I.Q Section - I

Straight Objective Type

This section contains 30 multiple choice questions numbered 1 to 30. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

1. After seeing a historical building a tourist asked, "How old is this building?" Guide replied, "It is older than 50 years. Two years ago its age was a perfect square and after two years will be a perfect cube." Then, what is the actual age of the building?
   (A) 343 (B) 216 (C) 64 (D) 123

2. If GO $\rightarrow$ 32
   SHE $\rightarrow$ 49
   Then SITA = ?
   (A) 54 (B) 59 (C) 49 (D) 69

Directions: (Q. 3 to 7) Read the following information and answer the following questions :
(i) There is a group of five people – A, B, C, D and E.
(ii) In the group, there are three professors, specialists in philosophy, Psychology and Economics.
(iii) A and D are unmarried ladies and are not specialist in any subject.
(iv) In the group there is a married couple and E is the husband.
(v) B is the brother of C, and he is neither a psychologist nor an economist.
(vi) Professor specialist in Psychology is also a lady.

3. Who is E's wife?
   (A) A (B) B (C) C (D) D

4. Which of the following group consists of all the males?
   (A) ABC (B) BCD (C) BC (D) BE

5. Who is the professor of philosophy?
   (A) A (B) B (C) C (D) E

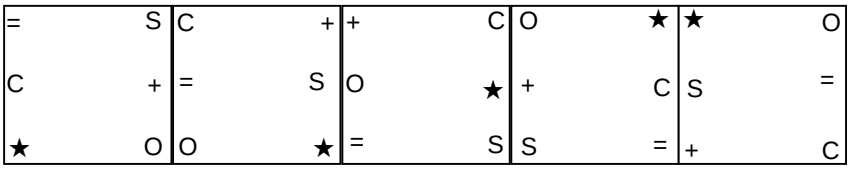
6. Who is the professor of Economics?
   (A) A (B) B (C) E (D) C

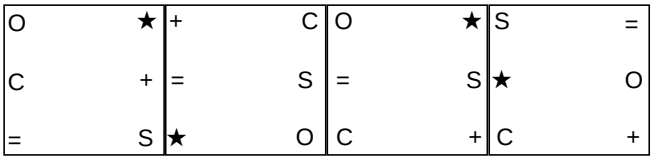
7. Which of the statements given above is superfluous?
   (A) None of these (B) (i) (C) (iii) (D) (vi)

Space for Rough Work

Directions: (8-9) In each of the questions given below which one of the figures (A), (B), (C) and (D) should come after the problem figures, if the sequence were continued?

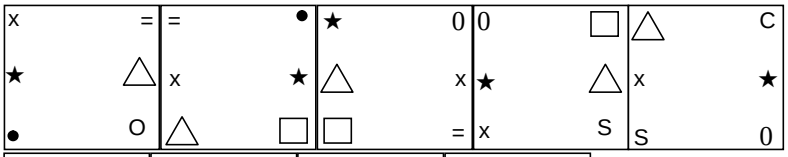
8.

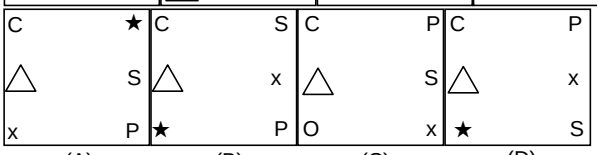




(A) (B) (C) (D)

9.





(A) (B) (C) (D)

10. If A + B means A is sister of B; A × B means A is wife of B; A ÷ B means A is father of B and A – B means A is brother of B. Which of the following means T is the daughter of P?
(A) P × Q ÷ R + S – T (B) P × Q ÷ R + T – S (C) P × Q ÷ R + T + S (D) none of these

11. At what time between 5:30 and 6 will the hands of a clock be at right angles?
(A) $43\frac{5}{11}$min.past5 (B) $43\frac{7}{11}$min.past5 (C) 40min.past5 (D) 45 min past 5

12. The reflex angle between the hands of a clock at 10:25 is:
(A) 180° (B) $192\frac{1}{2}^{o}$ (C) 195° (D) $197\frac{1}{2}^{o}$

Space for Rough Work

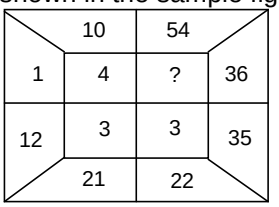
13. If 1st and 26th, 2nd and 25th, 3rd and 24th and so on, letters of the English alphabet are paired, then which of the following pairs is correct?
(A) GR (B) CW (C) IP (D) EV

14. If every alternative letter of English alphabet from B on wards (including B) is written in lower case (small letters) and the remaining letters are capitalized, then how will the first month of the second half of the year be written?
(A) JuLy (B) AuGuSt (C) jUlY (D) AugUSt

15. If only the first half of the English alphabet is reversed, how many letters will be there between K and R?
(A) 6 (B) 10 (C) 14 (D) 16

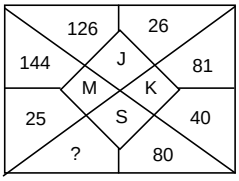
Directions: (Q. 16 to 18) In each of the following questions, the numbers have been arranged according to the pattern shown in the sample figure given below.

16.



(A) 10 (B) 22 (C) 5 (D) 2

17.



(A) 441 (B) 80 (C) 60 (D) 25

18. 6 7 5
7 8 6
8 9 ?
62 79 47
(A) 4 (B) 7 (C) 8 (D) 9

Space for Rough Work

Directions: (Q.19 to 21) There is a letter/number series from which some of the letters/numbers are missing. The missing letters/numbers are given in proper sequence in one of the alternatives among the four given under each question.

19. 7, 15, 47, 191, ?
(A) 385 (B) 767 (C) 959 (D) 1009

20. $11\frac{1}{9}, 12\frac{1}{2}, 14\frac{2}{7}, 16\frac{2}{3}, ?$
(A) $8\frac{1}{3}$ (B) $19\frac{1}{2}$ (C) 20 (D) $22\frac{1}{3}$

21. $\frac{2}{3}, \frac{4}{7}, ?, \frac{11}{21}, \frac{16}{31}$
(A) $\frac{5}{9}$ (B) $\frac{6}{11}$ (C) $\frac{7}{13}$ (D) $\frac{9}{17}$

22. Amar, Akbar and Anthony are friends, being looked after by a matron Farah. Amar weighs 50% more than Akbar and Anthony weights 25% less than Amar. Farah weighs one third of the combined weight of the three boys. All four together weight 232 kg. The correct arrangement of the person in the ascending order of their weight is:
(A) Anthony, Akbar, Farah, Amar (B) Anthony, Akbar, Amar, Farah
(C) Akbar, Anthony, Amar, Farah (D) Akbar, Anthony, Farah, Amar

23. On another planet, the local terminology for earth, water, light, air and sky, are 'sky', 'light', 'air', 'water' and 'earth' respectively. If someone is thirsty there, what would he drink?
(A) sky (B) water (C) air (D) light

Space for Rough Work

Directions (Questions 24– 25): In each of these questions there are two statements followed by two conclusions numbered I and II. You have to take the two given statements to be true even if they seem to be at variance from commonly known facts and decide which of the two given conclusions logically follows from the two given statements. Give answer:

(A) if only conclusion I follows
(B) If only conclusion II follows
(C) if neither I nor II follows
(D) If both I and II follow.

24. Statements:
1. Some players are singers.
2. All singers are tall.

Conclusions:
I. Some players are tall
II. All players are tall.

25. Statements :
1. Some fools are intelligent.
2. Some intelligent are great.

Conclusions :
I. Some fools are great
II. All great are intelligent.

26. In a group of 15 people, 7 read French, 8 read English while 3 of them read none of these two. How many read both of these two?
(A) 0 (B) 3 (C) 4 (D) 5

27. Today is Varun's birthday. One year from today he will be twice as old as he was 12 years ago. How old is Varun today?
(A) 20 years (B) 22 years (C) 25 years (D) 27 years

28. A student got twice as many sums wrong as he got right. If he attempted 48 sums in all, how many did he solve correctly?
(A) 12 (B) 16 (C) 18 (D) 24

Directions (Questions 29 – 30): These questions are based on the letters of the word: **"DISOBEDIENCE"**

29. How many sets of two letters are as much apart form each other as they are in the alphabetical order?
(A) 1 (B) 2 (C) 3 (D) 4

30. If a meaningful word can be formed with the 2^{nd}, 6^{th}, 10^{th}, 11^{th} and 12^{th} letters of the word, which would be the fourth letter of that word?
(A) I (B) E (C) N (D) C

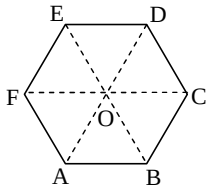
Space for Rough Work

Physics Section - II

Straight Objective Type

Physics contains 30 multiple choice questions numbered 1 to 30. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

1. In the figure shown, ABCDEF is regular hexagon, What is the value of $\overrightarrow{AB}+\overrightarrow{AC}+\overrightarrow{AD}+\overrightarrow{AE}+\overrightarrow{AF}$?



(A) $\overrightarrow{AO}$ (B) $2\overrightarrow{AO}$
(C) $4\overrightarrow{AO}$ (D) $6\overrightarrow{AO}$

2. The displacement (x) of a particle depends on time t as $x=\alpha t^2-\beta t^3$. Choose the incorrect statements from the following

(A) The particle comes to rest after time $\frac{3\alpha}{4\beta}$ (B) The particle comes to rest after time $\frac{2\alpha}{3\beta}$
(C) The initial velocity of the particle is non zero (D) The initial acceleration of the particle is zero

3. A body moves for a total of nine second starting from rest with uniform acceleration and then with uniform retardation, which is twice the value of acceleration and then stops. The duration of uniform acceleration is
(A) 3 s (B) 4.5 (C) 5 s (D) 6 s

4. The equation of motion of a projectile is

$$y=12x-\frac{3}{4}x^2$$

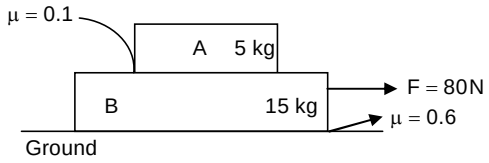
What is the range of the projectile?
(A) 12 m (B) 16 m (C) 20 m (D) 24 m

5. A projectile is fired from level ground at an angle θ above the horizontal. The elevation angle ϕ of the highest point as seen from the launch point is related to θ by the relation

(A) $\tan\phi=\frac{1}{4}\tan\theta$ (B) $\tan\phi=\tan\theta$ (C) $\tan\phi=\frac{1}{2}\tan\theta$ (D) $\tan\phi=2\tan\theta$

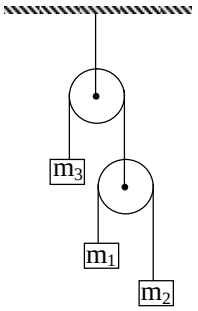
Space for Rough Work

6. Find the value of friction forces between the blocks A and B and between B and ground. $\left(\text{Take}, g=10\,ms^{-2}\right)$



(A) 90 N, 5 N (B) 5 N, 90 N
(C) 5 N, 75 N (D) 0 N, 80 N

7. In the figure, pulleys are smooth and strings are massless, $m_1 = 1\,kg$ and $m_2 = \frac{1}{3}kg$. To keep m_3 at rest, mass m_3 should be



(A) 1 kg (B) $\frac{2}{3}kg$
(C) $\frac{1}{4}kg$ (D) 2 kg

8. The upper half of an inclined plane of inclination θ is perfectly smooth while the lower half rough. A block starting from rest at the top of the plane will again come to rest at the bottom if the coefficient of friction between the block and the lower half of the plane is given by

(A) $\mu = 2\tan\theta$ (B) $\mu = \tan\theta$ (C) $\mu = \frac{2}{\tan\theta}$ (D) $\mu = \frac{1}{\tan\theta}$

9. The maximum velocity of a particle, executing simple harmonic motion with an amplitude 7 mm, is 4.4 m/s. The period of oscillation is

(A) 100 s (B) 0.01 s (C) 10 s (D) 0.1 s

10. If unit vectors $\hat{A}$ and $\hat{B}$ have an angle θ between them, then value of $\left|\hat{A}+\hat{B}\right|$ will be

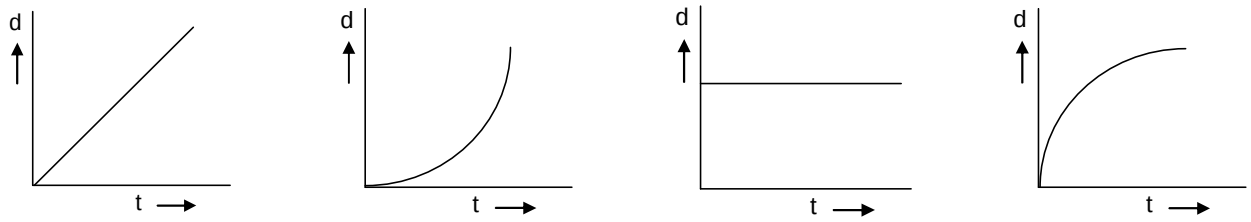
(A) $2\cos\frac{\theta}{2}$ (B) $2\tan\frac{\theta}{2}$ (C) $2\sin\frac{\theta}{2}$ (D) None of these

Space for Rough Work

11. A block of mass 0.5 kg has an initial velocity of 10 ms^{-1} while moving down an inclined plane of angle 30°, the coefficient of friction between the block and the inclined surface is 0.2. The velocity of the block, after it covers a distance of 10 m, is

(A) $17 ms^{-1}$ (B) $13 ms^{-1}$ (C) $24 ms^{-1}$ (D) $8 ms^{-1}$

12. A body is moving unidirectional under the influence of a source of constant power supplying energy. Which of the diagrams shown in figure correctly show the displacement – time curve for its motion?



(A) (B) (C) (D)

13. The particle is released from a height h. At a certain height, its kinetic energy is two times of its potential energy. Height and speed of the particle at that instant are

(A) $\frac{h}{3}, \sqrt{\frac{2gh}{3}}$ (B) $\frac{h}{3}, 2\sqrt{\frac{gh}{3}}$ (C) $\frac{2h}{3}, \sqrt{\frac{2gh}{3}}$ (D) $\frac{h}{3}, \sqrt{2gh}$

14. The potential energy function for the force between two atoms in a diatomic molecule is approximately given by $U(x) = \frac{a}{x^{12}} - \frac{b}{x^6}$, where a and b are constants and x is the distance between the atoms. If the dissociation energy of the molecule is $D = \left[U(x = \infty) - U_{\text{at equilibrium}}\right]$, D is

(A) $\frac{b^2}{2a}$ (B) $\frac{b^2}{12a}$ (C) $\frac{b^2}{4a}$ (D) $\frac{b^2}{6a}$

15. A body of mass m is accelerated uniformly from rest to a speed v in a time interval T. The instantaneous power delivered to the body as a function of time, is given by

(A) $\frac{mv^2}{T^2}t$ (B) $\frac{mv^2}{T^2}t^2$ (C) $\frac{1}{2}\frac{mv^2}{T^2}t$ (D) $\frac{1}{2}\frac{mv^2}{T^2}t^2$

Space for Rough Work

16. If a particle of mass m_1 is located at $(x, y, z) = (0, a, 0)$ and a second particle of mass m_2 is located at $(x, y, z) = (b, c, 0)$, what is the location of their centre of mass?

(A) $\left(\frac{b}{2}, \frac{a+c}{2}, 0\right)$ (B) $\left(\frac{m_2 b}{m_1+m_2}, \frac{m_1 a + m_2 c}{m_1+m_2}, 0\right)$

(C) $\left(\frac{m_1 b}{m_1+m_2}, \frac{m_2 a + m_1 c}{m_1+m_2}, 0\right)$ (D) None of these

17. The centre of mass of two particles lies
(A) On the line perpendicular to the line joining the particles (B) On a point outside the line joining the particles
(C) On the line joining the particles (D) None of above

18. Two identical billiard balls are in contact on table. A third identical ball strikes them symmetrically and comes to rest after impact. The coefficient of restitution is:

(A) $\frac{2}{3}$ (B) $\frac{1}{3}$ (C) $\frac{1}{6}$ (D) $\frac{\sqrt{3}}{2}$

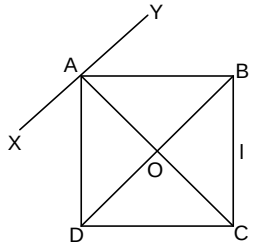
19. Two particles A and B which are initially at rest move towards each other under the mutual force of attraction. At the instant when the speed of A is v and the speed of B is 2 v, the speed of the centre of mass of the system is-
(A) v (B) 1.5 v (C) 3 v (D) zero

20. In an inelastic collision-
(A) Momentum is conserved but kinetic energy is not conserved
(B) Momentum is not conserved but kinetic energy is conserved
(C) Neither momentum nor kinetic energy is conserved
(D) Both the momentum and kinetic energy are conserved

Space for Rough Work

21. Consider three solid spheres, sphere (i) has radius r and mass m, sphere (ii) has radius r and mass 3m, sphere (iii) has radius 3r and mass m, All can be placed at the same point on the same inclined plane, where they will roll without slipping to the bottom, If allowed to roll down the incline, then at the bottom of the incline
(A) Sphere (i) will have the largest speed
(B) Sphere (ii) will have the largest speed
(C) Sphere (iii) will have the largest kinetic energy
(D) All the spheres will have equal speeds

22. Four point masses each of value m, are placed at the corners of a square ABCD of side l. The moment of inertia of the system about an axis passing though A and parallel to BD is



(A) $\sqrt{3}ml^2$
(B) $3ml^2$
(C) ml^2
(D) $2ml^2$

23. The ratio of the radii of gyration of a circular disc and a circular ring of the same radius about a tangential axis in the plane is
(A) $\sqrt{3} : \sqrt{4}$
(B) $\sqrt{5} : \sqrt{6}$
(C) $\sqrt{6} : \sqrt{5}$
(D) $\sqrt{4} : \sqrt{3}$

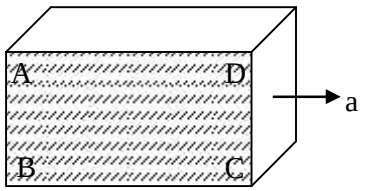
24. If S is stress and Y is Young's modulus of material of a wire, the energy stored in the wire per unit volume is
(A) $2Y/S$
(B) $S/2Y$
(C) $2S^2Y$
(D) $\frac{S^2}{2Y}$

25. The dimensional formula of young's modulus is
(A) $[ML^{-2}T^{-2}]$
(B) $[ML^{-3}T^{-2}]$
(C) $[ML^2T^{-2}]$
(D) $[ML^{-1}T^{-2}]$

Space for Rough Work

26. An ice block contains a glass ball. When the ice melts within the water containing vessel, the level of water
(A) Rises (B) falls
(C) remains unchanged (D) first rises and then falls

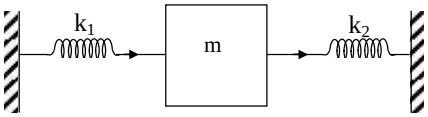
27. A closed rectangular tank is completely filled with water and is accelerated horizontally with an acceleration a towards right. Pressure is (i) maximum at, and (ii) minimum at
(A) B (ii) D (B) (i) C (ii) D
(C) (i) B (ii) C (D) (i) B (ii) A



28. A particle perform SHM about O with amplitude A & time period T. The magnitude of its acceleration $\frac{T}{8}s$ after the particle reaches the extreme position would be
(A) $\frac{4\pi^2 A}{\sqrt{2}T^2}$ (B) $\frac{4\pi^2 A}{T^2}$ (C) $\frac{2\pi^2 A}{\sqrt{2}T^2}$ (D) None

29. At what height h above Earth, the value of g becomes g/2 (where R is the radius of the Earth?
(A) $\left(\sqrt{2}-1\right)R$ (B) $\left(\sqrt{2}+1\right)R$ (C) $\sqrt{2}R$ (D) $R/\sqrt{2}$

30. Two springs, of force constants k_1 and k_2, are connected to a mass m as shown in the following. The frequency of oscillation of the mass is f. If both k_1 and k_2 are made 4 times their original values, the frequency of oscillation becomes
(A) f/2 (B) f/4
(C) 4f (D) 2f



Space for Rough Work

Chemistry

Straight Objective Type

Chemistry contains 30 multiple choice questions numbered 31 to 60. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

31. A photon of wavelength 4000 Å strikes a metal surface, the work function of the metal being 2·13 eV. The kinetic energy of the emitted photoelectron is—
(A) 0·97 eV (B) 9·7 eV (C) 5·23 eV (D) 3·10 eV

32. The solubility in grams per litre of $Al(OH)_3$ in water at 25°C if Ksp = $8{\cdot}5 \times 10^{-32}$ is
(A) $0{\cdot}749 \times 10^{-8}$ (B) $0{\cdot}749 \times 10^{-7}$ (C) $5{\cdot}842 \times 10^{-7}$ (D) $5{\cdot}842 \times 10^{-8}$

33. The solubility of AgI in NaI solution is less than that in pure water because
(A) AgI forms complex with NaI (B) Of common ion effect
(C) Solubility product of AgI is less than that of NaI (D) The temperature of the solution decreases

34. Among the following the molecule with the highest dipole moment is—
(A) CH_3Cl (B) CH_2Cl_2 (C) $CHCl_3$ (D) CCl_4

35. The dipole moment of HBr is $0{\cdot}78 \times 10^{-18}$ e.s.u. cm and interatomic spacing is 1·41 Å. The% ionic character of HBr is_____
(A) 7.5 (B) 11.7 (C) 15 (D) 27

36. Which of the following statement regarding spectral series is correct?
(A) The lines in the Balmer series correspond to electron transition from energy levels higher than n = 1 energy level
(B) Paschen series appear in infrared region
(C) The lines of Lyman series appear in visible region
(D) Transition from higher energy levels to 4th energy level produce Pfund series which fall in IR region

37. Which of the following sets of quantum numbers represents the highest energy of electron in an atom?
(A) $n = 3, l = 1, m = 1, s = +1/2$ (B) $n = 3, l = 2, m = 1, s = +1/2$
(C) $n = 4, l = 0, m = 1, s = +1/2$ (D) $n = 3, l = 1, m = 1, s = +1/2$

Space for Rough Work

38. The wave function ψ in the Schrodinger wave equations represents—
(A) Probability of the electron (B) Amplitude of the wave
(C) Frequency of the wave (D) Speed of the wave

39. The square pyramidal molecular shape is adopted by
(A) SOF_4 (B) $XeOF_4$ (C) $SeOCl_4$ (D) PF_5

40. Consider the following ions: a.Ni^{2+} b.Co^{2+} c.Cr^{2+} d.Fe^{3+} (At. No. Cr = 24, Fe = 26, Co = 27, Ni = 28) The correct sequence of the number of unpaired electrons is
(A) a, b, c, d (B) d, b, c, a (C) a, c, b, d (D) c, d, b, a

41. A 1s orbital refers to
(A) A circular track in an atom in which an electron travels (B) A one electron wave function
(C) An observable property of the system (D) A hermitian operator

42. The standard enthalpy of combustion at 25°C of H_2(g), cyclohexene(g) and cyclohexane(g) are – 241, -3800 and – 3920 kJ mol^{-1}, respectively. The standard enthalpy of hydrogenation of cyclohexene will be
(A) 121 kJ mol^{-1} (B) – 1211 kJ mol^{-1} (C) – 121 kJ mol^{-1} (D) – 242 kJ mol^{-1}

43. The combustion reaction occurring in an automobile is $2C_8H_{18}(s)+25O_2(g)\rightarrow 16CO_2(g)+18H_2O(g)$. This reaction is accompanied with
(A) $\Delta H=-ve, \Delta S=+ve, \Delta G=+ve$ (B) $\Delta H=+ve, \Delta S=-ve, \Delta G=+ve$
(C) $\Delta H=+ve, \Delta S=+ve, \Delta G=-ve$ (D) $\Delta H=-ve, \Delta S=+ve, \Delta G=-ve$

44. The mathematical relation for the first law of thermodynamics is
(A) $\Delta E = q - w$ (B) $\Delta E = 0$, for a cyclic process
(C) $\Delta E = q$, for an isochoric process (D) All of these

45. Which of the following does not have the intermolecular hydrogen bond—
(A) liquid NH_3 (B) water (C) salicylic acid (D) mono carboxylic acid

Space for Rough Work

46. Which is the correct relation for a salt of weak acid and weak base?
(A) $Kh = \frac{Kw}{Ka \times Kb}$ (B) $Kh = \frac{Kw \times Ka}{Kb}$ (C) $Kh = \frac{Kw \times Kb}{Ka}$ (D) Kh = Kw × Ka × Kb

47. Which one of the following relationship represents the isothermal expansion of one mole of an ideal gas?
(A) $\Delta S = RT \ln (V_2 / V_1)$ (B) $\Delta S = R \ln (V_2 / V_1)$ (C) $\Delta S = R \ln (V_1 / V_2)$ (D) $\Delta S = T \ln (V_2 / v_1)$

48. The pressure of a real gas is less in comparison to an ideal gas because of—
(A) finite size of the molecules
(B) increase of kinetic energy of molecules
(C) viscosity
(D) intermolecular forces

49. Which of the following order is wrong?
(A) $NH_3 < PH_3 < AsH_3$ – Acidic
(B) Li < Be < B < C – IE_1
(C) $Al_2O_3 < MgO < Na_2O < K_2O$ – Basic
(D) $Li^+ < Na^+ < K^+ < Cs^+$ – Ionic radius

50. The size of the ions change in the order—
(A) $Na^+ > Mg^{2+} > Si^{4+} > Cl^{7+}$
(B) $Cl^{7+} > Si^{4+} > Mg^{2+} > Na^+$
(C) $Cl^{7+} > Na+ > Mg^{2+} > Si^{4+}$
(D) $Na+ > Mg^{2+} > Cl^{7+} > Si^{4+}$

51. The screening effect of inner electrons of the nucleus causes—
(A) Decreases in the ionisation energy
(B) Increase in the ionisation energy
(C) No effect on the ionisation energy
(D) Increase in the attraction of the nucleus to the electrons

52. The electron affinity and ionisation potential of iodine are 3·43 eV and 10·5 eV respectively. The electronegativity of iodine is—
(A) 3·48 (B) 2·48 (C) 1·5 (D) 2·0

53. Out of NO_2, ClF_2^-, SO_2 and I_3^-, the linear species are—
(A) NO_2 and ClF_2^- (B) ClF_2^- and I_3^- (C) I_3^-, SO_2 (D) SO_2 and ClF_2^-

Space for Rough Work

54. When $KMnO_4$ acts as an oxidising agent and ultimately forms MnO_4^{2-}, MnO_2, Mn_2O_3 and Mn^{2+}, then the number of electrons transferred in each case respectively is—
(A) 4, 3, 1, 5 (B) 1, 5, 3, 7 (C) 1, 3, 4, 5 (D) 3, 5, 7, 1

55. The equivalent weight of phosphoric acid (H_3PO_4) in the reaction—
$NaOH + H_3PO_4 \text{--} \rightarrow NaH_2PO_4 + H_2O$ is—
(A) 59 (B) 49 (C) 25 (D) 98

56. The oxidation number of S in $Na_2S_4O_6$ is—
(A) 2·5
(B) + 2 and + 3 (two S have + 2 and other two have + 3)
(C) + 2 and + 3 (three S have + 2 and one S has + 3)
(D) + 5 and 0 (two S have + 5 and the other two have 0)

57. The molecular velocity of any gas is
(A) inversely proportional to the square root of temperature
(B) inversely proportional to the absolute temperature
(C) directly proportional to square of temperature
(D) directly proportional to square root of temperature

58. If Z is a compressibility factor, van der Waals equation at low pressure can be written as
(A) $Z = 1 - a/V_m RT$ (B) $Z = 1 - pb/RT$ (C) $Z = 1 + pb/RT$ (D) $Z = 1 + RT/pb$

59. The minimum number of intensive variables required to define the state of a gas is—
(A) 1 (B) 2 (C) 3 (D) 4

60. The temperature at which oxygen molecules have the same root mean square speed as helium atoms have at 300 K is (atomic masses: He = 4 u and O = 16 u)
(A) 300 K (B) 600 K (C) 1200 K (D) 2400 K

Space for Rough Work

Biology Section - III

Straight Objective Type

Biology contains 60 multiple choice questions numbered 1 to 60. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

1. Brunner's glands are found in
   (A) Stomach (B) Duodenum (C) Ileum (D) Large intestine

2. Pinocytosis refers to
   (A) Ingestion of solid particles by plasma membrane
   (B) Ingestion of liquid particles by plasma membrane
   (C) Diffusion of solid particles by plasma membrane
   (D) Diffusion of liquid particles by plasma membrane

3. Which one of the following is the function of nucleolus?
   (A) DNA replication (B) Ribosome synthesis
   (C) Organization of chromosomes (D) Chromatin separation

4. The vein through which food molecules goes towards the heart is called
   (A) Hepatic vein (B) Portal vein (C) Lateral vein (D) Ileum vein

5. Plastids differ from mitochondria on the basis of _____
   (A) Presence of two layers of membrane (B) Presence of ribosome
   (C) Presence of chlorophyll (D) Presence of DNA

6. Bundles of His is formed of mainly
   (A) Nervous tissue supplied to ventricles (B) Nervous tissue supplied to heart
   (C) Muscular tissue supplied to ventricles (D) muscular tissue supplied to heart

7. Which of the following statements are true about Eukaryotes? (a) They are cells with a nucleus. (b) They are found both in humans and multicellular organisms. (c) Endoplasmic reticulum is present in Eukaryotes. (d) They have chemically complex cell wall.
   (A) (a), (b) and (c) (B) (a), (c) and (d) (C) (a), (b) and (d) (D) All are correct

8. Which of the following is an example of cell devoid of nuclear membrane and mitochondria?
   (A) Bacterial cell (B) Sperm (C) Protista (D) Sponge cell

Space for Rough Work

9. Which of the following criteria does not pertain to facilitated transport?
(A) Requirement of special membrane proteins (B) High selectivity
(C) Transport saturation (D) Uphill transport

10. Water canal system is seen in
(A) Porifera (B) cnideria (C) Arthropoda (D) Echinodermata

11. Match column-I with column-II and choose the correct option.

	Column-I		Column-II
A.	Periplaneta americana	I.	Hepatic Caeca
B.	A ring of 6-8 blind tubules	II.	Phylum arthropoda
C.	Vascular system	III.	Spiracles
D.	10 pairs of small holes	IV.	Malpighian tubules
E.	Excretion	V.	Open type

(A) A-I; B-II; C-III; D-IV; E-V (B) A-II; B-I; C-V; D-III; E-IV
(C) A-II; B-I; C-III; D-V; E-IV (D) A- III; B - IV; C - II; D-V; E –I

12. The initial enzyme of Calvin cycle is:
(A) Ribulose 1, 5 diphosphate carboxylase (B) Triose phosphate dehydrogenase
(C) Phosphopentokinase (D) Cytochrome oxidase

13. Condensation of chromosomes occurs in
(A) Prophase I (B) Telophase (C) Anaphase (D) Metaphase

14. Cells which are not dividing are likely to be at
(A) G1 phase (B) G2 phase (C) G0 phase (D) S phase

15. Synapsis is pairing of
(A) Any two chromosomes (B) Non homologous chromosomes
(C) Acentric chromosomes (D) Homologous chromosomes

16. Amoeba reproduces by
(A) Fragmentation (B) Binary fission (C) Conjugation (D) None

17. During inspiration, diaphragm contracts to become
(A) Flat (B) Dome shaped (C) spiral (D) Twisted

Space for Rough Work

18. The excretory cells of flat worms are
(A) Malpighian tubules (B) flame cells (C) Nephridia (D) Nephron

20. Reduction in pH of blood will
(A) Reduce the rate of heart beat. (B) Reduce the blood supply to brain
(C) Decrease the affinity of haemoglobin with oxygen (D)Release bicarbonate ions by liver

21. All arteries carry oxygenated blood except
(A) carotid artery (B) Hepatic artery (C) Pulmonary artery (D) Phrenic artery

22. Read the following statements and choose the correct option
Statement 1 : Atria receive blood from all parts of the body which subsequently flows to ventricles.
Statement 2 : Action potential generated at sino-atrial node passes from atria to ventricles.
(A) Action mentioned in Statement 1 is dependent on action mentioned in Statement 2
(B) Action mentioned in Statement 2 is dependent on action mentioned in Statement 1
(C) Action mentioned in Statements 1 and 2 are independent of each other.
(D) Action mentioned in Statements 1 and 2 are synchronous.

23. A group of plants or animals with similar traits of any rank is
(A) Species (B) Genus (C) Order (D) Taxon

24. Which of these is considered as pacemaker of heart?
(A) SAN (B) AVN (C) Both (D) None of these

25. Practical purpose of taxonomy or classification
(A) To know the evolutionary history (B) Explain the origin of organisms
(C) Facilitate the identification of unknown species (D) Identification of medicinal plants

26. False statement regarding transport phenomena in plants is
(A) Transport in xylem is unidirectional (B) Transport in phloem is bi-directional
(C) sugars are passively transported into sieve tube (D) Active transport is uphill transport

27. Peptic ulcer is caused by
(A) Helicobacter Pylori (B) Clostiridium botulinum
(C) Shigella (D) Entamoeba histolytica

Space for Rough Work

28. Smooth muscle fibres
I. are fusiform and uninucleated cells
II. Are involuntary in function
III. Do not perform slow and sustained contractions
IV. Do not show striations due to regular arrangement of actin and myosin filaments.
Choose the incorrect set of statements.
(A) I &II (B) III&IV (C) II &III (D) I&IV

29. In which the pneumatophores are found
(A) Tinospora (B) Pinus (C) Rhizophora (D) None of these

30. Excess of bile is stored in
(A) Liver (B) Spleen (C) Gallbladder (D) Kidney

31. When body tissues are injured resulting in the loss of blood, the process of blood clot begins and the blood platelets release
(A) Fibrinogen (B) Thrombin (C) Thromboplastin (D) Prothrombin

32. The assimilatory power obtained from light reaction in photosynthesis is
(A) ATP only (B) NADPH only (C) ATP and NADPH (D) $FADH_2$

33. The water potential of pure water is:
(A) Zero (B) Less than zero
(C) More than zero but less than one (D) More than one

34. The centriole/centrosome takes part in
(A) Nucleus formation (B) Start of cell division (C) Spindle formation (D) None

35. If two organisms are in same phylum, they must also be in same
(A) Class (B) Species (C) Family (D) Kingdom

36. Which of the following options best represents the enzyme composition of pancreatic juice?
(A) Amylase, peptidase, trypsinogen, rennin
(B) Amylase, pepsin, trypsinogen, maltase
(C) Peptidase, amylase, pepsin, rennin
(D) Lipase, amylase, trypsinogen, procarboxypeptidase

Space for Rough Work

37. Phosphoenol pyruvate (PEP) is the primary CO_2 acceptor in:
(A) C_3 plants (B) C_4 plants (C) C_2 plants (D) C_3 and C_4 plants

38. Anaphase Promoting Complex (APC) is a protein degradation machinery necessary for proper mitosis of animal cells. If APC is defective in a human cell, which of the following is expected to occur?
(A) Chromosomes will not condense
(B) Chromosomes will be fragmented
(C) Chromosomes will not segregate
(D) Recombination of chromosomes arms will occur

39. Lungs are made up of air-filled sacs, the alveoli. They do not collapse even after forceful expiration, because of:
(A) Residual Volume (B) Inspiratory Reserve Volume
(C) Tidal volume (D) Expiratory Reserve Volume

40. Adult human RBCs are enucleate. Which of the following statement(s) is/are most appropriate explanation for this feature?
(1) They do not need to reproduce (2) They are somatic cells
(3) They do not metabolize (4) All their internal space is available for oxygen transport
OPTIONS:
(A) Only (4) (B) Only (1) (C) (1), (3) and (4) (D) (2) and (3)

41. Which of the following is not microelement for plants?
(A) Cu (B) B (C) Zn (D) Ca

42. Limiting factor in nitrification of soil is_____
(A) pH (B) Light (C) Air (D) Temperature

43. Spindle fibre is made up of___
(A) Tubulin (B) Humulin (C) Flagellin (D) All of the above

44. Mark the odd one in the following.
(A) Family (B) Class (C) Taxon (D) Phylum

45. Coronary heart disease is due to _____
(A) Streptococci bacteria (B) Inflammation of pericardium
(C) Weakening of the heart valves (D) Insufficient blood supply to the heart muscles

Space for Rough Work

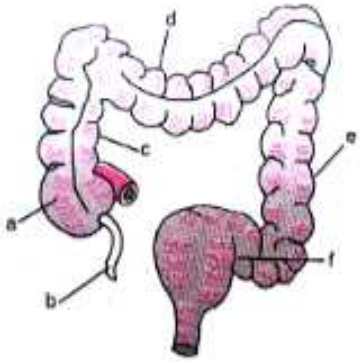
46. A cell plate is laid down during _____
(A) Interphase (B) Karyokinesis (C) cytokinesis (D) None of the above

47. Premature leaf fall is due to deficiency of _____
(A) Phosphorous (B) Nitrogen (C) Calcium (D) Sulfur

48. The Organelle associated with aerobic respiration is _____
(A) Chloroplast (B) Centriole (C) Nucleus (D) Mitochondria

49. The main difference between Gram positive and Gram Negative bacteria is _____
(A) Ribosome (B) Mitochondria (C) Cell membrane (D) Cell wall

50. Identify the following parts of large intestine



(A) a = Sigmoid, b = Vermiform appendix, c = Ascending colon, d = Transverse colon, e = Descending colon, f = Caecum
(B) a = Caecum, b = Vermiform appendix, c = Sigmoid, d = Ascending colon, e = Transverse colon, f = Descending colon
(C) a = Caecum, b = Vermiform appendix, c = Ascending colon, d = Transverse colon, e = Descending colon, f = Sigmoid
(D) a = Sigmoid, b = Vermiform appendix, c = Descending colon, d = Transverse colon, e = Ascending colon, f = Caecum

51. Non Essential part of flower
(A) Petals & Sepals (B) Petals & Androecium
(C) Androecium and Gynoecium (D) Petals & Gynoecium

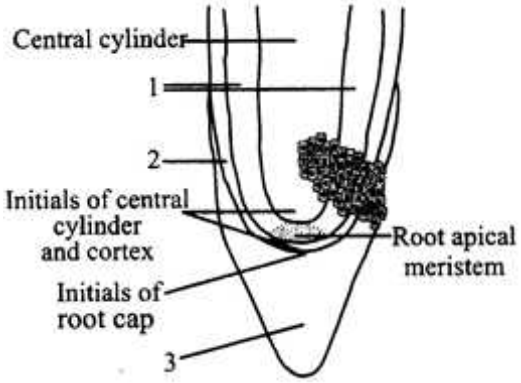
52. Which one is the most abundant protein in the animal world?
(A) Collagen (B) Insulin (C) Trypsin (D) Haemoglobin

Space for Rough Work

53. What is the eye of potato
(A) Axillary bud (B) Accessory bud (C) Adventitious bud (D) Apical bud

54. Fusiform roots are found in
(A) *Solanum tuberosum* (B) *Colocasia* (C) *Daucus carota* (D) *Raphanus sativus*

55. The given figure shows apical meristem of root apex with few parts marked as 1, 2 and 3. Identify the correct labeling of 1,2 and 3



(A) 1 - Vascular structure, 2 - Protoderm, 3 - Root cap (B) 1 - Cortex, 2 - Endodermis, 3 - Root cap
(C) 1 - Cortex, 2 - Protoderm, 3 - Root cap (D) 1 - Tunica, 2 - Protoderm, 3 - Root cap

56. System of classification used by Linnaeus was:
(A) Natural system (B) Artificial system
(C) Phylogenetic system (D) Asexual system

57. The chitinous exoskeleton of arthropods is formed by the polymerization of
(A) keratin sulphate and chondroitin sulphate (B) D-glucosamine
(C) N-acetyl glucosmine (D) Lipoglycans

58. Dark reaction of photosynthesis is called
(A) Aphotic action (B) Black action
(C) Blackman's reaction (D) None of the above

59. Outer covering of epiphytic root is
(A) Osmophore (B) Rhizophore (C) Velamen (D) Pneumatophore

60. The vascular cambium normally gives rise to
(A) Phelloderm (B) Primary phloem (C) Secondary xylem (D) Periderm

Space for Rough Work