = \frac{2(2+\sqrt{3})}{2(2-\sqrt{3})} = \frac{2+\sqrt{3}}{2-\sqrt{3}}$

38. **(b)** $\frac{5}{9}(10^n - 1)$

Explanation: 5+55+555+.....

$= \frac{5}{9}\{9 + 99 + 999 + \ldots\ldots\ldots\ldots\}$

$= \frac{5}{9}\{[10-1] + [10^2-1] + [10^3-1] + \ldots\ldots\ldots\ldots\ldots\ldots + [10^n-1] + \ldots\ldots\ldots\}$

Hence by inspection we get nth term is $\frac{5}{9}[10^n - 1]$

39. **(a)** 21

Explanation: Let S_n = 0. Then, $\frac{n}{2} \cdot [2a + (n-1)d] = 0$

$\therefore \frac{n}{2} \cdot \left[2 \times (-5) + (n-1) \times \frac{1}{2}\right] = 0 \Rightarrow n \cdot \left[\frac{-21}{2} + \frac{1}{2}n\right] = 0$

$\Rightarrow$ n = 0 or $\left\{\frac{1}{2}n - \frac{21}{2} = 0 \Rightarrow \frac{1}{2}n = \frac{21}{2} \Rightarrow n = 21\right\}$

$\therefore$ Therefore sum of 21 terms is 0.

40. **(b)** 6

Explanation: Given in the question,

a = 1, a_n = 11, S_n = 36

$\therefore$ a_n = 11

$\Rightarrow$ a + (n − 1)d = 11

$\Rightarrow$ 1 + (n − 1)d = 11

$\Rightarrow$ (n − 1)d = 10 ...(i)

Also, S_n = 36

$\Rightarrow$ n_2 {2a + (n − 1)d} = 36

$\Rightarrow$ n{2 + 10} = 72 (Using (1))

$\Rightarrow$ n = 6

ATOMIC ENERGY CENTRAL SCHOOL NO.4

RAWATBHATA

CLASS 11 - BIOLOGY

Biology MCQ (JAN 2021)

Time Allowed: 30 minutes **Maximum Marks: 40**

1. Dietary proteins are otherwise called as: **[1]**

   a) Non-essential aminoacids b) Aromatic aminoacids

   c) Essential aminoacids d) Alpha aminoacids

2. ATP is_____. **[1]**

   a) Nuleosome b) Nucleotide

   c) Purine base d) Nucleoside

3. Proteins are polymerization product of: **[1]**

   a) Monosaccharide b) Muramic acid

   c) Glucose d) Amino acids

4. Which one of the following is fibrous protein? **[1]**

   a) Haemoglobin b) Collagen

   c) Ribozymes d) Hemicellulose

5. Base pairs found in 5 turns of DNA spirals are _____. **[1]**

   a) 50 b) 100

   c) 10 d) 20

6. The number of substrate molecules changed per minute by a molecule of the enzyme is called: **[1]**

   a) Final number b) None of these

   c) Turn over number d) Enzyme reaction number

7. Metal ions required for the functioning of the enzyme is _____. **[1]**

   a) Prosthetic group b) Co-factor

   c) Holoenzyme d) Co-enzyme

8. An amino acid under certain conditions have both positive and negative charges simultaneously in the same molecule. Such a form of amino acid is called: **[1]**

   a) Acidic form b) Basic form

   c) Aromatic form d) Zwitterionic form

9. Which is the first step in analysis of biomolecules? **[1]**

   a) Precipitation b) Extraction

   c) Reagent reaction d) Staining

10. **Assertion:** Arachidonic acid is an unsaturated fatty acid. **[1]**
Reason: There are present one or more double bonds between carbon atoms in unsaturated fatty acid.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
c) Assertion is correct statement but reason is wrong statement.
d) Assertion is wrong statement but reason is correct statement.

11. Polyploidy is the property of: **[1]**

a) Increasing the size of chromosomes
b) Decreasing the number of chromosome sets
c) Maintaining the genetic materials
d) Increasing the number of chromosome sets

12. During which stage of meiosis, the recombination of genes takes place? **[1]**

a) Prophase I
b) Metaphase II
c) Prophase II
d) Metaphase I

13. During which stage the cell organelles reappear in cell division? **[1]**

a) Telophase
b) Prophase
c) Metaphase
d) Anaphase

14. A plant X has 2n = 8 chromosomes, how many chromosomes are present in daughter cells after meiosis II. **[1]**

a) 4 chromosomes
b) 8 chromosomes
c) 2 chromosomes
d) 16 chromosomes

15. Which of the following is the longest stage during meiosis? **[1]**

a) Prophase I
b) Metaphase I
c) Prophase II
d) Metaphase II

16. Select the correct statement about the G_1 phase. **[1]**

a) DNA in the cell does not replicate
b) Cell stops growing
c) It is not a phase of synthesis of macromolecules
d) Cell is metabolically inactive

17. The complex formed by a pair of synapsed homologous chromosomes is called: **[1]**

a) Diploid
b) Chaismata
c) Haploid
d) Tetrad

18. In between, two walls of adjacent cells are seen: **[1]**

a) Cytoplasm
b) Cell wall
c) Middle lamellae
d) Plasma membrane

19. The C_4 plants show higher rate of photosynthesis in: **[1]**

a) Low temperature
b) High temperature
c) Optimum temperature
d) Absence of temperature

20. In photosynthesis photolysis of water is used in: **[1]**

a) Oxidation of FAD
b) Oxidation of NADP
c) Reduction of $NADP^+$
d) Reduction of CO_2

21. The most efficient converter of sunlight is: **[1]**

a) Tomato
b) Papaya
c) Sugarcane
d) Potato

22. How does photosystem II maintain the continuous supply of electrons during electron transport system? **[1]**

a) By splitting water
b) By reduction of NADP to NADPH
c) By splitting CO_2
d) By utilizing ATP

23. The correct sequence of flow of electrons in the light reaction is: **[1]**

a) PSI, plastoquinone, cytochromes, PSIII, ferredoxin
b) PSII, plastoquinone, cytochromes, PSI, ferredoxin
c) PSIII, plastoquinone, cytochromes, PSII, ferredoxin
d) PSI, ferredoxin, PSII,

24. C_4 pathway is seen in: **[1]**

a) Evergreen plants
b) Deciduous plants
c) Temperate plants
d) Dry tropical plants

25. Which of the following happens during the dark reaction? **[1]**

a) Trapping of light energy
b) Carbon fixation
c) Formation of PGA
d) Formation of ATP and NADPH

26. In C_3 pathway, the bundle sheath cells are lack of an enzyme called **[1]**

a) ATP synthetase
b) RuBisCo
c) PEP carboxylase
d) PGA

27. Who proved that oxygen evolved in photosynthesis comes from water? **[1]**

a) Von Mayer
b) Hatch and Slack
c) Ruben, Hassid, and Kamen
d) Melvin Calvin

28. During light reaction in photosynthesis, the following are formed: **[1]**

a) Hydrogen, O_2 and sugar
b) ATP and sugar
c) ATP, hydrogen and O_2
d) ATP, hydrogen and O_2 donor

29. The C_4 pathway is otherwise called as: **[1]**

a) Non cyclic phosphorylation
b) Cyclic phosphorylation
c) Calvin pathway
d) Hatch and slack pathway

30. Which substrate is the connecting link between the Glycolysis and Krebs cycle? **[1]**

a) Acetyl CoA
b) Pyruvate
c) Citrate
d) Oxaloacetate

31. During which stage in the complete oxidation of glucose is the greatest number of ATP formed from ADP? **[1]**

a) Krebs cycle
b) Electron transport chain
c) Glycolysis
d) During conversion of pyruvic acid to Acetyl Co A

32. Two Synonyms are **[1]**

a) Citric acid cycle and calvin cycle
b) Tricarboxylic acid cycle and citric acid cycle
c) Tricarboxylic acid cycle and urea cycle
d) Krebs cycle and calvin cycle

33. What is the RQ of protein? **[1]**

a) 0.6
b) 0.7
c) 0.9
d) 0.8

34. Acetyl CoA combines with oxaloacetate in the presence of condensing enzyme citrate synthetase to form a 6-C compound called _____. **[1]**

a) Tartaric acid
b) Citric acid
c) Pyruvic acid
d) Malic acid

35. Lactic acid is formed by the process of: **[1]**

a) Fermentation
b) Kreb's cycle
c) Glycolysis
d) Incomplete oxidation

36. If both fatty acids and carbohydrates are available to muscles, which one is consumed first in respiration? **[1]**

a) Both Carbohydrates and Fatty acids
b) Carbohydrates
c) Fatty acids
d) None of these

37. Electron Transport System (ETS) is located in mitochondrial: **[1]**

a) Inter membrane space
b) Inner membrane
c) Outer membrane
d) Matrix

38. Mitochondria is called power house of the cell because **[1]**

a) Mitochondria have double membrane
b) Mitochondria contain ATP
c) Mitochondria are found in all kinds
d) Enzyme of Krebs cycle and the

of cells

cytochromes are found

39. Chemiosmotic theory of ATP synthesis in chloroplast and mitochondria is based on: **[1]**

a) Accumulation of K^+ ions

b) Accumulation of Na^+ ions

c) Proton gradient

d) Membrane potential

40. The net gain of ATP molecules per hexose during aerobic respiration is _____. **[1]**

a) 30

b) 18

c) 12

d) 36

Solution

Class 11 - Biology

Biology MCQ (JAN 2021)

1. **(c)** Essential aminoacids
   Explanation: Dietary proteins are the source of essential amino acids. Therefore, amino acids can be essential or non-essential. The latter are those which our body can make, while we get essential amino acids through our diet.
2. **(b)** Nucleotide
   Explanation: Adenosine triphosphate (ATP) is a nucleotide. A nucleotide is formed by pentose sugar, nitrogenous base and phosphates. Many nucleotides join together to form polynucleotide.
3. **(d)** Amino acids
   Explanation: The polymerisation is the chain of a large number of repeating units. Proteins are polymerization product of Amino acids combine together with peptide bonds.
4. **(b)** Collagen
   Explanation: Collagen is a fibrous protein. It is the main structural protein in the extracellular space in the various connective tissues. It is the most abundant protein in mammals.
5. **(a)** 50
   Explanation: Each turn of DNA spirals contains 10 base pairs. So, in five turns of DNA total number of Base pair is $5 \times 10 = 50$ base pairs.
6. **(c)** Turn over number
   Explanation: The number of substrate molecules changed per minute by a molecule of the enzyme is called turn over number. Higher the turn over number more effective is the enzyme.
7. **(b)** Co-factor
   Explanation: A number of enzymes require metal ions for their activity which form coordination bonds with side chains at the active site and at the same time form one or more coordination bonds with the substrate, e.g., zinc is a cofactor for the proteolytic enzyme carboxypeptidase.
8. **(d)** Zwitterionic form
   Explanation: Zwitterionic also called an inner salt, is a molecule that contains an equal number of positively and negatively charged functional group.
9. **(b)** Extraction
   Explanation: The first step is to extract from the input PDB file the molecules of interest and prepare them for the upcoming analysis.
10. **(a)** Assertion and reason both are correct statements and reason is correct explanation for assertion.
    Explanation: Arachidonic acid is an unsaturated fatty acid due to the presence of double bond. Arachidonic acid is a carboxylic **acid** with a 20-carbon chain and four cis-double bonds; the first double bond is located at the sixth carbon from the omega end.
11. **(d)** Increasing the number of chromosome sets
    Explanation: Polyploidy is the condition in which more than one set of chromosomes is present in one cell. It is the property of increasing the number of chromosome sets of the cell and results due to the failure of the segregation of non-sister chromatids after crossing over.
12. **(a)** Prophase I
    Explanation: Prophase I, it is during diplotene substage when the separation of cross over chromatids takes place.
13. **(a)** Telophase
    Explanation: Telophase results in the reappearance of cell organelles and their subsequent distribution to the two different cells since cytokinesis begins towards the end of telophase.
14. **(a)** 4 chromosomes
    Explanation: The number of chromosomes reduces to half at the end of meiosis cell division. If the plant

has 2n = 8 chromosome the number of chromosomes present in daughter cells after meiosis II is 4 only.

15. **(a)** Prophase I
Explanation: Prophase I which involves its further subdivision into five substages - Leptotene, Zygotene, Pachytene, Diplotene, and Diakinesis.

16. **(a)** DNA in the cell does not replicate
Explanation: DNA in the cell does not replicate as it is the first growth phase where ATP, nucleotides, amino acids, RNA, and protein synthesis, growth of the nucleus takes place.

17. **(d)** Tetrad
Explanation: The complex formed by a pair of synapsed homologous chromosomes is called a bivalent or a tetrad. However, these are more clearly visible at the ProphaseI of Meiosis-I.

18. **(c)** Middle lamellae
Explanation: The middle lamella cements the tertiary walls of two adjacent plant cells. It is formed out of materials of the cell plate.

19. **(b)** High temperature
Explanation: The C_4 plants respond to higher temperatures and show a higher rate of photosynthesis while C_3 plants have a much lower temperature optimum.

20. **(c)** Reduction of $NADP^+$
Explanation: Breaking down of water molecules in the presence of sunlight during photosynthesis is called photolysis of water. During photolysis of water reduction of $NADP^+$ into NADPH takes place.

21. **(c)** Sugarcane
Explanation: The efficiency of uncultivated plant life is only about 0.2%. In sugar cane, which is one of the most efficient plants, about 8% of the light absorbed by the plant is preserved as chemical energy. It shows the high efficiency of CO_2 fixation because of the Hatch and Slack cycle.

22. **(a)** By splitting water
Explanation: By splitting water hydrogen ion (H^+) is produced that maintain a continuous supply of electron.

23. **(b)** PSII, plastoquinone, cytochromes, PSI, ferredoxin
Explanation: From PSII, the electron passes over a series of carriers in a downhill journey losing its energy at every step PSII, plastoquinone, cytochromes, PSI, ferredoxin.

24. **(d)** Dry tropical plants
Explanation: Plants that are adapted to dry tropical regions have the C_4 pathway Though these plants have the C_4 oxaloacetic acid as the first CO_2 fixation product they use the C_3 pathway or the Calvin cycle as the main biosynthetic pathway.

25. **(b)** Carbon fixation
Explanation: Carbon fixation occurs in the dark reaction of photosynthesis.

26. **(c)** PEP carboxylase
Explanation: The CO_2 released in the bundle sheath cells enters the C_3 or the Calvin pathway, a pathway common to all plants. The bundle sheath cells are rich in an enzyme Ribulose bisphosphate carboxylase-oxygenase (RuBisCO), but lack PEPcase.

27. **(c)** Ruben, Hassid, and Kamen
Explanation: Ruben, Hassid and Kamen proved that Oxygen evolved during photosynthesis comes from water and not from carbon dioxide. For this, they used water with heavy isotope of oxygen, ^{18}O.

28. **(c)** ATP, hydrogen and O_2
Explanation: ATP, hydrogen, and O_2 are the components formed in light reaction.

29. **(d)** Hatch and slack pathway
Explanation: The presence of the bundle sheath would help you identify the C_4 plants. This pathway that has been named the Hatch and Slack Pathway, is again a cyclic process.

30. **(a)** Acetyl CoA
Explanation: The end product of Glycolysis is the formation of two molecules of pyruvate. Pyruvate is converted into Acetyl CoA before entering the Kreb's cycle. So Acetyl CoA is the connecting link between Glycolysis and Kreb's cycle.

31. **(b)** Electron transport chain
Explanation: During electron transport chain stage of respiration of complete oxidation of glucose, the greatest number of ATP is formed from ADP in the inner wall of mitochondria.

32. **(b)** Tricarboxylic acid cycle and citric acid cycle
Explanation: Tricarboxylic acid cycle and citric acid cycle are two synonyms as both represent same cycle occurring during respiration process.

33. **(d)** 0.8
Explanation: The respiratory quotient for protein metabolism can be demonstrated by the chemical equation for the oxidation of albumin:
$C_{72}H_{112}N_{18}O_{22}S + 77O_2 \rightarrow 63CO_2 + 38\ H_2O + SO_3 + 9CO(NH_2)_2$
The RQ for protein is approximately 0.8. RQ = $\frac{63CO_2}{77O_2}$ = 0.8
Due to the complexity of the various ways in which different amino acids can be metabolized, no single RQ can be assigned to the oxidation of protein in the diet; however, 0.8 is a frequently utilized estimate.

34. **(b)** Citric acid
Explanation: Acetyl CoA combines with oxaloacetate in presence of enzyme citrate synthetase to form 6-C compound called citric acid during Kreb's cycle.

35. **(d)** Incomplete oxidation
Explanation: Lactic acid is formed by the process of incomplete oxidation of glucose in the presence of insufficient oxygen. Lactic acid is formed in muscle cells due to incomplete oxidation to cause cramps.

36. **(b)** Carbohydrates
Explanation: Carbohydrates are the chief respiratory material. Starch and sucrose are the most important respiratory substrate. The reserve carbohydrates like starch are first transformed into simple carbohydrates. Then they are consumed in respiration. Fats: Fats are respiratory substrate in oily seeds. Fats are first converted into sugars. Then they are used in the respiratory process.

37. **(b)** Inner membrane
Explanation: Electron transport system is located in the Inner membrane .

38. **(d)** Enzyme of Krebs cycle and the cytochromes are found
Explanation: Mitochondria is called power house of the cell because it contain enzymes required for Kreb's cycle and cytochrome for electron transport chain during which energy is released in form of ATP.

39. **(c)** Proton gradient
Explanation: Synthesis of ATP during photosynthesis and respiration in chloroplast and mitochondria respectively is based explained by chemiosmotic theory. This theory is based on a protein gradient between the inner and outer membrane to form ATP from ADP and phosphate ions.

40. **(d)** 36
Explanation: Each glucose (hexose) during complete oxidation or aerobic respiration produces net 36 ATP molecules, which is produced in the form of NADPH and FADH. Each NADPH produce 3 ATP and FADH two ATP molecules.

Atomic Energy Central School No-4, Rawatbhata

ONLINE MULTIPLE CHOICE TEST– January (2020-21)

Class: XI Subject: Computer Science (083)

Time allowed: 1 Hours **Maximum Marks: 40**

1) What is the maximum possible length of an identifier?

a. 16
b. 32
c. 64
d. None of these above

2) Who developed the Python language?

a. Zim Den
b. Guido van Rossum
c. NieneStom
d. Wick van Rossum

3) In which year was the Python language developed?

a. 1995
b. 1972
c. 1981
d. 1989

4) In which language is Python written?

a. English
b. PHP
c. C
d. All of the above

5) Which one of the following is the correct extension of the Python file?

a. .py

b. .python
c. .p
d. None of these

6) What do we use to define a block of code in Python language?

a. Key
b. Brackets
c. Indentation
d. None of these

7) Which character is used in Python to make a single line comment?

a. /
b. //
c. #
d. !

8) Which of the following statements is correct for variable names in Python language?

a. All variable names must begin with an underscore.
b. Unlimited length
c. The variable name length is a maximum of 2.
d. All of the above

9) Which of the following words cannot be a variable in python language?

a. _val
b. val
c. if
d. _try_

10) Which of the following operators is the correct option for power (a, b)?

a. a ^ b
b. a**b
c. a ^ ^ b
d. a ^ * b

11) import math

```
abs(math.sqrt(36))
```

What will be the output of this code?

a. Error
b. -6
c. 6
d. 6.0

12) Which of the following option is not a core data type in the python language?

a. Dictionary
b. Lists
c. Class
d. All of the above

13) Which of the following data types is shown below?

```
L = [2, 54, 'javatpoint', 5]
```

a. Dictionary
b. Tuple
c. List
d. Stack

14) Which of the following data types is shown below?

```
L = (2, 54, 'javatpoint', 5)
```

a. Dictionary
b. Tuple
c. List
d. Stack

15) Which part of Mobile CPU responsible for voice call communication?

a. Digital Signal Processor

b. Power Management

c. CODEC

d. APU

16) Which part of Mobile Processor dealt with the mobile applications?

a. Com Processor

b. GPU

c. Digital Subsystem

d. APU

17) Assembler is a:

a. System Software

b. Application Software

c. Utility Software

d. Firmware

18) Storage of 1 MB means

a. 100000B

b. 1048576B

c. 1098304B

d. 10000000

19) Registers are the part of:

a. RAM

b. ROM

c. CPU

d. Hard Disk

20) What is a Bus in Computer Architecture?

a. A Signal Receiver

b. A communication system that transfers data between components inside a computer.

c. A Storage mechanism which stores data as they inputted.

d. A Signal Tracker in Architecture.

21) Flip-Flops are used in:

a. RAM-Static

b. RAM-Dynamic

c. Floppy

d. DVD-Blu-ray

22) Which of the following is not a utility software?

a. Text Editor

b. Spreadsheet

c. Disk Defragmenter

d. Antivirus

23) Which of the following is wrong?

a. TB>MB

b. KB<PB

c. YB>TB

d. EB<TB

24) (372) an octal number, its decimal equivalent is:

a. 350

b. 250

c. 450

d. 550

25) $(1948.B6)_{16}$ convert it into octal number:

a. 14410.554

b. 14510.505

c. 14510.554

d. 15440.554

26) 11100 + 11010 = ?

a. 101101

b. 100011

c. 110111

d. 110110

27) 1100101 – 1001110 =?

a. 11000

b. 10111

c. 11011

d. 10101

28) Which is literal from the following:

a. None

b. Boolean

c. Numeric

d. All of the above

29) Multiline comments are using which of the following sp. Character:

a. #

b. $

c. ”’

d. %

30) Which is not a barebones of Python:

a. Blocks & Indentation

b. Operator

c. Comment

d. Function

31) Find the output of the following:

x,y=2,6

x,y=y,x+2

printx,y

a. 4, 6

b. 6, 4

c. 10, 4

d. 4, 10

32) Which of the following is an identity operator:

a. isn’t

b. is not

c. Is not

d. IS

33) Under what conditions will this code print "water":

```
if temp<32:
print 'ice'
elif temp<212:
print 'water'
else:
print 'steam'
```

a. when temp>=32

b. when temp>=32 and >212

c. when temp<=32 and >0

d. when temp>=32 and <212

34) Find error:

```
Line:1      A,B=14,8
Line:2      IF A>10 and B>12:
Line: 3             print "No chance"
Line:4      else:
Line:5              print: "Yes…"
```

a. Line:1

b. Line:5

c. Line: 3

d. Line: 2

35) What signifies the end of a statement block or suite in Python?

a. end

b. ”’

c. }

d. A line that is indented less than the previous line

36) What is the output of the following if statement

```
a, b = 12, 5
if a + b:
print('True')
else:
print('False')
```

a. true

b. false

c. error

d. can’t say

37) What is the output of the following

```
x = 36 / 4 * (3 + 2) * 4 + 2
print(x)
```

a. 182.0

b. 37

c. 117

d. The Program executed with errors

38) What is the output of the following code?

```
str = "pynative"

print (str[1])
```

a. p

b. P

c. y

d. Y

39) What does the following code print?

```
if 4 + 5 == 10:
print("TRUE")
else:
print("FALSE")
print("TRUE")
```

a. TRUE

b.TRUE

FALSE

C. FALSE

TRUE

d. TRUE

FALSE

TRUE

40) Predict the output:

```
if 5 > 10:
print("fan")
elif 8 != 9:
```

```
print("glass")
else:
print("cream")
```

a. fan

b. glass

c. cream

d. error will be generated

Answer key

1. D
2. B
3. D
4. C
5. A
6. C
7. C
8. D
9. C
10. B
11. D
12. C
13. C
14. B
15. A
16. D
17. A
18. B
19. C
20. B
21. A
22. B
23. D
24. B
25. C
26. D
27. B
28. D
29. C
30. B
31. B
32. B
33. D
34. D
35. D
36. A
37. A
38. C
39. C
40. B

ATOMIC ENERGY CENTRAL SCHOOL NO.4

RAWATBHATA

CLASS 11 - HINDI CORE

HINDI CORE

Time Allowed: 30 minutes **Maximum Marks: 40**

1. स्पीति में बारिश निम्न में से कौन- सी विधा है? **[1]**

   a) रिपोर्ताज b) आत्मपरिचय

   c) . यात्रावृतांत d) कहानी

2. प्रश्न 1 स्पीति में बारिश के लेखक का सही नाम है? **[1]**

   a) कृष्णचंदर b) .कृष्णनाथ

   c) कृष्णदेव d) कृष्णमोहन

3. स्पीति किस राज्य में है ? **[1]**

   a) मध्यप्रदेश b) उत्तर प्रदेश

   c) कोई नहीं d) हिमाचल प्रदेश

4. स्पीति का रक्षा और संहार कौन करता है? **[1]**

   a) भूगोल b) इतिहास

   c) . समाज d) ..विज्ञान

5. हरकारा का अर्थ बताइए। **[1]**

   a) पत्रवाहक b) संदेशवाहक

   c) दूत d) डाकिया

6. स्पीति एवं वहां के बिहारों को कौन लूटा? **[1]**

   a) जोरावर सिंह b) नादिरशाह

   c) हिटलर d) गजनी

7. 1901 की जनगणना के अनुसार स्पीति की जनसंख्या थी? **[1]**

   a) 3282 b) 3531

   c) 3231 d) 3332

8. लाहुलस्पीति का प्रशासन किस से भारत को मिला? **[1]**

   a) गुलाब सिंह से b) जोरावर सिंह से

   c) कोई नहीं d) .ब्रिटिश राज से

9. स्पीति रेगुलेशन कब पास हुआ? **[1]**

   a) 1836 b) 1873

   c) 1847 d) 1857

10. ऋतुसंहार किसकी रचना है? **[1]**

a) कालिदास
b) केशवदास
c) रामदास
d) तुलसीदास

11. जामुन के पेड़ के लेखक कृश्नचंदर का जन्म किस गांव में हुआ था? **[1]**

a) इलाहाबाद
b) धनबाद
c) वजीराबाद
d) फरीदाबाद

12. जामुन का पेड़ गद्य की कौन-सी विधा है? **[1]**

a) कोईनहीं
b) कहानी
c) हास्यव्यंगकथा
d) यात्रावृतांत

13. जामुन का पेड़ कहां गिरा था? **[1]**

a) सेक्रेटेरिएट के लोन में
b) रास्ते पर
c) मकान पर
d) चौराहे पर

14. जामुन के पेड़ को गिरा हुआ सबसे पहले किसने देखा? **[1]**

a) मालीने
b) क्लर्कने
c) सुपरिटेंडेंटने
d) चपरासीने

15. बेचारा जामुन का पेड़ कितना फलदार था किसने कहा? **[1]**

a) क्लार्कने
b) चपरासीने
c) मालीने
d) आदमीने

16. पेड़ उठाने के विषय में सुपरिटेंडेंट ने किससे पूछा? **[1]**

a) अंडर सेक्रेट्री से
b) चीफ सेक्रेट्री से
c) डिप्टी सेक्रेटरी से
d) ज्वाइंट सेक्रेट्री से

17. पेड़ की समस्या किस विभाग के अधीन होती है? **[1]**

a) कृषि विभाग
b) व्यापार विभाग
c) विदेश विभाग
d) वित्त विभाग

18. किस डिपार्टमेंट का सेक्रेटरी साहित्य प्रेमी था? **[1]**

a) एग्रीकल्चर डिपार्टमेंट
b) मेडिकल डिपार्टमेंट
c) हॉर्टिकल्चर डिपार्टमेंट
d) कस्टम डिपार्टमेंट

19. किसने कहा अगर पेड़ काटा नहीं जा सकता तो इस आदमी को काट कर निकाल लिया जाए? **[1]**

a) विदेश विभाग ने
b) मनचले ने
c) सेक्रेटरी ने
d) सरकार ने

20. अंतमें पेड़ को काटने का हुक्म किसने दिया? **[1]**

a) मुख्यमंत्री
b) सेक्रेटरी
c) राष्ट्रपति
d) प्रधानमंत्री

21. घर की याद कविता केलेखक है? **[1]**

a) भवानी प्रसाद मिश्र
b) श्यामा प्रसाद
c) राजेंद्र प्रसाद
d) भवभूति मिश्र

22. कवि ने कविता की रचना की है? **[1]**

a) जेल प्रवास से
b) .छात्रावास से
c) घर से
d) गांव से

23. कवि कितने भाई थे? **[1]**

a) 4
b) 5
c) 3
d) अकेला

24. कवि की मां थी? **[1]**

a) सेविका
b) अनपढ़
c) पढ़ी-लिखी
d) ग्रहणी

25. कवि के पिता थे? **[1]**

a) युवा
b) चिर युवा
c) वृद्ध
d) अर्द्ध वयस्क

26. किसकी वाणी में बादलों जैसी गर्जना थी? **[1]**

a) भाई
b) बहन
c) माता
d) पिता

27. 'सोने पर सुहागा 'कह किसे याद किया गया है? **[1]**

a) .भाई को
b) कवि को
c) मां को
d) बहन को

28. घर की याद कविता के प्रारंभ में किस ऋतु का वर्णन है? **[1]**

a) वसंत ऋतु का
b) कोई नहीं
c) शरद ऋतु का
d) वर्षा ऋतु का

29. एक कंठ विषपायी के रचयिता हैं? **[1]**

a) फिराक गोरखपुरी
b) दुष्यंत कुमार
c) भवानी प्रसाद मिश्र
d) प्रेमचंद

30. दुष्यंत कुमार का जन्म कब हुआ था? **[1]**

a) सन 1933
b) सन 1934
c) सन 1930
d) सन 1932

31. आपकी पाठ्यपुस्तक में दो गजल दुष्यंत कुमार की है यह उनके किस गजल संग्रह से ली गई है? **[1]**

a) नए पत्ते
b) साए में धूप
c) सूर्य का स्वागत
d) एक कंठ विषपायी

32. राजस्थान की रजत बूंदें पाठ के रचयिता हैं? **[1]**

a) अनुभवमिश्र
b) भवभूति मिश्र
c) अनुपम मिश्र
d) दशरथ मिश्र

33. कुई की खुदाई किससे की जाती है? **[1]**

a) कुल्हाड़ी से
b) फावड़े से
c) वसूली से
d) खुरपी से

34. कुई की गर्मी कम करने के लिए किसका इस्तेमाल किया जाता है? **[1]**

a) रेत का
b) बर्फ का
c) पानी का
d) हवा का

35. चेलवानजी रेत कण से बचने हेतु अपने सिर पर किसका प्रयोग करता है? **[1]**

a) धातु का एक बर्तन टॉप की तरह
b) पगड़ी का
c) टोपी का
d) कोई नहीं

36. कुई का अर्थ है? **[1]**

a) बहुत ही छोटा सा कुआं
b) चौड़ा कुआं
c) मध्य कुआं
d) बड़ा कुआं

37. कुई शब्द में कौन सा लिंग है? **[1]**

a) स्त्रीलिंग
b) कोई नहीं
c) पुल्लिंग
d) पुलिंग

38. मरुभूमि समाज के लोगों ने उपलब्ध पानी को कितने रूपों में बांटा है? **[1]**

a) *3*
b) 4
c) 5
d) 2

39. पालरपानी पानी का कौन सा रूप है? **[1]**

a) कोई नहीं
b) दूसरा
c) पहला
d) तीसरा

40. पलरपानी और पातालपानी के बीच पानी का तीसरा रूप है? **[1]**

a) रेजानी पानी
b) साधारण पानी
c) पारलर पानी
d) पाताल पानी

Solution

Class 11 - Hindi Core

HINDI CORE

1. **(c)** . यात्रावृतांत
   Explanation: ----------
2. **(b)** .कृष्णनाथ
   Explanation: ----------
3. **(d)** हिमाचल प्रदेश
   Explanation: ----------
4. **(a)** भूगोल
   Explanation: ----------
5. **(b)** संदेशवाहक
   Explanation: ----------
6. **(a)** जोरावर सिंह
   Explanation: ----------
7. **(c)** 3231
   Explanation: ----------
8. **(d)** .ब्रिटिश राज से
   Explanation: ----------
9. **(b)** 1873
   Explanation: ----------
10. **(a)** कालिदास
    Explanation: ----------
11. **(c)** वजीराबाद
    Explanation: ----------
12. **(c)** हास्यव्यंगकथा
    Explanation: ----------
13. **(a)** सेक्रेटेरिएट के लोन में
    Explanation: ----------
14. **(a)** मालीने
    Explanation: ----------
15. **(a)** क्लार्कने
    Explanation: ----------
16. **(a)** अंडर सेक्रेट्री से
    Explanation: ----------
17. **(a)** कृषि विभाग
    Explanation: ----------
18. **(c)** हॉर्टिकल्चर डिपार्टमेंट
    Explanation: ----------
19. **(b)** मनचले ने
    Explanation: ----------
20. **(d)** प्रधानमंत्री
    Explanation: ----------
21. **(a)** भवानी प्रसाद मिश्र
    Explanation: ----------

22. **(a)** जेल प्रवास से
Explanation: ----------

23. **(b)** 5
Explanation: ----------

24. **(b)** अनपढ़
Explanation: ----------

25. **(b)** चिर युवा
Explanation: ----------

26. **(d)** पिता
Explanation: ----------

27. **(b)** कवि को
Explanation: ----------

28. **(d)** वर्षा ऋतु का
Explanation: ----------

29. **(b)** दुष्यंत कुमार
Explanation: ----------

30. **(a)** सन 1933
Explanation: ----------

31. **(b)** साए में धूप
Explanation: ----------

32. **(c)** अनुपम मिश्र
Explanation: ----------

33. **(c)** वसूली से
Explanation: ----------

34. **(a)** रेत का
Explanation: ----------

35. **(a)** धातु का एक बर्तन टॉप की तरह
Explanation: ----------

36. **(a)** बहुत ही छोटा सा कुआं
Explanation: ----------

37. **(a)** स्त्रीलिंग
Explanation: ----------

38. **(a)** *3*
Explanation: ----------

39. **(b)** दूसरा
Explanation: ----------

40. **(a)** रेजानी पानी
Explanation: ----------

ATOMIC ENERGY CENTRAL SCHOOL NO.4 Rawatbhata

MCQ Examination September (2020-2021)

CLASS 11 - PHYSICAL EDUCATION

MCQ Test January

Time Allowed: 30 minutes **Maximum Marks: 40**

1. Who is the writer of yoga sutra? **[1]**

   a) Maharshi Patanjali b) Swami Vivekananda

   c) Baba Ramdev d) Ved Vyas

2. How many limbs Yoga has? **[1]**

   a) Seven b) Two

   c) Five d) Eight

3. Which of the following is not a part of Yama? **[1]**

   a) Santosh b) Aparigraha

   c) Asteya d) Satya

4. How many components yoga has: **[1]**

   a) Six b) Two

   c) Eight d) Four

5. Which is the eighth limb of Ashtanga yoga? **[1]**

   a) Pratyahara b) Dhyana

   c) Dharana d) Samadhi

6. Which of the following sport is not related to air? **[1]**

   a) Rock Climbing b) Bungee Jumping

   c) Paragliding d) Free-flying

7. Which of the following is not a physical activity? **[1]**

   a) Dancing b) Gardening

   c) Domestic work d) Reading a book

8. Which of the following is a water sport? **[1]**

   a) Skate boarding b) River Rafting

   c) Trekking d) Sky-diving

9. Which of the following is not a quality of a good leader? **[1]**

   a) Attractive personality b) Richness

   c) Cooperative d) Organisational ability

10. Another name for adventurous sports is: **[1]**

a) Adventure related game
b) All of these
c) Thrilling game
d) Risk-taking game

11. Which of the following body type has a slim body? **[1]**

a) Ectomorph
b) Endomorph
c) Mesomorph
d) Ambivert

12. Which of the following body type is good for adventurous activities? **[1]**

a) Ambivert
b) Ectomorph
c) Mesomorph
d) Endomorph

13. Which of the following body type looks like a pear shape? **[1]**

a) None of these
b) Ectomorph
c) Mesomorph
d) Endomorph

14. Which of the following body type has a rectangular shaped body? **[1]**

a) Mesomorph
b) None of these
c) Endomorph
d) Ectomorph

15. Which of the following body type is good for weight lifting activity? **[1]**

a) Mesomorph
b) Introvert
c) Ectomorph
d) Endomorph

16. This joint facilitates turning and twisting movements: **[1]**

a) Pivot joint
b) Gliding joint
c) Hinge joint
d) Ball and socket joint

17. Anatomy is the study of: **[1]**

a) Application of the Principles
b) All systems of human body and their mutual relationship
c) Study of movement
d) Structure, shape, size and weight of organs

18. Which of the following is not a Sesamoid bone: **[1]**

a) Pisiform
b) Femur
c) Incus
d) Patella

19. It provides protection to the vital organs of our body: **[1]**

a) Respiratory system
b) Skeletal system
c) Cardiovascular system
d) Muscular system

20. Ball and Socket joint is situated at: **[1]**

a) Wrist
b) Knee
c) Shoulder
d) Neck

21. Adolescent age is: **[1]**

a) 10 to 18 years
b) 13 to 18 years
c) 9 to 18 years
d) 12 to 18 years

22. What is the meaning of Psyche? **[1]**

a) Science
b) Soul
c) Behaviour
d) Environement

23. What is the meaning of development? **[1]**

a) Change in size
b) All of these
c) Change in structure of body organ
d) Change in maturity

24. Which of the following will not come under growth? **[1]**

a) Increase in Weight
b) Increase in Height
c) Increase in size
d) Increase in obesity

25. In childhood, Individual's behaviour is most influenced by: **[1]**

a) School
b) Community
c) Peer group
d) Family

26. when was organise first ancient olympic? **[1]**

a) 1894
b) 1896
c) 1893
d) 1895

27. The headquarter of Paralympics is at: **[1]**

a) Denmark
b) Paris
c) Germany
d) New york

28. Speech therapist helps a child in: **[1]**

a) Playing
b) Communication
c) In enhancing mobility
d) Grooming

29. What is the motto of deaflympic? **[1]**

a) Let me win brane in my attempt
b) Per Ludos Aequalitas
c) Cetius, Altius Fortius
d) Spirit in motion

30. When start arjuna award? **[1]**

a) 1962
b) 1960
c) 1963
d) 1961

31. How many components does physical fitness has? **[1]**

a) Three
b) Four
c) Six
d) Five

32. What is another name of synchronisation? **[1]**

a) Strength
b) Coordination
c) Speed
d) Endurance

33. The percentage of fat, bones, water and muscles in human body is called: **[1]**

a) Flexibility
b) Body composition
c) Muscular endurance
d) Muscular strength

34. What is Suppleness called in simple words? **[1]**

a) Flexibility
b) Endurance
c) Strength
d) Speed

35. The ability to overcome resistance for a longer duration is called: **[1]**

a) Strength
b) Speed
c) Endurance
d) Flexibility

36. Ancient Olympic Games were organized in the honor of God: **[1]**

a) Theodosius
b) Zeus
c) Posedon
d) Hercules

37. IOC was formed in: **[1]**

a) 1886
b) 1894
c) 1880
d) 1892

38. The Paralympic Games were organized after the completion of: **[1]**

a) Olympic Games
b) SAF Games
c) Commonwealth Games
d) Asian Games

39. Where are the headquarters of IOC situated? **[1]**

a) France
b) Switzerland
c) Paris
d) New York

40. How many rings Olympic symbol has? **[1]**

a) Four
b) Five
c) Three
d) Two

Solution

Class 11 - Physical Education

MCQ Test January

1. **(a)** Maharshi Patanjali
   Explanation: Maharshi Patanjali wrote "Yog Sutra".
2. **(d)** Eight
   Explanation: Yoga has 8 limbs according to "Yog Sutra".
3. **(a)** Santosh
   Explanation: Ahimsa, Satya, Asteya, Brahmacharya and Aparigraha are the five Yam**.** Santosh is not one of them.
4. **(c)** Eight
   Explanation: There are Eight components in Yoga.
5. **(d)** Samadhi
   Explanation: Samadhi is the last or the eight limb of ashtanga yoga.
6. **(a)** Rock Climbing
   Explanation: Rock Climbing is not related to air at all.
7. **(d)** Reading a book
   Explanation: Reading a book is not a physical activity as it does not involve movement.
8. **(b)** River Rafting
   Explanation: River Rafting is one of the water-sports.
9. **(b)** Richness
   Explanation: Richness is not a trait that a leader must possess. A poor can also be a good leader.
10. **(b)** All of these
    Explanation: Adventurous sports can also be called as risk-taking, thrilling, or adventure-related games.
11. **(a)** Ectomorph
    Explanation: Ectomorphs have a slim body. They face difficulty in gaining weight.
12. **(c)** Mesomorph
    Explanation: Mesomorphs are best suited for adventurous activities like Mountain Climbing.
13. **(d)** Endomorph
    Explanation: Endomorphs have a pear-shaped body.
14. **(a)** Mesomorph
    Explanation: Mesomorphs have a rectangular body design.
15. **(d)** Endomorph
    Explanation: Endomorphs are naturally suitable for activities like weightlifting as they have a lot of strength.
16. **(a)** Pivot joint
    Explanation: Pivot joint helps in turning and twisting movements.
17. **(d)** Structure, shape, size and weight of organs
    Explanation: Study of structure, shape, size and weight of the organs of the body is called "Anatomy".
18. **(b)** Femur
    Explanation: Femur is not a sesamoid bone.
19. **(b)** Skeletal system
    Explanation: The skeletal system acts as a protection of our vital organs.
20. **(c)** Shoulder
    Explanation: The shoulder contains a ball and socket joint.
21. **(b)** 13 to 18 years
    Explanation: 13 to 18 years of age is regarded as adolescent age.

22. **(b)** Soul
Explanation: Psyche means soul.

23. **(b)** All of these
Explanation: Change in structure, size, maturity all are some sort of development.

24. **(d)** Increase in obesity
Explanation: Increase in obesity cannot be called as growth.

25. **(d)** Family
Explanation: A child's behaviour is most influenced by his family as he/she most of the time remains between the family members.

26. **(b)** 1896
Explanation: first olympic organise by b.p cobertin

27. **(c)** Germany
Explanation: The headquarters of Paralympics is located in Bonn, Germany.

28. **(b)** Communication
Explanation: Speech therapists help a child in improving communication skills.

29. **(b)** Per Ludos Aequalitas
Explanation: "Per Ludos Aequalitas" is the motto of Deaflympics i.e. Equality through Sports.

30. **(d)** 1961
Explanation: in the memory of arjuna

31. **(d)** Five
Explanation: There are five components of physical fitness:
    i. Strength
    ii. Speed
    iii. Endurance
    iv. Flexibility
    v. Co-ordination

32. **(b)** Coordination
Explanation: The synchronisation also means "Coordination".

33. **(b)** Body composition
Explanation: Body composition means the percentages of fat, bones, water, and muscles in the human body.

34. **(a)** Flexibility
Explanation: Suppleness means "Flexibility".

35. **(c)** Endurance
Explanation: Endurance is the ability to overcome resistance for a longer duration.

36. **(b)** Zeus
Explanation: The ancient Olympic Games were a sporting event held every four years at the sacred site of Olympia, in honour of Zeus, the supreme god of Greek religion.

37. **(b)** 1894
Explanation: The IOC was founded at the Sorbonne University in Paris on 23 June 1894.

38. **(a)** Olympic Games
Explanation: Paralympic games were organised soon after the completion of the Olympic Games.

39. **(b)** Switzerland
Explanation: IOC's headquarters are in Gland, Switzerland.

40. **(b)** Five
Explanation: Olympic Symbol has Five rings.