

INSTRUCTIONS

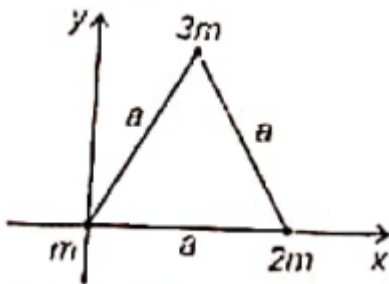
1. This test will be a 3 hour Test.
2. This test consists of Physics, Chemistry, Botany and Zoology questions with equal weightage of 180 marks.
3. Each question is of 4 marks.
4. There are four parts in the question paper, consisting Part-I Physics (Q.no.1 to 50), Part-II Chemistry (Q.no.51 to 100), Part-III Botany (Q. no. 101 to 150) and Part-IV Zoology (Q no 151 to 200). Each part is divided into two Sections, Section A consists of 35 multiple choice questions & Section-B contains 15 Multiple choice questions, out of these 15 questions candidates can choose to attempt any 10 questions
5. There will be only one correct choice in the given four choices for each question. For each question 4 marks will be awarded for correct choice, 1 mark will be deducted for incorrect choice and zero mark will be awarded for unattempted question.
6. Any textual, printed or written material, mobile phones, calculator etc, is not allowed for the student appearing for the test.
7. All calculations/written work should be done in the rough sheet provided,

SYLLABUS

Physics	: Rotation, Gravitation & S.H.M
Chemistry	: Equilibrium, Redox Reactions, Structure of atom
Biology	: Morphology of Flowering Plants, Anatomy of Flowering Plants, Reproduction In Organisms, Sexual Reproduction In Flowering Plants.

Physics
Section-A

1. Three-point masses of mass $m, 2m$ and $3m$ are placed at the corner of an equilateral triangle of side a as shown fig. Moment of inertia of the system about x-axis is

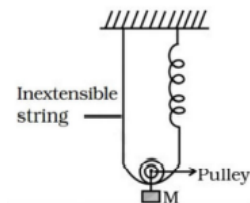


- (a) $6ma^2$ (b) $\frac{3ma^2}{4}$
 (c) $\frac{ma^2}{3}$ (d) $\frac{9ma^2}{4}$

2. A wheel is rotating at the rate of 22 rev/min. If it comes to rest in 10s, then angular retardation will be

- (a) $\frac{0.13\pi}{2} \text{ rad/s}^2$ (b) $\frac{0.22\pi}{3} \text{ rad/s}^2$
 (c) $\frac{0.11\pi}{5} \text{ rad/s}^2$ (d) $\frac{\pi}{3} \text{ rad/s}^2$

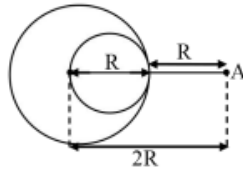
3. Find the time period of mass M when displaced from its equilibrium position and then released for the system shown in Fig.



- (a) $T = 2\pi\sqrt{\frac{m}{2K}}$ (b) $T = 2\pi\sqrt{\frac{m}{K}}$
 (c) $T = \pi\sqrt{\frac{m}{4K}}$ (d) $T = 2\pi\sqrt{\frac{m}{4K}}$

4. A solid sphere of uniform density and radius R applies gravitational force of attraction equal to F_1 on a particle placed at A, distance $2R$ from the centre of the sphere. A spherical cavity of radius $R/2$ is now made in the sphere as shown in the figure. The sphere with cavity now applies a gravitational force F_2 on the same particle placed at A. The ratio F_2/F_1 will be-

- (a) $1/2$
 (b) $3/4$
 (c) $7/8$
 (d) $7/9$



5. If the radius of earth is suddenly contracted to one third of its present value, then duration of the day will be of (Consider mass remains same)

- (a) $\left(\frac{8}{3}\right) hr$ (b) $\left(\frac{4}{3}\right) hr$
 (c) $\left(\frac{2}{3}\right) hr$ (d) $2hr$

6. The radii of circular orbit of two satellite A and B of earth are $4R$ and $3R$ respectively. If speed of satellite A is $3v$, then speed of satellite B will be-

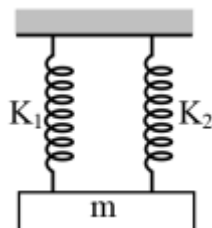
- (a) $2\sqrt{3}v$ (b) $3\sqrt{2}v$
 (c) $2\sqrt{3}v$ (d) $\sqrt{2}v$

7. When the displacement is half of the amplitude, then what fraction of total energy of a simple harmonic oscillator is kinetic?

- (a) $3/4$ th (b) $2/7$ th
 (c) $5/7$ th (d) $2/9$ th

8. A mass is suspended separately by two different springs in successive order then time period is T_1 and T_2 , respectively. If it is connected by both spring as shown in figure then time period is T_0 the correct relation is:

- (a) $T_0^2 = T_1^2 + T_2^2$
 (b) $T_0^{-2} = T_1^{-2} + T_2^{-2}$
 (c) $T_0^{-1} = T_1^{-1} + T_2^{-1}$
 (d) $T_0 = T_1 + T_2$



9. Displacement of a particle is, $x = 3 \sin 2t + 4 \cos 2t$, the amplitude and the max. velocity will be:

- (a) 5, 10 (b) 3, 2
 (c) 4, 2 (d) 3, 8

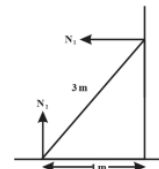
10. A child swinging on a swing in sitting position, stands up, then the period of the swing will:

- (a) Increase
 (b) Decrease
 (c) Remain same
 (d) Increase if child is long and decrease if child is short

11. A metal bar 70 cm long and 4.00 kg in mass is supported on two knife-edges placed 10 cm from each end. A 6.00 kg load is suspended at 30 cm from one end. Find the reactions at the knife edges. (Assume the bar to be of uniform cross section and homogeneous.)

- (a) $R_1 = 64.88 \text{ N}$ (b) $R_1 = 54.88 \text{ N}$
 $R_2 = 33.12 \text{ N}$ $R_2 = 43.12 \text{ N}$
 (c) $R_1 = 43.12 \text{ N}$ (d) $R_1 = 33.12 \text{ N}$
 $R_2 = 43.12 \text{ N}$ $R_2 = 33.12 \text{ N}$

12. A 3m long ladder weighing 20 kg leans on a frictionless wall. Its feet rest on the floor 1 m from the wall as shown in Fig. Find the reaction forces of the wall and the floor.



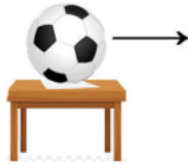
- (a) $N_1 = 34.66 \text{ N}, N_2 = 196 \text{ N}$
 (b) $N_1 = 196 \text{ N}, N_2 = 34.6 \text{ N}$
 (c) $N_1 = 56.4 \text{ N}, N_2 = 98 \text{ N}$
 (d) $N_1 = 98 \text{ N}, N_2 = 56.4 \text{ N}$

13. Three bodies, a ring, a solid cylinder and a solid sphere roll down the same inclined plane without slipping. They start from rest. The radii of the bodies are identical. Which of the bodies reaches the ground with maximum velocity?

- (a) Sphere
 (b) Ring
 (c) Cylinder
 (d) All have same velocity

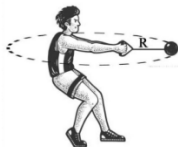
14. From a uniform disk of radius R , a circular hole of radius $R/2$ is cut out. The centre of the hole is at $R/2$ from the centre of the original disc. Locate the centre of gravity of the resulting flat body.
- (a) $R/3$ from centre of original disc in opposite direction of hole
 (b) $R/6$ from centre of original disc in opposite direction of hole
 (c) $R/3$ from centre of original disc in same direction of hole
 (d) $R/6$ from centre of original disc in same direction of hole

15. A ball rests upon a flat piece of paper on a table top. The paper is pulled horizontally but quickly towards the right as shown. Relative to its initial position with respect to the table, the ball



- (1) Remains stationary if there is no friction between the paper and the ball.
 (2) Moves to the left and starts rolling backwards, i.e., to the left if there is a friction between the paper and the ball.
 (3) Moves forward, i.e., in the direction in which the paper is pulled. Here, the correct statement/s is/are
- (a) Both (1) and (2) (b) Only (3)
 (c) Only (1) (d) Only (2)

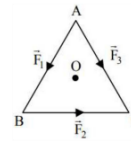
16. A small mass attached to a string rotates on a frictionless surface as shown. If the tension on the string is increased by pulling the string causing the radius of the circular motion to decrease by a factor of 2, the kinetic energy of the mass will



- (a) Increase by a factor of 4
 (b) Decrease by a factor of 2
 (c) Remain Constant
 (d) Increase by a factor of 2

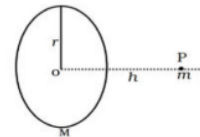
17. A body weighs 63 N on the surface of the earth. What is the gravitational force on it due to the earth at a height equal to half the radius of the earth?
- (a) 25 N (c) 28 N
 (b) 35 N (d) 40 N

18. ABC is an equilateral triangle with O as its centre. $\vec{F}_1, \vec{F}_2,$ and $\vec{F}_3,$ represent three forces acting along the sides AB, BC and AC respectively. If the total torque about O is zero then the magnitude of $\vec{F}_3,$ is



- (a) $F_1 + F_2$ (b) $F_1 - F_2$
 (c) $\frac{F_1 + F_2}{2}$ (d) $2(F_1 + F_2)$

19. A mass m is placed at P a distance h along the normal through the centre O of a thin circular ring of mass M and radius r (Fig.)



If the mass is removed further away such that OP becomes $2h$, by what factor the force of gravitation will decrease, if hr ?

- (a) $\frac{4\sqrt{2}}{5\sqrt{5}}$ (b) $\frac{5\sqrt{2}}{4\sqrt{5}}$
 (c) $\frac{4\sqrt{5}}{5\sqrt{2}}$ (d) $\frac{5\sqrt{5}}{4\sqrt{2}}$

20. The displacement of a particle varies with time according to the relation $y = a \sin \omega t + b \cos \omega t$
- (a) The motion is oscillatory but not S.H.M.
 (b) The motion is S.H.M. with amplitude $a+b$.
 (c) The motion is S.H.M. with amplitude a^2+b^2 .
 (d) The motion is S.H.M. with amplitude $\sqrt{a^2 + b^2}$

21. If three uniform spheres, each having mass M and radius R , are kept in such a way that each touches the other two, the magnitude of the gravitational force on any sphere due to the other two is

- (a) $\frac{GM^2}{4r^2}$ (b) $\frac{2GM^2}{r^2}$
 (c) $\frac{2GM^2}{4r^2}$ (d) $\frac{\sqrt{3}GM^2}{4r^2}$

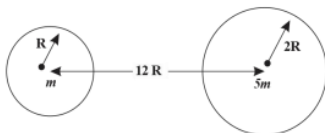
22. A particle of mass $m = 5$ units is moving with a uniform speed $y = 3\sqrt{2}$ units in the x - y plane along the line $y=x+4$. The magnitude of the angular momentum about origin is

- (a) zero (b) 60 units
 (c) 7.5 units (d) $40\sqrt{2}$ units

23. Two spherical bodies of masses M and $4M$ and radii R and $2R$ released in free space with initial separation between their centers equal to $8R$. If they attract each other due to gravitational force only, then distance covered by smaller body before collision is

- (a) $2R$ (b) $4R$
 (c) $5R$ (d) $3R$

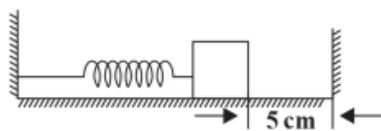
24. Two spherical bodies of mass m and $5m$ and radii R and $2R$ respectively are released in free space with initial separation between their centres equal to $12R$. If they attract each other due to gravitational force only then the distance covered by small sphere just before collision will be



- (a) $5R$ (b) $7.5R$
 (c) $2.5R$ (d) $6R$

25. A Block of mass 100 g attached to a spring of spring constant 100 N/m is lying on a frictionless floor as shown. The block is moved to compress the spring by 10 cm and then released. If the collision with the wall in front are elastic then the time period of the motion is

- (a) 0.20 s
 (b) 0.40 s
 (c) 0.27 s
 (d) 0.13 s



26. The acceleration of a particle executing S.H.M. is

- (a) Always directed towards the equilibrium position
 (b) Always towards the one end
 (c) Continuously changing in direction
 (d) Maximum at the mean position

27. The phase of a particle in SHM at time t is $\pi/6$. The following inference is drawn from this:

- (a) The particle is at $x=a/2$ and moving in $+X$ -direction
 (b) The particle is at $x=a/2$ and moving in $-X$ -direction
 (c) The particle is at $x=-a/2$ and moving in $+X$ -direction
 (d) The particle is at $x=-a/2$ and moving in $-X$ -direction

28. The phase difference between the displacement and acceleration of particle executing S.H.M. in radian is:

- (a) $\pi/4$ (b) $\pi/2$
 (c) π (d) 2π

29. The radius of gyration of a rotating body depends upon -

- (a) mass^2
 (b) volume of the body
 (c) shape of the body
 (d) applied torque.

30. The acceleration down the plane of spherical body of mass m radius R and moment of inertia I having inclination θ to the horizontal is-

- (a) $\frac{g \sin \theta}{1 + I^2/R^2}$ (b) $\frac{g \sin \theta}{1 + I/R^2}$
 (c) $\frac{g \sin \theta}{1 + 1/MR^2}$ (d) $\frac{g \sin \theta}{MR^2 + 1}$

31. Two discs of the same moment of inertia rotating about their regular axis passing through centre and perpendicular to the plane of disc with angular velocities ω_1 and ω_2 . They are brought into contact face to face coinciding the axis of rotation. The expression for loss of energy during this process.

- (a) $\frac{1}{4}I(\omega_1 - \omega_2)^2$ (b) $I(\omega_1 - \omega_2)^2$
 (c) $\frac{I}{8}(\omega_1 - \omega_2)^2$ (d) $(\omega_1 - \omega_2)^2$

32. A particle executes linear simple harmonic motion with amplitude of 3 cm. When the particle is at 2 cm from the mean position, the magnitude of its velocity is equal to that of its acceleration. Its period in seconds is

- (a) $\frac{\sqrt{5}}{2\pi}$ (b) $\frac{4\pi}{\sqrt{5}}$
(c) $\frac{4\pi}{\sqrt{3}}$ (d) $\frac{\sqrt{5}}{\pi}$

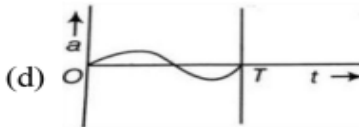
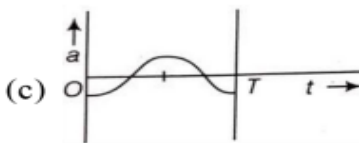
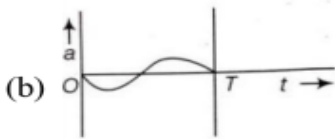
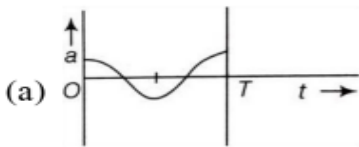
33. The oscillation of a body on a smooth horizontal surface is represented by the equation.

$$X = A \cos(\omega t)$$

Where X = displacement at time t

ω = frequency of oscillation

Which one of the following graph correctly shows the variation of 'a' with 't'?

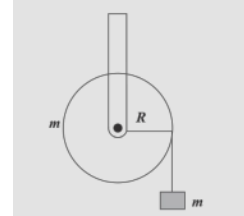


34. Which one of the following equations of motion represents simple harmonic motion?

(Where k, k₀, k₁, and a are all positive)

- (a) Acceleration = kx
(b) Acceleration = k₀x + k₁x²
(c) Acceleration = -k(x + a)
(d) Acceleration = k(x+a)

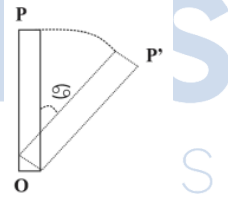
35. A mass m supported by a massless string wound around a uniform hollow cylinder of mass m and radius R. If the string does not slip on the cylinder, with what acceleration will the mass fall on release?



- (a) 2g/3 (b) g/2
(c) 5g/6 (d) g

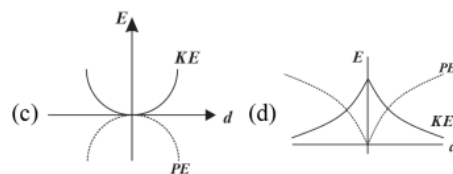
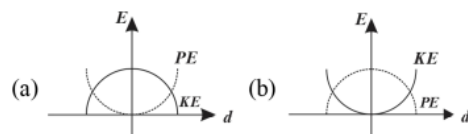
Section B

36. A rod of uniform mass and of length L can freely rotate in a vertical plane about an axis passing through O. The angular velocity of the rod when it falls from position P to P' through an angle α is

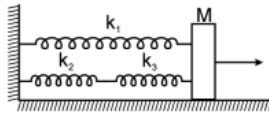


- (a) $\sqrt{\frac{6g}{5L}} \sin \alpha$ (b) $\sqrt{\frac{6g}{L}} \sin \frac{\alpha}{2}$
(c) $\sqrt{\frac{6g}{L}} \cos \frac{\alpha}{2}$ (d) $\sqrt{\frac{6g}{L}} \sin \alpha$

37. For a simple pendulum, a graph is plotted between its Kinetic Energy (KE) and Potential Energy (PE) against its displacement d. Which one of the following represents these correctly? (graphs are schematic and not drawn to scale)



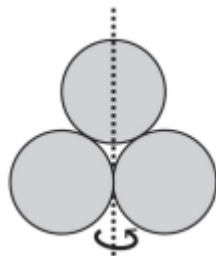
38. A particle moves with simple harmonic motion in a straight line. In first sec, after starting from rest it travels a distance a and in next t sec, it travels $2a$ in same direction, then
 (a) amplitude of motion is $3a$
 (b) time period of oscillation is $8T$
 (c) amplitude of motion $4a$
 (d) time period of oscillation is $6T$
39. The springs shown in the figure are all unstretched in the beginning when a man starts pulling the block. The man exerts a constant force F on the block. The Time Period of the motion of the block is



- (a) $2\pi\sqrt{M\frac{(k_2 + k_3)}{k_1k_2 + k_2k_3 + k_3k_1}}$
 (b) $2\pi\sqrt{\frac{M}{k_1 + k_2 + k_3}}$
 (c) $2\pi\sqrt{M\left(\frac{1}{k_1} + \frac{1}{k_2} + \frac{1}{k_3}\right)}$
 (d) $2\pi\sqrt{\frac{M(k_1 + k_2)}{k_1k_2 + k_2k_3 + k_3k_1}}$

40. Three rings, each of mass m and radius r , form an equilateral triangle. Moment of inertia about an axis shown in figure. Which is in the plane of the rings.

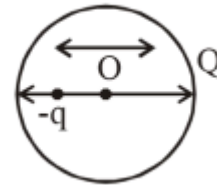
- (a) $5mr^2$
 (b) $5/7mr^2$
 (c) $7mr^2$
 (d) $7/2mr^2$



41. A ring is suspended from its one end and is oscillating then its time period for small oscillations will be
 (a) $2\pi\sqrt{\frac{R}{g}}$ (b) $2\pi\sqrt{\frac{2R}{g}}$
 (c) $2\pi\sqrt{\frac{R}{2g}}$ (d) $2\pi\sqrt{\frac{3R}{2g}}$

42. The acceleration due to gravity on the surface of the moon is 1.7 ms^{-1} . What is the time period of a simple pendulum on the surface of moon if its time period on the surface of earth is 3.5 s ? (g on the surface of earth is 9.8 ms^{-2})
 (a) 7.5 (c) 9.3
 (b) 8.4 (d) 10.2
43. A hoop of radius 2 m weighs 100 kg . It rolls along a horizontal floor so that its centre of mass has a speed of 20 cm/s . How much work has to be done to stop it?
 (a) 4J (b) 1 J
 (c) 0.5J (d) 0.25 J

44. A particle of mass m and charge $-q$ moves along a diameter of uniformly charged sphere of radius R and carrying a total charge $+Q$. The frequency of the SHM of the particle, if the amplitude does not exceed, is



- (a) $\frac{1}{2\pi}\sqrt{\frac{qQ}{4\pi\epsilon_0 R^2 m}}$ (b) $\frac{1}{2\pi}\sqrt{\frac{qQ}{4\pi\epsilon_0 m R^3}}$
 (c) $\frac{1}{2\pi}\sqrt{\frac{qQ}{4\pi\epsilon_0 m R}}$ (d) $\frac{1}{2\pi}\sqrt{\frac{qQm}{4\pi\epsilon_0 R^2}}$

45. The escape speed of a projectile on the earth's surface is 11.2 kms^{-1} . A body is projected out with thrice this speed. What is the speed of the body far away from the earth? Ignore the presence of the sun and other planets.
 (a) 11.2 km/s (b) 28,7 km/s
 (c) 31.7 km/s (d) 22,4 km/s

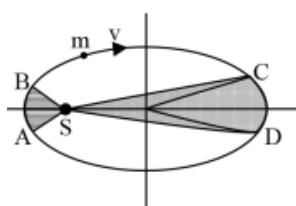
46. The angular speed of a motor wheel is increased from 1200 rpm to 3120 rpm in 16 seconds.
- (i) What is its angular acceleration, assuming the acceleration to be uniform?
- (ii) How many revolutions does the engine make during this time?
- (a) $\alpha = 2\pi \text{ rad/s}^2$, $N = 576$
 (b) $\alpha = 4\pi \text{ rad/s}^2$, $N = 256$
 (c) $\alpha = 4\pi \text{ rad/s}^2$, $N = 576$
 (d) $\alpha = 2\pi \text{ rad/s}^2$, $N = 256$

47. The length of a second's pendulum on the surface of Earth is 1m. The length of a second's pendulum on the moon will be?
- (a) 1/3 m (b) 1/6 m
 (c) 1/12 m (d) 1/24 m

48. A particle executing S.H.M. has a maximum speed of 30 cm/s and a maximum acceleration of 60 cm/s^2 . The period of oscillation is
- (a) πs (b) $\frac{\pi}{2} s$
 (c) $2\pi s$ (d) $\frac{2\pi}{15} s$

49. The figure shows elliptical orbit of a planet m about the sun S . The shaded area SCD is twice the shaded area SAB . If t_1 is the time for the planet to move from C to D and t_2 is the time to move from A to B then-

- (a) $2t_1 = t_2$
 (b) $t_1 = t_2$
 (c) $4t_1 = t_2$
 (d) $t_1 = 2t_2$



50. Choose the correct statement.
- (i) All oscillatory motions are necessarily periodic motion but all periodic motion are not oscillatory. Simple pendulum is an example of oscillatory motion.
- (ii) Simple harmonic motion is a uniform motion. Simple harmonic motion is the projection of uniform circular motion.
- (iii) Acceleration is proportional to the displacement. This condition is not sufficient for motion in simple harmonic. In simple harmonic motion direction of displacement is also considered.

- (iv) Sine and cosine functions are periodic functions. Sinusoidal functions repeats its values after a definite interval of time.
- (v) Gravitational force between two particles is negligibly small compared to the electrical force. The electrical force is experienced by charged particles only.
- (a) (i), (ii), (iii), (iv) and (v)
 (b) (i) and (ii)
 (c) (i) and (iv)
 (d) (i) and (v)

CHEMISTRY

Section A

51. Match the correct statement -
- | List-I | List-II |
|-----------------|--|
| (a) isotope | (i) ${}^{228}_{88}\text{Ra}$ and ${}^{228}_{89}\text{Ac}$ |
| (b) isobar | (ii) ${}^{39}_{18}\text{Ar}$ and ${}^{40}_{19}\text{K}$ |
| (c) isotone | (iii) ${}^2_1\text{H}$ and ${}^3_1\text{Ac}$ |
| (d) isostere | (iv) ${}^{235}_{92}\text{Ra}$ and ${}^{231}_{90}\text{Ac}$ |
| (e) isodiaphers | (v) CO_2 and N_2O |
- (a) a = ii, b = i, c = iv, d = v, e = iii
 (b) a = ii, b = v, c = i, d = iv, e = iii
 (c) a = iii, b = i, c = ii, d = v, e = iv
 (d) none
52. The value of K_c for the reaction $2A \rightleftharpoons B + C$ is 2×10^{-3} . At a given time, the composition of the reaction mixture is $[A] = [B] = [C] = 3 \times 10^{-4} \text{ M}$. In which direction will the reaction proceed?
- (a) Forward Direction
 (b) Backward Direction
 (c) at Equilibrium
 (d) None of these
53. Hydrolysis of sucrose gives,
 $\text{Sucrose} + \text{H}_2\text{O} \rightleftharpoons \text{Glucose} + \text{Fructose}$
 Equilibrium constant K_c for the reaction is 2×10^{13} at 300 K. Calculate ΔG° at 300K.
- (a) 76.4×10^4
 (b) 7.64×10^4
 (c) -76.4×10^4
 (d) -7.64×10^4
54. Which is a buffer solution
- (a) $\text{CH}_3\text{COOH} + \text{CH}_3\text{COONa}$
 (b) $\text{CH}_3\text{COOH} + \text{CH}_3\text{COONH}_4$
 (c) $\text{CH}_3\text{COOH} + \text{NH}_4\text{Cl}$
 (d) $\text{NaOH} + \text{NaCl}$

55. The concentration of hydrogen ion in a sample of soft drink is 3.8×10^{-3} M. What is its pH?
 (a) 2.42 (b) 24.2
 (c) 6.4 (d) 4.2
56. The ionization constant of a certain weak acid is 10^{-4} . What should be the [salt] to [acid] ratio if we have to prepare a buffer with pH = 5 using this acid and one of the salts
 (a) 1:10 (b) 10:1
 (c) 5:4 (d) 4:5
57. The pH of 0.1 M monobasic acid is 4.50. Calculate the concentration of species H^+ .
 (a) 3.16×10^{-5} (b) 3.16×10^5
 (c) 31.6×10^{-5} (d) 31.6×10^5
58. Which of the following are isoelectronic and isostructural $NO_3^-, CO_3^{2-}, ClO_3^-, SO_3$,
 (a) NO_3^-, CO_3^{2-} (b) SO_3, NO_3^-
 (c) ClO_3^-, CO_3^{2-} (d) CO_3^{2-}, SO_3
59. Calculate the pH of 0.08 M solution of hypochlorous acid HOCl. The ionization constant of the acid is 2.5×10^{-5} .
 (a) 2.85 (b) 4.85
 (c) 6.85 (d) 7
60. The energy of a radiation of wavelength 8000 Å is E_1 and energy of a radiation of wavelength 16000 Å is E_2 What is the relation between these two
 (a) $E_1 = 6E_2$ (b) $E_1 = 2E_2$
 (c) $E_1 = 4E_2$ (d) $E_1 = 1/2E_2$
61. The wavelength of the radiation emitted, when in a hydrogen atom electron falls from infinity to stationary state 1, would be (Rydberg constant = $1.097 \times 10^7 \text{ m}^{-1}$)
 (a) 406 nm (b) 192 nm
 (c) 91 nm (d) $9.1 \times 10^{-8} \text{ nm}$
62. The following concentrations were obtained for the formation of NH_3 from N_2 and H_2 . At equilibrium at 500 K, $[N_2] = 1.5 \times 10^{-2}$, $[H_2] = 3.0 \times 10^{-2}$ M and $[NH_3] = 1.2 \times 10^{-2}$ M. Calculate equilibrium constant.
 (a) 3.5×10^2 (c) 106×10^3
 (b) 10.6×10^3 (d) 1.06×10^4
63. Which of the following sets of quantum numbers represent an impossible arrangement

	n	l	m	m_s
(a)	3	2	-2	(+) $1/2$
(b)	4	0	0	(-) $1/2$
(c)	3	2	-3	(+) $1/2$
(d)	5	3	0	(-) $1/2$
64. For the equilibrium.
 $2NOCl(g) \rightleftharpoons 2NO(g) + Cl_2(g)$
 the value of the equilibrium constant, K_C is 3.75×10^{-6} at 1069 K. Calculate the K_P for the reaction at this temperature?
 (a) 33 (b) 0.33
 (c) 3.3 (d) 0.033
65. The energy of an electron in the first Bohr orbit of an H atom is -13.6 eV. The possible energy value(s) of the excited state(s) for electrons in Bohr orbits to hydrogen is
 (a) -3.4 eV (b) -4.2 eV
 (c) -6.8 eV (d) +6.8 eV
66. The rate of the reaction $2N_2O_5 \rightarrow 4NO_2 + O_2$ can be written in three ways

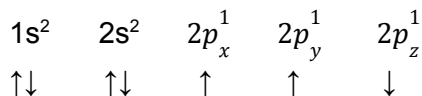
$$\frac{1}{4} \frac{-d[N_2O_5]}{dt} = k[N_2O_5] = \frac{-d[NO_2]}{dt} = k'[N_2O_5]$$

$$\frac{d[O_2]}{dt} = k''[N_2O_5]$$
 The relationship between k and k' and between k' and k'' are:
 (a) $k' = k$; $k'' = k$ (b) $k' = 2k$; $k'' = k$
 (c) $k' = 2k$; $k'' = k/2$ (d) $k' = 2k$; $k'' = 2k$
67. pH of a saturated solution of $Ba(OH)_2$ is 12. The value of solubility product (K_{sp}) of $Ba(OH)_2$ is:
 (a) 4.0×10^{-6} (b) 5.0×10^{-6}
 (c) 3.3×10^{-7} (d) 5.0×10^{-7}
68. Maximum number of electrons in a subshell with $l = 3$ and $n = 4$ is
 (a) 10 (b) 12
 (c) 14 (d) 16

69. The value of K, for the reaction.
 $\text{CO}_2(\text{g}) + \text{C}(\text{s}) \rightleftharpoons 2\text{CO}(\text{g})$
 is 3.0 at 1000 K. If initially $P_{\text{CO}_2} = 0.48$ bar and $P_{\text{CO}} = 0$ bar and pure graphite is present, calculate the equilibrium partial pressures of CO and CO_2 .
 (a) 0.66, 0.15 (b) 0.15, 0.66
 (c) 0.33, 0.15 (d) 0.66, 0.66
70. Given that the equilibrium constant for the reaction
 $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$
 has a value of 278 at a particular temperature. What is the value of the equilibrium constant for the following reaction at the same temperature?
 $\text{SO}_3(\text{g}) \rightleftharpoons \text{SO}_2(\text{g}) + \frac{1}{2}\text{O}_2(\text{g})$
 (a) 6.0×10^{-2} (b) 1.3×10^{-5}
 (c) 1.8×10^{-3} (d) 3.6×10^{-3}
71. Maximum number of moles of electrons taken up by one mole of NO_3^- when it is reduced to
 (a) NH_3 (b) NH_2OH
 (c) NO (d) NO_2
72. The kinetic energy of an electron in an orbit of radius r of Li^{2+} ion is (e = electronic charge)
 (a) $\frac{e^2}{r}$ (b) $\frac{e^2}{3r}$
 (c) $\frac{3e^2}{r}$ (d) $\frac{3e^2}{2r}$
73. Which of the following is not an example of redox reaction?
 (a) $\text{CuO} + \text{H}_2 \rightarrow \text{Cu} + \text{H}_2\text{O}$
 (b) $\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$
 (c) $2\text{K} + \text{F}_2 \rightarrow 2\text{KF}$
 (d) $\text{AgNO}_3(\text{aq}) + \text{NaCl}(\text{aq}) \rightarrow \text{AgCl}(\text{s}) + \text{NaNO}_3(\text{aq})$
74. In the following reaction,
 $\text{P}_4 + 3\text{KOH} + 3\text{H}_2\text{O} \rightarrow 3\text{KH}_2\text{PO}_2 + \text{PH}_3$
 (a) P is oxidized as well as reduced
 (b) P is reduced only
 (c) P is oxidised only
 (d) None of these
75. Equation $\text{H}_2\text{S} + \text{H}_2\text{O}_2 \rightarrow \text{S} + 2\text{H}_2\text{O}$ represents
 (a) Acidic nature of H_2O_2
 (b) Basic nature of H_2O_2
 (c) Oxidising nature of H_2O_2
 (d) Reducing nature of H_2O_2
76. For the reaction: $\text{H}_2(\text{g}) + \text{CO}_2(\text{g}) \rightleftharpoons \text{CO}(\text{g}) + \text{H}_2\text{O}(\text{g})$ if the initial concentration of $[\text{H}_2] = [\text{CO}_2]$ and x moles/litre of hydrogen is consumed at equilibrium, the correct expression of K is
 (a) $\frac{x^2}{(1-x)^2}$ (b) $\frac{(1+x)^2}{(1-x)^2}$
 (c) $\frac{x^2}{(2+x)^2}$ (d) $\frac{x^2}{1-x^2}$
77. According to Bronsted-Lowry concept, the relative strengths of the bases CH_3COO^- , OH^- and Cl^- are in the order -
 (a) $\text{OH}^- > \text{CH}_3\text{COO}^- > \text{Cl}^-$
 (b) $\text{Cl}^- > \text{OH}^- > \text{CH}_3\text{COO}^-$
 (c) $\text{CH}_3\text{COO}^- > \text{OH}^- > \text{Cl}^-$
 (d) $\text{OH}^- > \text{Cl}^- > \text{CH}_3\text{COO}^-$
78. The number of moles of KMnO_4 reduced by one mole of KI in alkaline medium is:
 (a) One fifth (b) five
 (c) One (d) Two
79. Identify the correct statement (s) in relation to the following reaction:
 $\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$
 (i) Zinc is acting as an oxidant
 (ii) Chlorine is acting as a reductant
 (iii) Hydrogen ion is acting as an oxidant
 (iv) Zinc is acting as a reductant
 (a) i & ii (b) i & iii
 (c) ii & iii (d) iii & iv
80. The product of oxidation of I^- with MnO_4^- in alkaline medium is
 (a) IO_3^- (b) I_2
 (c) I_3^- (d) IO_4^-
81. In alkaline medium ClO_2 oxidize H_2O_2 to O_2 and reduced itself in Cl^- , then how many mole of H_2O_2 will oxidize by one mole of ClO_2
 (a) 1.0 (b) 1.5
 (c) 2.5 (d) 3.5
82. Which is correct order-
 (a) $E_{2s}(\text{H}) > E_{2s}(\text{He}) > E_{2s}(\text{Na}) > E_{2s}(\text{K})$
 (b) $1s < 2s = 2p < 3s = 3p = 3d < 4s = 4p = 4d = 4f < \dots$ for hydrogen
 (c) Radius of the stationary states is expressed by $r = 52.9 \text{ pm} \times \frac{n^2}{Z}$
 (d) All are correct

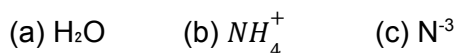
83. The oxidation number of sulphur in S_8 , S_2F_2 , H_2S respectively, are
 (a) 0, +1 and -2
 (b) +2, +1 and -2
 (c) 0, +1 and +2
 (d) 2, 1 and -2
84. Which of the following reactions are disproportionation reactions?
 (i) $2Cu^+ \rightarrow Cu^2 + Cu^0$
 (ii) $3MnO_4^{2-} + 4H^+ \rightarrow 2MnO_4^- + MnO_2 + 2H_2O$
 (iii) $2KMnO_4 \xrightarrow{\Delta} K_2MnO_4 + MnO_2 + O_2$
 (iv) $2MnO_4^- + 3Mn^{2+} + 2H_2O \rightarrow 4H^+$
 (a) (i) and (iv) only
 (b) (i) and (ii) only
 (c) (i), (ii) and (iii)
 (d) (i), (iii) and (iv)
85. In the chemical reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$ at equilibrium point, state whether
 (a) Equal volumes of N_2 and H_2 are reacting
 (b) Equal masses of N_2 and H_2 are reacting
 (c) The reaction has stopped
 (d) The same amount of ammonia is formed as is decomposed into N_2 and H_2
84. Sodium sulphate is soluble in water whereas Barium sulphate is sparingly soluble because
 (a) the hydration energy of sodium sulphate is more than its lattice energy
 (b) the lattice energy of barium sulphate is more than its hydration energy
 (c) the lattice energy has no role to play in solubility
 (d) the hydration energy of sodium sulphate is less than its lattice energy
87. For the system $3A + 2B \rightleftharpoons C$, the expression for equilibrium constant is
 (a) $\frac{[3A][2B]}{C}$ (b) $\frac{[C]^2}{[A]^3[B]^2}$
 (c) $\frac{[A]^2[B]^2}{[C]^2}$ (d) $\frac{[C]^2}{[A]^2[B]^2}$
88. In the reversible reaction $A+B \rightleftharpoons C+D$, the concentration of each C and D at equilibrium was 0.8 mole/litre, then the equilibrium constant K_c will be
 (a) 6.4 (b) 0.64
 (c) 1.6 (d) 16.0
89. The rate of forward reaction is two times that of reverse reaction at a given temperature and identical concentration. $K_{equilibrium}$ is
 (a) 2.5 (b) 2.0
 (c) 0.5 (d) 1.5
90. What is the equilibrium expression for the reaction $P_{4(s)} + 5O_{2(g)} \rightleftharpoons P_4O_{10(s)}$
 (a) $K = [O_2]^5$
 (b) $K = [P_4O_{10}]/5[P_4][O_2]$
 (c) $K = [P_4O_{10}]/[P_4][O_2]^5$
 (d) $K = 1/[O_2]^5$
91. $NH_4COONH_{4(s)} \rightleftharpoons 2NH_{3(g)} + CO_{2(g)}$ if equilibrium pressure is 3 atm for the above reaction K_p for the reaction is
 (a) 4 (b) 27
 (c) 4/27 (d) 1/27
92. The pK_a of acetic acid and pK_b of ammonium hydroxide are 4.76 and 4.75 respectively. Calculate the pH of ammonium acetate solution.
 (a) 9 (b) 4
 (c) 7 (d) 3
93. Consider the reaction equilibrium, $2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)}$; $\Delta H^\circ = -198 \text{ kJ}$. On the basis of Le-Chatelier's principle, the condition favourable for the forward reaction is
 (a) Lowering of temperature as well as pressure
 (b) Increasing temperature as well as pressure
 (c) Lowering the temperature and increasing the pressure
 (d) Any value of temperature and pressure
94. Calculate the molar solubility of $Ni(OH)_2$ in 0.10 M NaOH. The ionic product of $Ni(OH)_2$ is 2.0×10^{-15}
 (a) 2×10^{-13} (b) 0.2×10^{-13}
 (c) 20×10^{-13} (d) 2×10^{-13}

95. Which one is wrong statement-
 (a) The electronic configuration of N atom is



- (b) Total orbital angular momentum of electrons in 's' orbital is equal to zero.
 (c) The value of m for d is zero
 (d) An orbital is designated by three quantum numbers while an electron in an atom is designated by four quantum numbers.

96. Select the species which can function as - Lewis base, bronsted acid and bronsted base-



Correct code is

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

97. Arrange NH_4^+ , H_2O , H_3O^+ , HF and OH^- increasing order of acidic nature -

- (a) $OH^- < H_2O < NH_4^+ < HF < H_3O^+$
 (b) $H_3O^+ > HF > H_2O > NH_4^+ > OH^-$
 (c) $NH_4^+ < HF < H_3O^+ < H_2O < OH^-$
 (d) $H_3O^+ < NH_4^+ < HF < OH^- < H_2O$

98. The number of angular nodes and radial nodes in 3s orbital are

- (a) 0 and 2, respectively
 (b) 1 and 0, respectively
 (c) 3 and 0, respectively
 (d) 0 and 1, respectively

99. A precipitate of AgCl is formed when equal volumes of the following are mixed. [K_{sp} for AgCl = 10^{-10}]

- (a) 10^{-4} M $AgNO_3$ and 10^{-7} M HCl
 (b) 10^{-5} M $AgNO_3$ and 10^{-6} M HCl
 (c) 10^{-5} M $AgNO_3$ and 10^{-4} M HCl
 (d) 10^{-4} M $AgNO_3$ and 10^{-6} M HCl

100. Find out the correct statement.

- (i) The atoms of different elements having same mass number but different atomic number are known as isobars
 (ii) The sum of protons and neutrons, in the isobars is always different
 (iii) Threshold frequency is a characteristic for a metal.

(iv) Threshold frequency is a maximum frequency required for the ejection of electrons from the metal surface.

(v) Stannous chloride is a powerful oxidising agent which oxidises mercuric chloride to mercury.

(vi) Stannous chloride gives grey precipitate with mercuric chloride, but stannic chloride does not do so.

(vii) $HClO_4$ is a stronger acid than $HClO_3$.

(viii) Oxidation state of Cl in $HClO_4$ is +VII and in $HClO_3$ is +V.

(ix) For a reaction $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$ if the volume of a vessel is reduced to half of its original volume, the equilibrium constant will be doubled.

- (a) (i), (ii), (iii), (vi), (vii), (viii), (ix)
 (b) (i), (iii), (vi), (vii), (viii), (ix)
 (c) (i), (iii), (v), (vi), (vii), (viii), (ix)
 (d) (i), (iii), (v), (viii), (ix)

Biology

Section A

101. Read the following statements & choose the correct :-

(I) Heart wood does not conduct water but it gives mechanical support to the stem

(II) Sap wood involved in the conduction of water & minerals.

Options :-

- (a) (I) is correct, (II) is incorrect
 (b) (I) is incorrect, (II) is correct
 (c) (I) & (II) both are correct
 (d) (I) & (II) both are incorrect

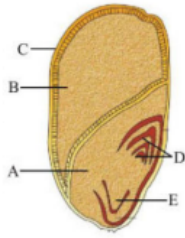
102. How many meiotic and mitotic divisions are required for the formation of female gametophytes from functional megaspore ?

- (a) 1, 2 (b) 0, 2
 (c) 0, 3 (d) 1, 3

103. The pollen grains of wind pollinated flowers are :-

- (a) Large, hairy and sticky
 (b) Small, lightweight and non-sticky
 (c) Attractive with fragrance and sticky
 (d) Small, light weight and sticky

104. Identify the labelled parts in the given diagram and select the correct option :-



A B C D E

- (a) Scutellum Endosperm Pericarp Coleorhiza Coleoptile
 (b) Scutellum Endosperm Pericarp Plumule Radicle
 (c) Pericarp Endosperm Scutellum Radicle Plumule
 (d) Endosperm Scutellum Pericarp Coleoptile Coleorhiza

105. A typical angiospermous ovule is attached to the placenta by means of a stalk called X. Body of the ovule fuses with X in the region called Y. Identify X and Y.

X	Y
(a) Funicle	Hilum
(b) Hilum	Funicle
(c) Funicle	Micropyle
(d) Hilum	Chalaza

106. Which of the following statements are true
- (i) Production of unisexual flowers prevents self pollination.
 (ii) Pollen release and stigma receptivity are always synchronised.
 (iii) Many insects may consume pollen or nectar without bringing about pollination.
 (iv) Apomixis is a form of sexual reproduction that mimics asexual reproduction.
- (a) ii, iv (b) i, iii, iv
 (c) i, iii (d) All of the above.

107. Umbellate clusters type inflorescence usually found in :-
- (a) Solanaceae (b) Liliaceae
 (c) Brassicaceae (d) Fabaceae

108. Select the incorrect statement for orchid
- (a) Monocotyledonous
 (b) Endospermic seeds
 (c) One large scutellum
 (d) Presence of coleoptile and coleorhiza

109. Which one of the following statements is incorrect about parenchyma ?
- (a) The cells are usually isodiametric
 (b) The cell wall is made up of cellulose
 (c) The cells may either be closely packed or have small intercellular spaces
 (d) The cell wall are much thickened at the corners due to deposition of cellulose, hemicellulose & pectin

110. Select the mismatched pair.
- (a) Tap root system - Dicots
 (b) Fibrous root system - Monocots
 (c) Prop roots - Wheat
 (d) Stilt root - Sugarcane

111. Consider the following statements w.r.t. zygote and select the right choice
- A. It is a vital link between two successive generations.
 B. It is the first cell of the new generation in all sexually reproducing organisms.

C. It is formed in the external aquatic medium in all seed producing plants,

- (a) A and C are correct
 (b) Only C is correct
 (c) A and B are correct
 (d) Only A is correct

112. Which of the following groups of plants propagated through a bulb?
- (a) Onion, Garlic and *Colocasia*
 (b) Lily, Garlic, and *Oxalis*
 (c) Turmeric, Ginger and *Narcissus*
 (d) Garlic and Onion

113. Select the correct statement w.r.t. zygote
- (a) It is thick walled in Marchantia
 (b) It undergoes a period of rest in pteridophytes
 (c) In majority of green algae, it divides by mitosis to form spores that grow into haploid organisms
 (d) It divides by meiosis in organism with haplontic life cycle

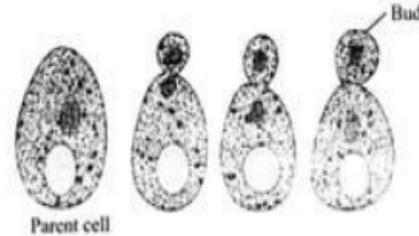
114. Which of the following pairs is incorrectly matched?
- (a) Isogametes - *Cladophora*
 (b) Heterogametes - *Fucus*
 (c) Monoecious - *Mulberry*
 (d) Dioecious - Date palm

115. In 60% Angiosperms pollen grains are shed at
 (a) One celled stage
 (b) Three celled stage
 (c) Three nuclei stage
 (d) Two celled stage
116. How many and what type of male gametes are produced by the male gametophyte of angiosperms-
 (a) One, multi ciliated
 (b) Two, biciliated
 (c) Two, multi ciliated
 (d) Two, non motile
117. An obligatory relation between a flower and a pollinating agent is best exemplified by -
 (a) Cocos (b) Salvia
 (d) Avena (c) Yucca
118. Ginger is an underground stem. It is distinguished from root because :
 (a) It lacks chlorophyll
 (b) It stores food
 (c) It has nodes and internodes
 (d) It has xylem and vessels
119. _____ are one internode long runners, usually found in rosette plants at the ground/ water level.
 (a) Trailers (b) Offsets
 (c) Stolons (d) Rhizomes
120. **Assertion:** Thorn-like structures present in *Citrus* and *Bougainvillea* are root modifications.
Reason: Thorns are developed from apical bud.
 (a) If both Assertion and Reason are true and the Reason is the correct explanation of the Assertion.
 (b) If both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion.
 (c) If Assertion is true but Reason is false.
 (d) If both Assertion and Reason are false.
121. From the statements given below choose the option that are true for a typical female gametophyte of a flowering plant.
 (i) It is 8-nucleate and 7-celled at maturity.
 (ii) It is free-nuclear during the development.
 (iii) It is situated inside the integument but outside the nucellus.
 (iv) It has an egg apparatus situated at the chalazal end.
 (a) (i) and (iv) (b) (ii) and (iii)
 (c) (i) and (ii) (d) (ii) and (iv)
122. The phenomenon observed in some plants where in parts of the sexual apparatus is used for forming embryos without fertilization is called
 (a) Parthenocarpy
 (b) Apomixis
 (c) Vegetative propagation
 (d) Sexual reproduction
123. The phenomenon where in the ovary develops into a fruit without fertilization is called
 (a) Parthenocarpy
 (b) Apomixis
 (c) Asexual reproduction
 (d) Sexual reproduction
124. Read the following statements about asexual reproduction and select the correct ones.
 (i) It involves a single parent
 (ii) It is slower than sexual reproduction
 (iii) It produces progeny that are genetically identical with the parent but not with one another.
 (iv) The progeny of asexual reproduction can be termed as clones.
 (a) (i) and (ii)
 (b) (ii) and (iii)
 (c) (i) and (iv)
 (d) (i), (iii) and (iv)
125. Which of the following is not a stem modification?
 (a) Tendrils of cucumber
 (b) Flattened structures of *Opuntia*
 (c) Pitcher of *Nepenthes*
 (d) Thorns of *Citrus*
126. Stems modified into flat green organ performing the functions of leaves are known as
 (a) Phylloclades (b) Scales
 (c) cladodes (d) phyllodes

127. Tricarpellary, syncarpous gynoecium is found in flower of
 (a) Fabaceae (b) Poaceae
 (c) Liliaceae (d) Solanaceae
128. The wheat grain has an embryo with one large, shield shaped cotyledon known as
 (a) Scutellum (b) Coleoptile
 (c) Epiblast (d) Coleorhiza
129. When the margins of sepals or petals overlap one another without any particular direction, the condition is termed as
 (a) Vexillary (b) Imbricate
 (c) Twisted (d) Valvate
130. In China rose the flowers are
 (a) Zygomorphic, hypogynous with imbricate aestivation
 (b) Zygomorphic, epigynous with twisted aestivation
 (c) Actinomorphic, hypogynous with twisted aestivation
 (d) Actinomorphic, epigynous with valvate aestivation
131. Cymose inflorescence is present in
 (a) *Solanum* (b) *Sesbania*
 (c) *Trifolium* (d) *Brassica*
132. Read the following statements about 'Terror of Bengal' and select the correct ones.
 (i) 'Terror of Bengal' is the name given to water hyacinth (*Eichhornia*), an algae.
 (ii) *Eichhornia* was introduced in India due to its aesthetic value.
 (iii) *Eichhornia* drains oxygen from the water which leads to death of fishes.
 (a) (i) and (ii) (b) (i) and (iii)
 (c) (ii) and (iii) (d) (i), (ii) and (iii)
133. Specialised epidermal cells surrounding the guard cells are called
 (a) Bulliform cells
 (b) Lenticels
 (c) Complementary cells
 (d) Subsidiary cells
134. Read the different components from (i) to (iv) in the list given below and tell the correct order of the components with reference to their arrangement from outer side to inner side in a woody dicot stem.

- (i) Secondary cortex (ii) Wood
 (iii) Secondary phloem (iv) Phelllem
 (a) (iv), (i), (iii), (ii) (b)(iv), (iii), (i), (ii)
 (c) (iii), (iv), (ii), (i) (d)(i), (ii), (iv), (iii)

135. Refer to the given figures and select the correct option.



- (a) It is a type of parthenogenesis
 (b) It is a type of asexual reproduction
 (c) The offsprings can also be called as clones
 (d) both (b) and (c)
136. The cork cambium, cork and secondary cortex are collectively called
 (a) Phelloderm (b) Phellogen
 (c) Periderm (d) Phellem
137. This plant flowers once in 12 years. During September October 2006, Its mass flowering transformed large tracks of hilly areas in Kerala, Karnataka and Tamil Nadu into blue stretches and attracted a large number of tourists. This plant is
 (a) *Bambusa tulda*
 (b) *Strobilanthes kunthiana*.
 (c) *Kigelia*
 (d) *Adansonia*

138. Match column I and column II and select the correct option using the codes given below

Column I	Column II
(A) Pistils fused together	(i) Gametogenesis
(B) Formation of gametes	(ii) Pistillate
(C) Hyphae of higher Ascomycetes	(iii) Syncarpous
(D) Unisexual female Flower	(iv) Dikaryotic

- (a) A (iv), B (iii), C (i), D (ii)
 (b) A (ii), B(i), C (iv), D (iii)
 (c) A(i), B (ii), C(iv), D(iii)
 (d) A(iii), B(i), C(iv), D(ii)

139. Which one of the following statements is not correct?
 (a) Offspring produced by the asexual reproduction are called clones.
 (b) Microscopic, motile, asexual reproductive structures are called zoospores.
 (c) In potato, banana and ginger, the plantlets arise from the internodes present in the modified stem.
 (d) Water hyacinth, growing in the standing water, drains oxygen from water that leads to the death of fishes.

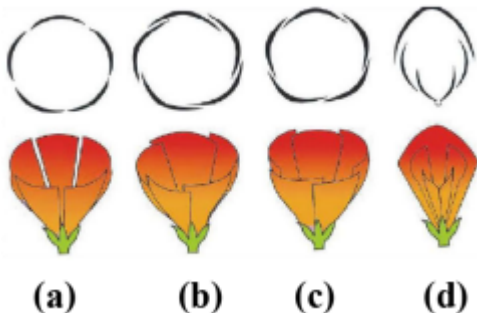
140. Which of the following pairs is not correctly matched?
- | Mode of reproduction | Example |
|----------------------|--------------------|
| (a) Binary fission | <i>Myxine</i> |
| (b) Conidia | <i>Penicillium</i> |
| (c) Offset | Water hyacinth |
| (d) Rhizome | Banana |

141. **Assertion:** All tissues lying inside vascular cambium are called bark.

Reason: Bark is made up of phellogen, phellem and phelloderm lying inside secondary phloem.

- (a) If both Assertion and Reason are true and the Reason is the correct explanation of the Assertion.
 (b) If both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion.
 (c) If Assertion is true but Reason is false.
 (d) If both Assertion and Reason are false.

142.



The aestivation in petals of *Cassia* and *Calotropis* plants are respectively

- (a) a and c
 (b) c and a
 (c) b and c
 (d) a and b

143. Select the incorrect match pair
 (a) Drupe - Coconut
 (b) Berry - Brinjal
 (c) Capsule - Onion
 (d) Pepo - Mango

144. Select the correct option for a plant group which has stilt roots ?
 (a) Grass, Wheat
 (b) Carrot, Mustard
 (c) Maize, Sugarcane
 (d) Banyan, Mustard

145. **Assertion:** The lenticel is meant for gaseous exchange.

Reason: Lenticel checks excessive evaporation of water.

- (a) If both Assertion and Reason are true and the Reason is the correct explanation of the Assertion.
 (b) If both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion.
 (c) If Assertion is true but Reason is false.
 (d) If both Assertion and Reason are false.

146. Which type of vascular bundles are present in the given diagram?



- (a) Conjoint open
 (b) Radial
 (c) Concentric
 (d) Conjoint closed

147. **Assertion:** Pollen grain reaches directly to the egg, which is seated deep in the ovarian cavity.

Reason: To effect fertilization, the pollen grains germinate in this style..

- (a) If both Assertion and Reason are true and the Reason is the correct explanation of the Assertion.
 (b) If both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion.
 (c) If Assertion is true but Reason is false.
 (d) If both Assertion and Reason are false.

148. **Assertion:** Unisexual flowers have separate male and female flowers.

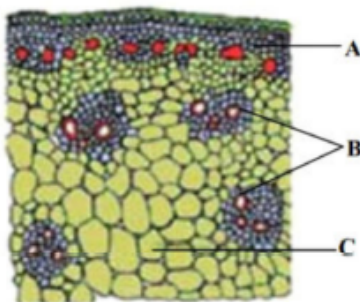
Reason: Both monoecious or dioecious plants have unisexual flowers.

- (a) If both Assertion and Reason are true and the Reason is the correct explanation of the Assertion.
 (b) If both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion.
 (c) If Assertion is true but Reason is false.
 (d) If both Assertion and Reason are false.

149. Find out the incorrectly matched pair:

- (a) Peripheral metaxylem - Stem
 (b) Peripheral protoxylem - Root
 (c) Phloem parenchyma - Common in Monocots
 (d) Xylem parenchyma - Store starch or fat

150. Identify the given figure as well as alphabetically marked structures.



- (a) Dicot stem
 A- Epidermis, B-Vascular bundle
 C- Pith
 (b) Monocot stem

A-Hypodermis B-Vascular bundles
 C-Ground tissue
 (c) Monocot stem

A-Hypodermis B-Vascular bundles
 C- Pith
 (d) Dicot root

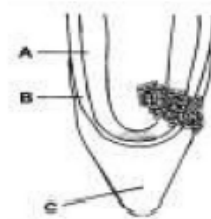
A-Cortex C-Ground tissue
 B-Vascular bundles

Section A

151. Monocotyledonous root differs from dicot root in which of the following internal features (a to d)?

- a. Presence of parenchymatous pericycle.
 b. Presence of more than six xylem bundles.
 c. Presence of large and well developed pith
 d. Presence of a parenchymatous cortex without intercellular spaces. Find out the correct option.
 (a) a, c & d (b) b & d
 (c) b & c (d) a & d

152. Select the option that correctly identifies the labellings A, B and C in the given figure showing the section of root apical meristem.



- | | A | B | C |
|-----|------------|-----------|----------|
| (a) | Cortex | protoderm | Root cap |
| (b) | Protoderm | Cortex | Root cap |
| (c) | Hypodermis | Epidermis | Cortex |
| (d) | Tunica | protoderm | Root cap |

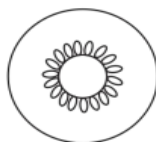
153. Read the following statement and select correct one-

- (a) A flower may be bimerous having 3, 4 or 5 floral appendages.
 (b) Leaves at the base of flower pedicel is called bract.
 (c) flower are actinomorphic
 (d) Unisexual flowers have either stamen or carpel or both

154. The floral formula $\oplus \overset{\text{♂}}{P}_{3-3} \overset{\text{♀}}{A}_{3-3} \overset{\text{G}}{(3)}$ represents which one of the following families?
 (a) Solanaceae (b) Liliaceae
 (c) Fabaceae (d) Malvaceae
155. Phyllotaxy in Calotropis and mustard plant is respectively
 (a) Opposite and alternate
 (b) Opposite and whorled
 (c) Whorled and alternate
 (d) Alternate and opposite
156. Select the incorrect statement w.r.t. megaspore mother cell (MMC)
 (a) It is located in the chalazal region of ovule
 (b) MMC undergoes meiotic division
 (c) It is a large cell containing dense cytoplasm
 (d) Generally single MMC is differentiated from ovule
157. What will be the ploidy of PEN and zygote respectively if the cross is made between the tetraploid male plant and hexaploid female plant?
 (a) $8n, 7n$ (b) $6n, 8n$
 (c) $8n, 6n$ (d) $8n, 5n$
158. Read the following statement and select the correct one.
 (i) Phloem parenchyma is absent in most monocots
 (ii) Gymnosperms lack vessels.
 (iii) Gymnosperm lack companion cells
 (a) (i) and (ii) (b) (ii) and (iii)
 (c) (i) and (iii) (d) (i) (ii) and (iii)
159. Consider the following events w.r.t. sexual reproduction and select the correct choice
 A. Gametogenesis B. Gamete transfer
 D. Parthenocarpy C. Embryogenesis
 (a) A and D are correct
 (b) Only D is incorrect
 (c) A, B and D are correct
 (d) Only B is correct
160. During successive type of microsporogenesis, total number of meiotic divisions required to produce 2400 pollens, is
 (a) 400 (b) 600
 (c) 200 (d) 300
161. Which one of the following is correctly matched?
 (a) Onion-bulb
 (b) Ginger-Sucker
 (c) *Chlamydomonas*-Conidia
 (d) Yeast - Zoospores
162. Vegetative propagation in Pistia occurs by
 (a) Stolon (b) Offset
 (c) Runner (d) Sucker
163. Vegetative propagation in mint occurs by
 (a) Offset (b) Rhizome
 (c) Sucker (d) Runner
164. In majority of angiosperms
 (a) Egg has a filiform apparatus
 (b) There are numerous antipodal cell
 (c) Reduction division occurs in the megaspore mother cell
 (d) A small central cell is present in the embryo sac.
165. Pollination in water hyacinth and water is brought about by the agency of
 (a) Water (c) Birds
 (b) Insects or wind (d) Bats.
166. Which one of the following fruits is parthenocarpic?
 (a) Jackfruit (b) Banana
 (c) Brinjal (d) Apple
167. Non-albuminous seed is produced in
 (a) Maize (b) Castor
 (c) Wheat (d) Pea.
168. Geitonogamy involves
 (a) Fertilization of a flower by the pollen from another flower of the same plant
 (b) Fertilization of a flower by the pollen from the same flower
 (c) Fertilization of a flower by the pollen from a flower of another plant in the same population
 (d) Fertilization of a flower by the pollen from a flower of another plant belonging to a distant population.
169. Starch sheath endodermis is found in:-
 (a) Monocot stem (b) Monocot root
 (c) Dicot stem (d) Dicot root

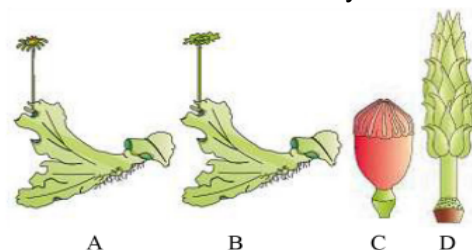
170. An organic substance that can withstand environmental extremes and cannot be degraded by any enzyme is
 (a) Cuticle (b) Sporopollenin
 (c) Lignin (d) Cellulose
171. Even in absence of pollinating agents seed setting is assured in
 (a) *Commelina* (b) *Zostera*
 (c) *Salvia* (d) Fig
172. Polyembryony is reported in species of
 (a) *Citrus* (b) *Gossypium*
 (c) *Triticum* (d) *Brassica*
173. In angiosperm, functional megaspore develops into
 (a) Embryo sac (b) Ovule
 (c) Endosperm (d) Pollen sac.
174. Floral formula belongs to :-
 (a) Mustard (b) Tulip
 (c) Lupin (d) Groundnut
175. Select the incorrect statements:-
 (i) All aquatic plants use water for pollination
 (ii) Pollen grains are protected from wetting by a mucilaginous covering in most of the water pollinated species.
 (iii) In *Vallisneria*, female flowers remain submerged in water and the pollen grains are released inside the water
 (iv) Pistil has the ability to recognise the pollen whether it is of right type or of wrong type
 (a) ii, iv (b) i, ii, iv
 (c) iii, iv (d) i, iii

176. Given figure represents which type of placentation?
 (a) Basal
 (b) Axile
 (c) Free central
 (d) Marginal



177. Soyabean, Onion, Potato, Mustard, lupin, groundnut, sem, *Trifolium*, Brinjal, *Petunia* How many plants belongs to family fabaceae?
 (a) Five (b) Six
 (c) Eight (d) Four

178. Which of the following statements regarding the structure of microsporangium are correct?
 (i) Microsporangium is generally surrounded by four wall layers-epidermis, endothecium, middle layers and tapetum.
 (ii) Outer three layers perform functions of protection and dehiscence of anthers
 (iii) Cells of tapetum undergo meiosis and produce microspore tetrads.
 (a) (i) and (ii) (b) (ii) and (iii)
 (c) (i) and (ii) (d) (i), (ii) and (iii)
179. Which of the following is formed by the process of dedifferentiation?
 (a) Apical meristem
 (b) Intrafascicular cambium
 (c) Intercalary meristem
 (d) Interfascicular cambium
180. In Isobilateral leaf, bundle sheath are made up of :- extensions
 (a) Parenchyma
 (b) Sclerenchyma
 (c) Collenchyma
 (d) Chlorenchyma
181. Endosperm is completely consumed during embryo development in
 (a) Castor, onion and groundnut
 (b) Onion, beans and peas
 (c) Rice, wheat and onion.
 (d) Pea, groundnut and gram
182. Examine the figures (AD) given below and select the right option out of 1 - 4, in which all the four structures A, B, C and D are identified correctly.

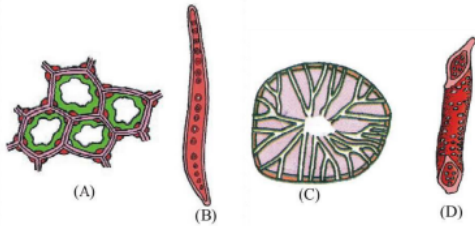


	A	B	C	D
(a)	Antheridi-ophore	Archegoni-ophore	Apocarpous-gynoecium	Syncarpous ovary
(b)	Antheridi-ophore	Archegoni-ophore	Syncarpous ovary	Apocarpous-gynoecium
(c)	Archegoni-ophore	Antheridi-ophore	Syncarpous ovary	Apocarpous-gynoecium
(d)	Archegoni-ophore	Antheridi-ophore	Apocarpous-gynoecium	Syncarpous ovary

183. Among plum, rose, peach, mustard, Apple, Banana, Pomegranate, Coconut, Brinjal, Mango, groundnut and soybean, how many plants have hypogynous flowers?

- (a) Five (b) Seven
 (c) Six (d) Ten

184. Identify the following four diagrams (A,B,C and D):-



- | A | B | C | D |
|-----------------|------------|-------------|--------------------|
| (a) Parenchyma | Vessel | Sclereid | Tracheid |
| (b) Collenchyma | Tracheid | Sclereid | Vessel |
| (c) Collenchyma | Parenchyma | Tracheid | Vessel |
| (d) Sclereid | Tracheid | Collenchyma | Sieve tube element |

185. Study the following four statements carefully and give the answer :-

- (1) Roots have exarch and stems have endarch xylem
 (2) Casparian strips are present in pericycle
 (3) Phloem parenchyma is present in most of monocotyledons
 (4) Vessels are present in angiosperms

- (a) 1, 2 and 3 are correct
 (b) 1, 2, 4 are correct
 (c) 1 and 4 are correct
 (d) 1, 2 and 3 are correct

Section B

186. Identify the plant tissue in which lignin is absent

- (a) Collenchyma
 (b) Sclerenchyma fibres
 (c) Sclereids
 (d) Xylem tracheids.

187. **Assertion:** Megaspore mother cell undergoes meiotic division.

Reason: All cells of female gametophyte are haploid.

- (a) If both Assertion and Reason are true and the Reason is the correct explanation of the Assertion.

(b) If both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion.

(c) If Assertion is true but Reason is false.

(d) If both Assertion and Reason are false.

188. Rearrange the following zones as seen in the root in the vertical section and choose the correct option.

- A. Root hair zone
 B. Zone of meristems
 C. Root Cap zone
 E. Zone of elongation
 D. Zone of maturation

- (a) C, B, E, A, D (b) A, B, C, D, E
 (c) D, E, A, C, B (d) E, D, C, B, A

189. The mature seeds of plants such as gram and peas, possess no endosperm, because

- (a) these plants are not angiosperms
 (b) there is no double fertilization in them
 (c) endosperm is not formed in them
 (d) endosperm gets used up by the developing embryo during seed development

190. Which of the following plants is used to extract the blue dye?

- (a) *Trifolium* (b) *Indigofera*
 (c) Lupin (d) *Cassia*

191. Match the following and choose the correct option.

- | Group A | Group B |
|-------------------------|----------------------------|
| A. Aleurone layer | (i) Without fertilization |
| B. Parthenocarpic fruit | (ii) Nutrition |
| C. Ovule | (iii) Double fertilization |
| D. Endosperm | (iv) Seed |
- (a) A-(i), B-(ii), C-(iii), D-(iv)
 (b) A-(ii), B-(i), C-(iv), D-(iii)
 (c) A-(iv), B-(ii), C-(i), D-(iii)
 (d) A-(ii), B-(iv), C-(i), D-(iii)

192. Match the following and choose the correct option from below.
- | | |
|--------------------|----------------------------|
| A. Cuticle | (i) guard cells |
| B. Bulliform cells | (ii) single layer |
| C. Stomata | (iii) waxy layer |
| D. Epidermis | (iv) empty colourless cell |
- (a) A-(iii), B-(iv), C-(i), D-(ii)
(b) A-(i), B-(ii), C-(iii), D-(iv)
(c) A-(iii), B-(ii), C-(iv), D-(i)
(d) A-(iii), B-(ii), C-(i), D-(iv)
193. Which of the following statements is correct?
- (a) All the individuals of a species have exactly the same life span.
(b) Smaller organisms always have shorter life span and vice versa.
(c) Life span of an organism is the time period from its birth to its natural death.
(d) No organism may have a life span of several hundred years
194. A few statements describing certain features of reproduction are given below.
- (i) Gametic fusion takes place
(ii) Transfer of genetic material takes place
(iii) Reduction division takes place
(iv) Progeny have some resemblance with parents.
- Select the options that are true for both asexual and sexual reproduction from the options given below.
- (a) (i) and (ii) (b) (ii) and (iii)
(c) (ii) and (iv) (d) (i) and (iii)
195. A few statements with regard to sexual reproduction are given below.
- (i) Sexual reproduction does not always require two individuals
(ii) Sexual reproduction generally involves gametic fusion
(iii) Meiosis never occurs during sexual reproduction.
(iv) External fertilisation is a rule during sexual reproduction.
- Choose the correct statements from the options below.
- (a) (i) and (iv) (b) (i) and (ii)
(c) (ii) and (iii) (d) (i) and (iii)
196. The male gametes of rice plants have 12 chromosomes in their nucleus. The chromosome number in the female gamete, zygote and the cells of the seedling will be, respectively
- (a) 12, 24, 12 (b) 24, 12, 12
(c) 12, 24, 24 (d) 24, 12, 24
197. Which of the following statements support the view that elaborate sexual reproductive processes appeared much later in the organic evolution?
- (i) Lower groups of organisms have simpler body design.
(ii) Asexual reproduction is common in lower groups.
(iii) Asexual reproduction is common in higher groups of organisms.
(iv) The high incidence of sexual reproduction in angiosperms and vertebrates.
- Choose the correct answer from the options given below.
- (a) (i), (ii) and (iii)
(b) (i), (iii) and (iv)
(c) (i), (ii) and (iv)
(d) (ii), (iii) and (iv)
198. Identify the incorrect statement.
- (a) In asexual reproduction, the offspring produced are morphologically and genetically identical to the parent
(b) Zoospores are sexual reproductive structures.
(c) In asexual reproduction, a single parent produces offspring with or without the formation of gametes.
(d) Conidia are asexual structures in Penicillium.
199. From among the sets of terms given below, identify those that are associated with the gynoecium.
- (a) Stigma, ovule, embryo sac, placenta
(b) Thalamus, pistil, style, ovule
(c) Ovule, ovary, embryo sac, tapetum
(d) Ovule, stamen, ovary, embryo sac

200. Which one of the following statements are incorrect?

- (i) In opposite phyllotaxy, two leaves are borne on a node.
- (ii) Leaves of Bryophyllum, help in vegetative propagation.
- (iii) In Racemose inflorescence, the flowers are arranged in a basipetal fashion.
- (iv) All tissues lying inside vascular cambium are called bark.
- (v) Endosperm is formed by fusion of the secondary nucleus to the second female gamete. It is used by developing zygote.
- (vi) In asexual reproduction offspring is produced by a single parent.
- (vii) Fusion of male & female gametes are called sexual reproduction.
- (viii) In sexually reproducing organisms, if two gametes are similar in appearance, then gametes are called heterogametes and when gametes produced are morphologically distinct, it is called homogametes (isogametes).
- (ix) In diploid organism specialised cell, gamete mother cell called meiocytes undergo meiosis.
- (x) In plants, specialised event called pollination facilitates transfer of pollen grains to the style.

Options:-

- (a) (i), (ii), (iii), (v), (viii) and (ix)
- (b) (iii), (iv), (v), (iii), (vi), (iii), (x) and (xi)
- (c) (iii), (iv), (v), (viii) and (x)
- (d) only (iii)