English

(1103CMD303031230074)

Test Pattern

ALLEN CAREER INSTITUTE KOTA (RAJASTHAN)

CLASSROOM CONTACT PROGRAMME

(Academic Session : 2023-2024)

NEET (UG)
MAJOR
26-04-2024

PRE-MEDICAL : Enthuse & Leader

Test Booklet Code

Q1

This Booklet contains **36** pages.

Do not open this Test Booklet until you are asked to do so.

Important Instructions :

1. The Answer Sheet is inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars on ORIGINAL Copy carefully with **blue/black** ball point pen only.
2. The test is of **3 hours 20 minutes** duration and the Test Booklet contains **200** multiple-choice questions (four options with a single correct answer) from **Physics, Chemistry and Biology (Botany and Zoology). 50** questions in each subject are divided into **two Sections (A and B)** as per details given below :
   (a) **Section A** shall consist of **35 (Thirty-five)** Questions in each subject (Question Nos - 1 to 35, 51 to 85, 101 to 135 and 151 to 185). All questions are compulsory.
   (b) **Section B** shall consist of **15 (Fifteen)** questions in each subject (Question Nos - 36 to 50, 86 to 100, 136 to 150 and 186 to 200). In Section B, a candidate needs to **attempt any 10 (Ten)** questions out of **15 (Fifteen)** in each subject.
   Candidates are advised to read all 15 questions in each subject of Section B before they start attempting the question paper. In the event of a candidate attempting more than ten questions, **the first ten questions answered by the candidate shall be evaluated.**
3. Each question carries **4** marks. For each correct response, the candidate will get **4** marks. For each incorrect response, **one mark** will be deducted from the total scores. **The maximum marks are 720**.
4. Use **Blue/Black Ball Point Pen only** for writing particulars on this page/marking responses on Answer Sheet.
5. Rough work is to be done in the space provided for this purpose in the Test Booklet only.
6. On completion of the test, the candidate **must hand over the Answer Sheet (ORIGINAL and OFFICE Copy) to the Invigilator** before leaving the Room/Hall. The candidates are allowed to take away this Test Booklet with them.
7. The candidates should ensure that the Answer Sheet is not folded. Do not make any stray marks on the Answer Sheet. Do not write your Form No. anywhere else except in the specified space in the Test Booklet/Answer Sheet.
8. Use of white fluid for correction is **NOT** permissible on the Answer Sheet.
9. Each candidate must show on-demand his/her Allen ID Card to the Invigilator.
10. No candidate, without special permission of the Invigilator, would leave his/her seat.
11. The candidates should not leave the Examination Hall without handing over their Answer Sheet to the Invigilator on duty and sign (with time) the Attendance Sheet **twice. Cases, where a candidate has not signed the Attendance Sheet second time, will be deemed not to have handed over the Answer Sheet and dealt with as an Unfair Means case.**
12. Use of Electronic/Manual Calculator is prohibited.
13. The candidates are governed by all Rules and Regulations of the examination with regard to their conduct in the Examination Room/Hall. All cases of unfair means will be dealt with as per the Rules and Regulations of this examination.
14. **No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.**
15. The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.
16. Compensatory time of one hour five minutes will be provided for the examination of three hours and 20 minutes duration, whether such candidate (having a physical limitation to write) uses the facility of scribe or not.

Name of the Candidate (in Capitals) : _____

Form Number : in figures _____

: in words _____

Centre of Examination (in Capitals) : _____

Candidate's Signature : _____ Invigilator's Signature : _____

Your Target is to secure Good Rank in Pre-Medical 2023

SECTION-A (PHYSICS)

1. A particle is moving on a circular path with speed V = 2t + 1 m/sec if radius of path is 5m, then:-

(1) Tangential acc. at t = 2 sec is 4 m/sec^2

(2) Centripetal acc. at t = 2 sec is 5 m/sec^2

(3) Total acc. at t = 2 sec is 7 m/sec^2

(4) Motion of particle is uniform circular motion

2. A car of mass m moves in a horizontal circular path of radius 'r' metre. At an instant its speed is V m/s and is increasing at the rate of 'a' m/sec^2. Then, the acceleration of the car is :

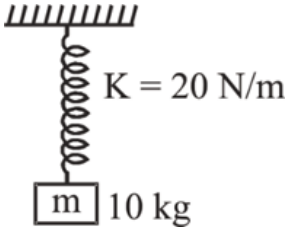
(1) $\frac{V^2}{r}$

(2) a

(3) $\sqrt{a^2 + \left(\frac{V^2}{r}\right)^2}$

(4) $\sqrt{a + \frac{V^2}{r}}$

3. A block of mass 10 kg is attached to a unstreched spring of spring constant K = 20 N/m and is released. Find the Maximum extension in spring after this :



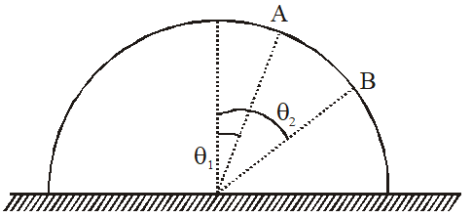
(1) 5 m

(2) 20 m

(3) 10 m

(4) $\sqrt{20}$m

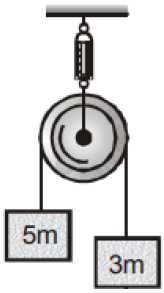
4. A small block slides down from rest at point A on the surface of a smooth cylinder, as shown. At point B, the block falls off (leaves) the cylinder. The equation relating the angles θ_1 and θ_2 is given by



(1) $\sin\theta_2 = \frac{2}{3}\sin\theta_1$ (2) $\sin\theta_2 = \frac{3}{2}\sin\theta_1$

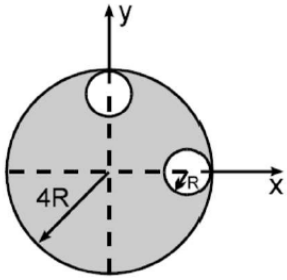
(3) $\cos\theta_2 = \frac{2}{3}\cos\theta_1$ (4) $\cos\theta_2 = \frac{3}{2}\cos\theta_1$

5. If the system is released, then the acceleration of the centre of mass of the system :



(1) $\frac{g}{4}$ (2) $\frac{g}{16}$ (3) $\frac{g}{8}$ (4) $\frac{g}{12}$

6. From the uniform disc of radius 4 R two small disc of radius R are cut off. The centre of mass of the new structure will be : (Centre of lower circular cavity lies on x-axis and centre of upper circular cavity lies on y-axis)



(1) $\frac{R}{5}\hat{i} + \frac{R}{5}\hat{j}$ (2) $-\frac{R}{5}\hat{i} + \frac{R}{5}\hat{j}$

(3) $-\frac{R}{5}\hat{i} - \frac{R}{5}\hat{j}$ (4) $-\frac{3R}{14}\left(\hat{i} + \hat{j}\right)$

7. **Statement-1** : Kinetic energy of a system is minimum in centre of mass frame of reference
Statement-2 : In centre of mass frame kinetic energy of all particles is smaller than their respective kinetic energy in ground frame.

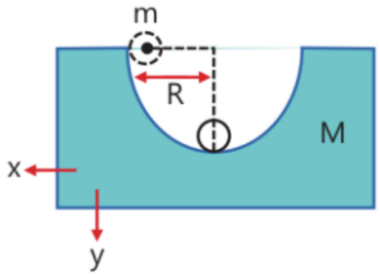
(1) Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.

(2) Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1.

(3) Statement-1 is true, statement-2 is false.

(4) Statement-1 is false, statement-2 is true.

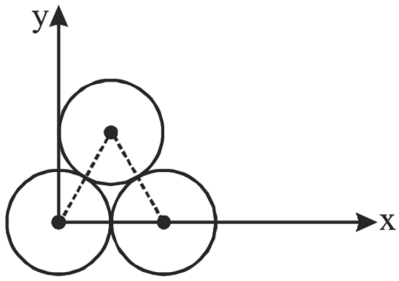
8. A sphere of mass m is rolling down on a wedge of mass M. When sphere reaches at lowest point then find distance moved by wedge in horizontal direction.



(1) $\frac{mR}{M+m}$ (2) $\frac{MR}{M+m}$

(3) $\frac{2MR}{M+m}$ (4) None

9. Three identical spheres each of radius R are placed touching each other on a horizontal table as shown in figure. The co-ordinates of centre of mass are :–



(1) (R, R) (2) (0, 0)

(3) $\left(\frac{R}{2}, \frac{R}{2}\right)$ (4) $\left(R, \frac{R}{\sqrt{3}}\right)$

10. A body of mass 2m moving with velocity of 10 m/s collides inelastically with another body of mass m initially at rest. If e = 1/2, the velocities of both the bodies after collision are respectively:-

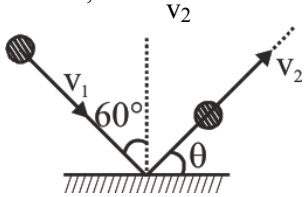
(1) $v_1 = 10$ m/s, $v_2 = 5$ m/s

(2) $v_1 = -5$ m/s, $v_2 = +10$ m/s

(3) $v_1 = +5$ m/s, $v_2 = 10$ m/s

(4) $v_1 = -10$ m/s, $v_2 = +5$ m/s

11. The collision of a ball with the ground is shown in figure. If e = 1/2, then $\frac{v_1}{v_2}$ = :-



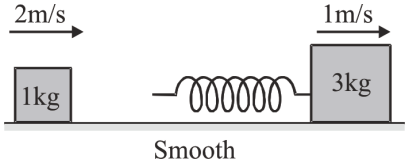
(1) $\frac{4}{\sqrt{13}}$

(2) $\frac{2}{\sqrt{13}}$

(3) $\frac{5}{\sqrt{13}}$

(4) $\frac{7}{\sqrt{13}}$

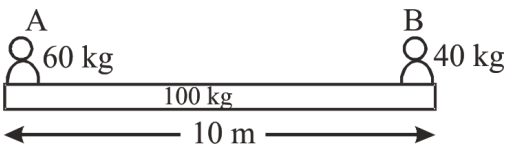
12. Two blocks of masses 1 kg and 3 kg are moving with velocities 2 m/s and 1 m/s, respectively, as shown. If the spring constant is 75 N/m, the maximum compression of the spring is :



(1) 5 cm (2) 10 cm

(3) 15 cm (4) 20 cm

13. Two men A & B of masses 60kg and 40kg are standing on a plank of mass 100kg, which is kept on a smooth horizontal plane. If A and B exchange their position then centre of mass of system will shift :-



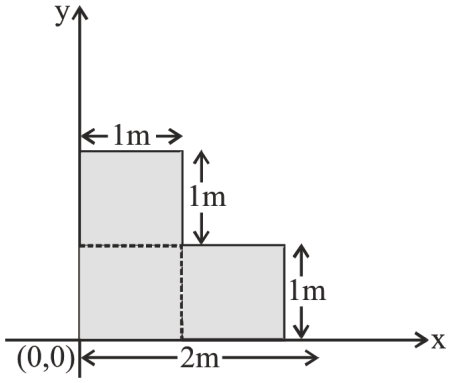
(1) 2 m

(2) 1 m

(3) Zero

(4) N.O.T.

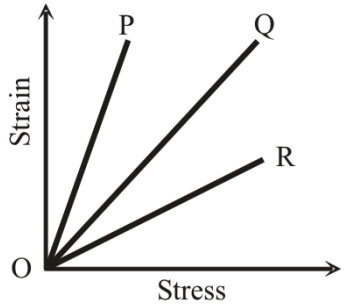
14. The x and y coordinates of the centre of mass of a uniform L-shaped lamina of mass 3kg is :-



(1) $\left(\frac{5}{6}m, \frac{5}{6}m\right)$ (2) (1m, 1m)

(3) $\left(\frac{6}{5}m, \frac{6}{5}m\right)$ (4) (2m, 2m)

15. The strain-stress curves of three wires of different materials are shown in the figure. P, Q and R are the elastic limits of the wires. The figure shows that



(1) Elasticity of wire P is maximum

(2) Elasticity of wire Q is maximum

(3) Tensile strength of R is maximum

(4) None of the above is true

16. The centre of mass of a body :-

(1) Lies always outside the body

(2) May lie within, outside of the surface of the body

(3) Lies always inside the body

(4) Lies always on the surface of the body

17. A body of mass 50 kg is projected vertically upward with velocity of 100 m/s. After 5 s this body breaks into 20 kg and 30 kg. If the 20 kg piece travels upwards with 150 m/s, then the velocity of other block will be :-

(1) 15 m/s downwards

(2) 15 m/s upwards

(3) 51 m/s downwards

(4) 50/3 m/s downwards

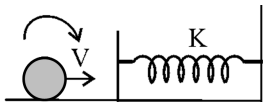
18. Two circular discs are of the same thickness. The diameter of A is twice that of B. The moment of inertia of A as compared to that of B is :-

(1) twice as large (2) four times as large

(3) 8 times as large (4) 16 times as large

19. A solid sphere of mass M is rolling with a speed V on a horizontal surface and strikes a massless spring of force constant K.

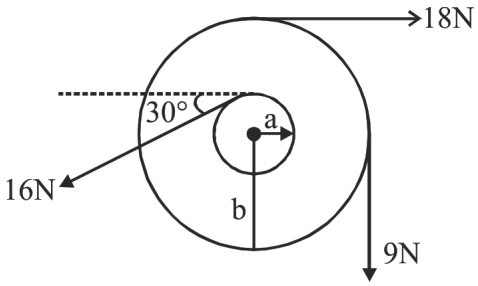
Then the maximum compression of spring is :-



(1) $\sqrt{\frac{5MV^2}{3K}}$ (2) $\sqrt{\frac{7MV^2}{5K}}$

(3) $\sqrt{\frac{MV^2}{K}}$ (4) None of the above

20. In the figure a = 6 m and b = 20 m. If the moment of inertia of the system is 4440 kg-m^2. Its angular acceleration would be :-



(1) 10^{-1} rad/sec^2 (2) 10^{-2} rad/sec^2

(3) 10^{-3} rad/sec^2 (4) 10^{-4} rad/sec^2

21. If angular velocity of a disc depends on angle rotated θ as $\omega = \theta^2 + 2\theta$, then its angular acceleration α at θ = 1 rad is :

(1) 8 rad/s^2

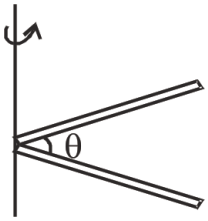
(2) 10rad/s^2

(3) 12 rad/s^2

(4) None of these

22. The M.I. of a rod about an axis through its center and perpendicular to it is I_0. The rod is bent in the middle so that the two halves make an angle θ. The moment of inertia of the bent rod about the same axis would be :-

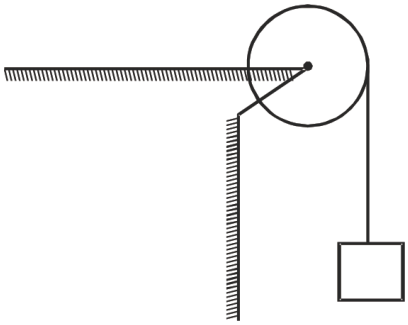
(Two halves are $\perp$ to axis)



(1) $I_0\sin^2\theta$ (2) $I_0\cos^2\theta$

(3) I_0 (4) $\frac{I_0}{2}$

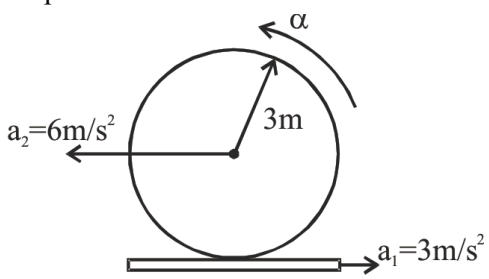
23. Figure shows a uniform disc, with mass M = 2.4 kg and radius R = 20 cm, mounted on a fixed horizontal axle. A block of mass m = 1.2 kg hangs from a massless cord which is wrapped around the rim of the disc. The tension in the cord is :



(1) 12 N (2) 20 N

(3) 24 N (4) 6 N

24. In the following figure a sphere of radius 3 m rolls on a plank. The acceleration of the sphere and the plank are indicated. The value of α is



(1) 3 rad/s²

(2) 6 rad/s²

(3) 3 rad/s² (opposite to the direction shown in figure)

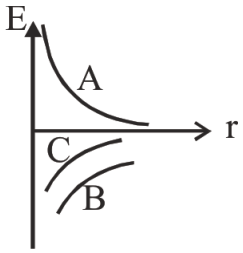
(4) 1 rad/s²

25. If the radius of earth reduces by 4% and density remains same then escape velocity will-

(1) reduce by 2% (2) increase by 2%

(3) reduce by 4% (4) increase by 4%

26. Figure shows the variations of energy E with the orbit radius r of a satellite in a circular motion. Choose the correct statement :-



(1) A shows the kinetic energy, B shows the total energy and C the potential energy of the satellite.

(2) A and B are kinetic energy and potential energy respectively and C the total energy of the satellite.

(3) A and B are the potential energy and kinetic energy respectively and C the total energy of the satellite.

(4) C and A are the kinetic and potential energies and B the total energy of the satellite

27. Three particles each of mass m are placed at the three corners of an equilateral triangle of side a. The work which should be done to increase the sides of the triangle to 2a is:

(1) $\frac{3Gm^2}{a}$

(2) $\frac{3Gm^2}{2a}$

(3) $\frac{Gm^2}{2a}$

(4) $\frac{Gm^2}{a}$

28. The acceleration due to gravity on the planet A is 9 times the acceleration due to gravity on planet B. A man jumps to a height of 2m on the surface of A. What is the height of jump by the same person on the planet B ?

(1) $\frac{2}{9}$m

(2) 18m

(3) 6m

(4) $\frac{2}{3}$m

29. Escape speed of a body from the earth does not depend on :

(1) Mass of body

(2) Direction of projection

(3) Both (1) and (2)

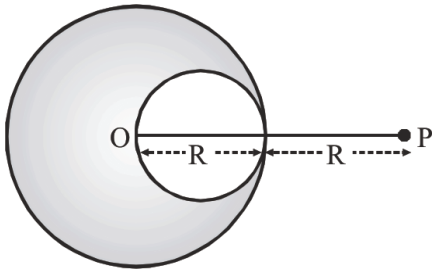
(4) The distance of point of projection from centre of the earth.

30. The percentage errors in the measurement of length and time period of a simple pendulum are 1% and 2% respectively. Then the maximum error in the measurement of acceleration due to gravity is :-

(1) 8% (2) 3%

(3) 4% (4) 5%

31. A solid sphere of uniform density and radius R exerts a gravitational force of attraction F_1 on a particle P, distant 2R from the centre of the sphere. A spherical cavity of radius R/2 is now formed in the sphere as shown in figure. The sphere with cavity now applies a gravitational force F_2 on the same particle P. Find the ratio F_2/F_1 .



(1) $\frac{4}{9}$ (2) $\frac{9}{7}$

(3) $\frac{7}{9}$ (4) $\frac{9}{4}$

32. The orbital speed of mercury is :

(1) greater than that of Earth

(2) less than that of Earth

(3) equal than that of Earth

(4) less than that of Mars

33. **Assertion:** The velocity increases, when water flowing in broader pipe enter a narrow pipe.

Reason: According to equation of continuity, product of volume and velocity is constant

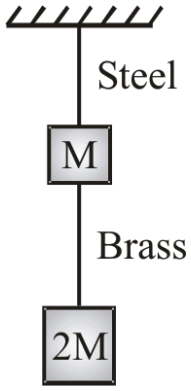
(1) If both Assertion and Reason are true & the Reason is a correct explanation of the Assertion.

(2) If both Assertion & Reason are true but Reason is not a correct explanation of the Assertion.

(3) If Assertion is true but the Reason is false

(4) If Both Assertion and Reason are false

34. If the ratio of lengths, radii and Young's modulus of steel and brass wires in the figure are a, b and c respectively, then the corresponding ratio of increase in their lengths would be:



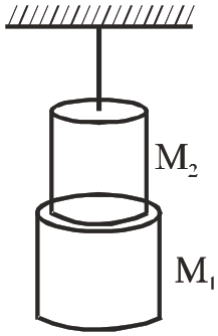
(1) $\frac{2a^2c}{b}$

(2) $\frac{3a}{2b^2c}$

(3) $\frac{2ac}{b^2}$

(4) $\frac{3c}{2ab^2}$

35. The length of wire, when M_1 is hung from it is ℓ_1 and is ℓ_2 when both M_1 and M_2 are hanging. The natural length of wire is:



(1) $\frac{M_1}{M_2}(l_1 - l_2) + l_1$

(2) $\frac{M_2 l_1 - M_1 l_2}{M_1 + M_2}$

(3) $\frac{l_1 + l_2}{2}$

(4) $\sqrt{l_1 l_2}$

SECTION-B (PHYSICS)

36. The height upto which water will rise in capillary tube will be

(1) Same at all temperatures

(2) Minimum when temperature of water is 0° C

(3) Maximum when temperature of water is 4° C

(4) Minimum when temperature of water is 4° C

37. In which one of the following cases will the liquid flow in a pipe be most streamlined?

(1) Liquid of high viscosity and high density flowing through a pipe of small radius

(2) Liquid of high viscosity and low density flowing through a pipe of small radius

(3) Liquid of low viscosity and low density flowing through a pipe of large radius

(4) Liquid of low viscosity and high density flowing through a pipe of large radius

38. The Young's modulus of the material of wire is 2×10^{10} Nm^{-2} .If the elongation strain is 1%, then the energy stored in the wire per unit volume in J m^{-3}

(1) 10^6 J m^{-3}

(2) 10^8 J m^{-3}

(3) 2×10^6 J m^{-3}

(4) 2×10^8 J m^{-3}

39. The pressure of the medium changed from 1.01×10^5 Pa to 1.165×10^5Pa and change in volume is 10% keeping the temperature constant. The bulk modulus of the medium is

(1) 204.8×10^5Pa

(2) 51.2×10^5 Pa

(3) 103.4×10^5 Pa

(4) 1.55×10^5 Pa

40. Which of the fact is not due to surface tension?

(1) dancing of a camphor piece over the surface of water

(2) small mercury drop itself becomes spherical

(3) a liquid surface comes at rest after stirring

(4) mercury does not wet the glass vessel

41. A small tiny lead shot is gently dropped on the surface of a viscous liquid

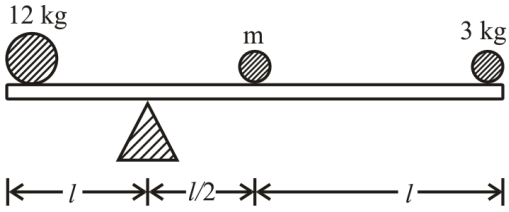
(1) the lead shot will fall with an acceleration equal to g at that place

(2) the velocity of the lead shot will decrease with time

(3) the velocity of the lead shot will increase continuously

(4) the velocity of the lead shot will reach a steady value after sometime

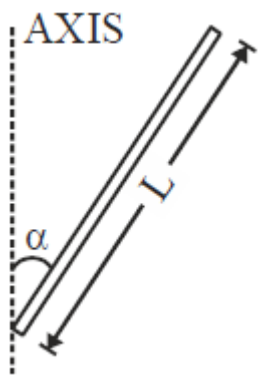
42. For equilibrium of the system, value of mass m should be :-



(1) 9 kg (2) 15 kg

(3) 21 kg (4) 1 kg

43. The moment of inertia of thin uniform rod of mass M and length L about the axis shown is _____.



(1) $\frac{ML^2}{2}\sin^2\alpha$

(2) $\frac{ML^2}{3}\sin^2\alpha$

(3) $\frac{ML^2}{3}\cos^2\alpha$

(4) $\frac{ML^2}{2}\cos^2\alpha$

44. **Statement-1:** Total kinetic energy of a rolling solid sphere is the sum of translational as well as rotational kinetic energies.

Statement-2: Total kinetic energy is always twice the translational kinetic energy, for all solid bodies.

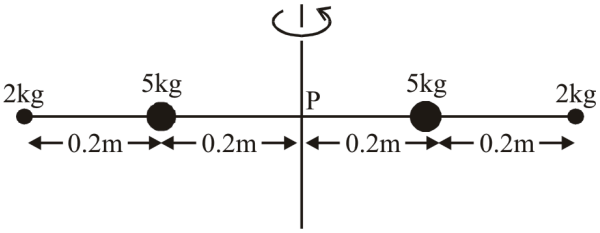
(1) Both statement 1 and statement 2 are true and the statement 2 is the correct explanation of the statement 1.

(2) Both statement 1 and statement 2 are true but statement 2 is not the correct explanation of the statement 1.

(3) The statement 1 and statement 2 both are false

(4) Statement 1 is true but statement 2 is false

45. Four masses are fixed on a massless rod as shown in figure. The moment of inertia about the axis P is about :



(1) 2 kg m^2

(2) 1 kg m^2

(3) 0.5 kg m^2

(4) 0.3 kg m^2

46. Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R),

Assertion (A) :

When a fire cracker (rocket) explodes in mid air, its fragments fly in such a way that they continue moving in the same path, which the fire cracker would have followed, had it not exploded

Reason (R) :

Explosion of cracker (rocket) occurs due to internal forces only and no external force acts for this explosion.

In the above statements, choose the most appropriate answer from the options given below :

(1) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**

(2) Both **(A)** and **(R)** are correct but **(R)** is not the correct explanation of **(A)**

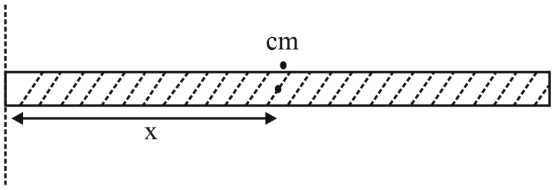
(3) **(A)** is correct but **(R)** is not correct

(4) **(A)** is not correct but **(R)** is correct

47. A stone tied at one end of a light string is whirled around a vertical circle. If the difference between the maximum and minimum tension experienced by the string is 120N, than the mass of the stone must be : (Take g = 10m/s^2)

(1) 1 kg (2) 1/2 kg (3) 2 kg (4) 4 kg

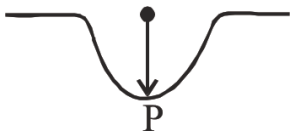
48. Centre of mass of non-uniform rod of length L whose linear mass density varies as $\lambda = \lambda_0 x^2$. (where x is the distance from one end) is _____.



(1) $x_{cm} = \frac{2L}{3}$ (2) $x_{cm} = \frac{L}{3}$

(3) $x_{cm} = \frac{3L}{4}$ (4) $x_{cm} = \frac{L}{4}$

49. A car travelling on a smooth road passes through a curved portion of the road in form of an arc of circle of radius 10 m. If the mass of car is 500 kg, the reaction on car at lowest point P where its speed is 20 m/s is



(1) 35 kN (2) 30 kN

(3) 25 kN (4) 20 kN

50. A particle of mass 'm' describes a circle of radius r. The centripetal acceleration of the particle is $\frac{2}{r^3}$. The momentum of the particle is:

(1) $\frac{\sqrt{2}m}{r}$ (2) $\frac{2m}{\sqrt{r}}$

(3) $\frac{4m}{r}$ (4) $\frac{4m}{\sqrt{r}}$

SECTION-A (CHEMISTRY)

51. How many moles of magnesium phosphate, $Mg_3(PO_4)_2$ will contain 0.25 mole of oxygen atoms ?

(1) 1.25×10^{-2}

(2) 2.5×10^{-2}

(3) 0.02

(4) 3.125×10^{-2}

52. 10 mL of 2(M) NaOH solution is added to 200 mL of 0.5(M) of NaOH solution. What is the final concentration ?

(1) 0.57(M) (2) 5.7(M)

(3) 11.4(M) (4) 1.14(M)

53. For which one of the following sets of four quantum numbers, an electron will have the highest energy ?

	n	*l*	*m*	*s*
(1)	3	2	1	1/2
(2)	4	2	−1	1/2
(3)	4	1	0	−1/2
(4)	5	0	0	−1/2

54. In an atom, an electron is moving with a speed of 600 m/s with an accuracy of 0.005%. Certainity with which the position of the electron can be located is (h = 6.6×10^{-34} kg m^2s^{-1}, mass of electron, $e_m = 9.1 \times 10^{-31}$kg)

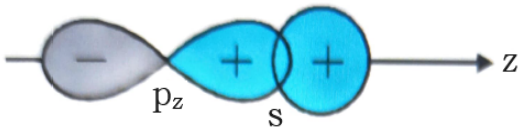
(1) 5.10×10^{-3}m

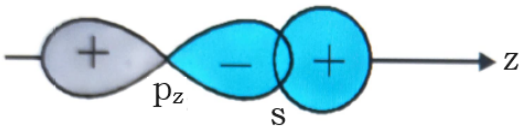
(2) $1.92 \times \times 10^{-3}$m

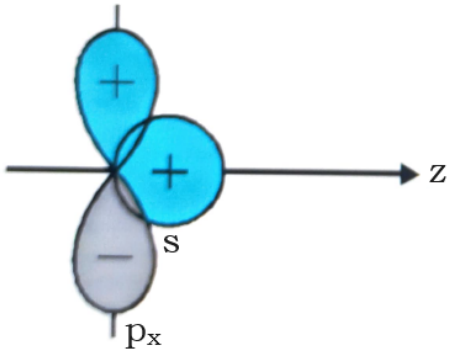
(3) 3.84×10^{-3}m

(4) 1.52×10^{-4}m

55. Which of the following represents zero overlap of atomic orbitals.

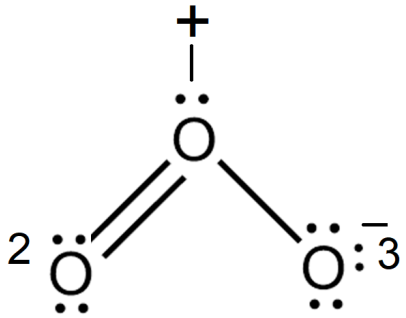
(1) 

(2) 

(3) 

(4) All of these

56. Assertion : The correct Lewis structure of O_3 may be drawn as



Reason : The formal charges on atom 1, 2 and 3 are +1, 0 and -1 respectively.

(1) Assertion is correct, reason is correct; reason is a correct explanation for assertion.

(2) Assertion is correct, reason is correct; reason is not a correct explanation for assertion.

(3) Assertion is correct, reason is incorrect.

(4) Assertion is incorrect, reason is correct.

57. Diborane is a potential rocket fuel which undergoes combustion according to the equation

$B_2H_6(g) + 3O_2(s) \rightarrow B_2O_3(s) + 3H_2O(g)$

Calculate the enthalpy change for the combustion of diborane. Given

(i) $2B(s) + \frac{3}{2}O_2(g) \rightarrow B_2O_3(s)$; $\Delta H = -1273$kJ per mol

(ii) $H_2(g) + \frac{1}{2}O_2(g) \rightarrow H_2O(l)$; $\Delta H = -286$kJ per mol

(iii) $H_2O(l) \rightarrow H_2O(g)$; $\Delta H = 44$kJ per mol

(iv) $2B(s) + 3H_2(g) \rightarrow B_2H_6(g)$; $\Delta H = 36$ kJ per mol

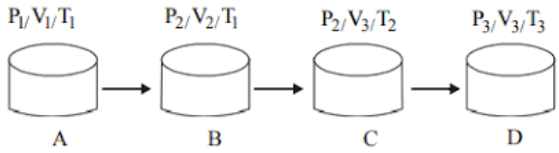
(1) +2035 kJ per mol

(2) −2035 kJ per mol

(3) +2167 kJ per mol

(4) −2167 kJ per mol

58. Processes A to B, B to C and C to D shown in the figure below respectively are ?



(1) Isothermal, isobaric and isochoric

(2) Isobaric, isothermal and isochoric

(3) Isothermal, Isothermal and isobaric

(4) Isobaric, isobaric and isothermal

59. An 1% solution of KCl(I), NaCl(II), $BaCl_2$ (III) and urea (IV) have their osmotic pressure at the same temperature in the ascending order (molar masses of NaCl, KCl, $BaCl_2$ and urea are respectively 58.5, 74.5, 208.4 and 60 g mole^{-1}). Assume 100% ionization of the electrolytes at this temperature

(1) I < III < II < IV (2) III < I < II < IV

(3) I < II < III < IV (4) III < IV < I < II

60. Ionisation constant of CH_3COOH is 1.7×10^{-5} if concentration of H^+ ions is 3.4×10^{-4}M, then find out initial concentration of CH_3COOH molecules.

(1) 3.4×10^{-4}M (2) 3.4×10^{-3}M

(3) 6.8×10^{-3}M (4) 6.8×10^{-4}M

61. At 25°C, the solubility product of $Mg(OH)_2$ is 1.0×10^{-11}. At which pH, will Mg^{2+} ions start precipitation in the form of $Mg(OH)_2$ from a solution of 0.001 M Mg^{2+} ions ?

(1) 9 (2) 10 (3) 11 (4) 8

62. You must have seen that when a soda water bottle is opened, some of the carbon dioxide gas dissolved in it fizzes out rapidly. There is equilibrium between the molecules in the gaseous state and the molecules dissolved in the liquid under pressure i.e.,

$$CO_2(gas) \rightleftharpoons CO_2(\text{in soution})$$

Which of the following statements is/are correct regarding this ?

(i) The phenomenon arises due to difference in solubility of carbon dioxide at different pressures.

(ii) This equilibrium is-governed by Henry's law.

(iii) The amount of CO_2 gas dissolved in liquid decreases with decrease of temperature.

(iv) The amount of CO_2 gas dissolved in liquid decreases with increase of temperature.

(1) (i), (ii) and (iv) are correct

(2) (i), (iii) and (iv) are correct

(3) (i), (ii) and (iii) are correct

(4) only (iii) is correct

63. In the disproportionation reaction $3HClO_3 \rightarrow HClO_4 + Cl_2 + 2O_2 + H_2O$, the equivalent mass of the oxidizing agent is (molar mass of $HClO_3$ = 84.45)

(1) 16.89 (2) 32.22

(3) 84.45 (4) 28.15

64. The standard reduction potentials for Cu^{2+}/Cu; Zn^{2+}/Zn; Li^{+}/Li; Ag^{+}/Ag and H^{+}/H_2 are +0.34 V, −0.762 V, −3.05 V, +0.80 V and 0.00 V respectively. Choose the strongest reducing agent among the following

(1) Zn (2) H_2

(3) Ag (4) Li

65. Cu^{+} (aq) is unstable in solution and undergoes simultaneous oxidation and reduction according to the reaction :

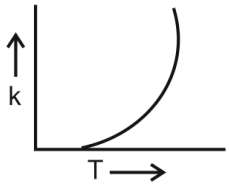
$$2Cu^{+}(aq) \rightleftharpoons Cu^{2+}(aq) + Cu(s)$$

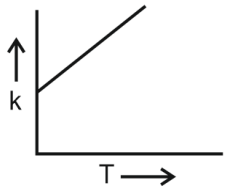
Choose correct E° for given reaction if E° Cu^{2+}/Cu = 0.34 V and E° Cu^{2+}/Cu^{+} = 0.15 V

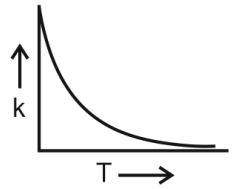
(1) −0.38 V (2) +0.49 V

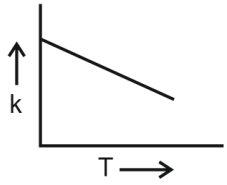
(3) +0.38 V (4) −0.19 V

66. Plots showing the variation of the rate constant (k) with temperature (T) are given below. The plot that follows Arrhenius equation is

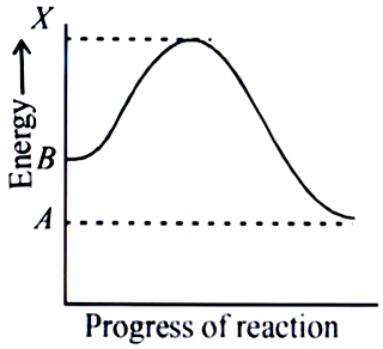
(1) 

(2) 

(3) 

(4) 

67. Consider the energy diagram of a reaction : B → A, on the basis of given diagram select the correct code for matching Column-I and Column-II.



	Column-I		Column-II
(A)	X – A	(p)	Enthalpy of reaction
(B)	X – B	(q)	Energy of transition state
(C)	A – B	(r)	Activation energy of forward reaction
(D)	X	(s)	Activation energy of backward reaction

(1) A – (s), B – (r), C – (q), D – (p)

(2) A – (q), B – (r), C – (p), D – (s)

(3) A – (r), B – (s), C – (p), D – (q)

(4) A – (s), B – (r), C – (p), D – (q)

68. The first (Δ_iH_1) and second (Δ_iH_2) ionization enthalpies (in kJ mol^{-1}) and the electron gain enthalpy ($\Delta_{eg}H$) (in kJ mol^{-1}) of the elements I, II, III, IV and V are given below

Element	Δ_iH_1	Δ_iH_2	$\Delta_{eg}H$
I	520	7300	−60
II	419	3051	−48
III	1681	3374	−328
IV	1008	1846	−295
V	2372	5251	+48

The most reactive metal and the least reactive non-metal of these are respectively

(1) I and V (2) V and II

(3) II and V (4) IV and V

69. **Assertion :** Atomic radius of gallium is higher than that of aluminium.

Reason : The presence of additional d-electron offer poor screening effect for the outer electrons from increased nuclear charge.

(1) Assertion is correct, reason is correct; reason is a correct explanation for assertion.

(2) Assertion is correct, reason is correct; reason is not a correct explanation for assertion.

(3) Assertion is correct, reason is incorrect.

(4) Assertion is incorrect, reason is correct.

70. Which of the following order is/are incorrect regarding the property indicated against it ?

(i) HF > HI > HBr > HCl : Thermal stability

(ii) Cl_2O_7 > Cl_2O_6 > ClO_2 > Cl_2O : Acidic character\

(iii) $SbCl_3$ > $SbCl_5$: Covalent character

(iv) MCl > MBr : Ionic character

(1) (iii) only (2) (ii) only

(3) (i) and (iii) (4) (ii) and (iv)

71. When $KMnO_4$ solution is added to oxalic acid solution, the decolourisation is slow in the beginning but becomes instantaneous after some time because

(1) CO_2 is formed as the product.

(2) reaction is exothermic.

(3) MnO_4^- catalyses the reaction.

(4) Mn^{2+} acts as autocatalyst.

72. Crystal field stabilization energy for high spin d^4 octahedral complex is :

(1) $-1.8\,\Delta_0$ (2) $-1.6\,\Delta_0 + P$

(3) $-1.2\,\Delta_0$ (4) $-0.6\,\Delta_0$

73. Match the columns.

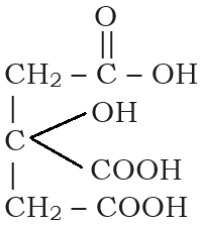
	Column-I		Column-I
(A)	Estimation of water hardness.	(p)	$[Ag(CN)_2]^-$
(B)	Extraction of silver.	(q)	$[Ni(CO)_4]$
(C)	Hydrogenation of alkenes.	(r)	Na_2EDTA
(D)	Photography	(s)	$[(Ph_3P)_3RhCl]$
(E)	Purification of Nickel.	(t)	$[Ag(S_2O_3)_2]^{3-}$

(1) A – (r), B – (p), C – (s), D – (t), E – (q)

(2) A – (p), B – (r), C – (s), D – (t), E – (q)

(3) A – (r), B – (s), C – (p), D – (t), E – (q)

(4) A – (r), B – (p), C – (s), D – (q), E – (t)

74. The IUPAC name of compound  is :

(1) 1, 2, 3 - tricarboxy - 2, 1 - propane

(2) 3 - carboxy - 3 hydroxy - 1, 5 - pentanedioic acid

(3) 3 - hydroxy - 3 - carboxy - 1, 5 - pentanedioic acid

(4) 2 - hydroxy propane - 1, 2, 3 - tricarboxylic acid

75. Match the columns

	Column-I		Column-II
(A)	Duma's method	(p)	$\frac{80 \times m_1 \times 100}{188 \times m}$
(B)	Kjeldahl's method	(q)	$\frac{31 \times m_1 \times 100}{1877 \times m}\%$
(C)	Carius method for bromine	(r)	$\frac{1.4 \times M \times 2\left(v - \frac{v_1}{2}\right)}{m}\%$
(D)	Percentage of phosphorus	(s)	$\frac{28 \times V \times 100}{22400 \times m}\%$

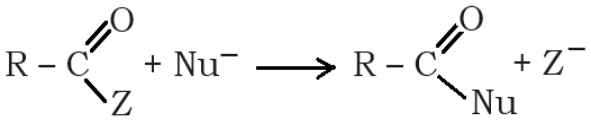
(1) A – (s), B – (r), C – (p), D – (q)

(2) A – (r), B – (s), C – (q), D – (p)

(3) A – (s), B – (p), C – (q), D – (r)

(4) A – (p), B – (r), C – (q), D – (s)

76. Rate of the reaction



is fastest when Z is

(1) OC_2H_5 (2) NH_2

(3) Cl (4) $OCOCH_3$

77. The compound $C_4H_{10}O$ can show

(1) metamerism

(2) functional isomerism

(3) position isomerism

(4) All of these

78. Which pair of isomerism is not possible together ?

(1) Ring-chain and functional

(2) Geometrical and optical

(3) Metamerism and functional

(4) Metamerism and chain

79. Match the columns

	Column-I		Column-II
(A)	$CH_4 + O_2 \xrightarrow{Cu/523K/100\ atm}$	(p)	HCHO
(B)	$CH_4 + O_2 \xrightarrow[\Delta]{Mo_2O_3}$	(q)	$(CH_3)_3COH$
(C)	$C_2H_6 + O_2 \xrightarrow[\Delta]{(CH_3COO)_2Mn}$	(r)	CH_3OH
(D)	$(CH_3)_3CH \xrightarrow[oxidation]{KMnO_4}$	(s)	CH_3COOH

(1) A – (s), B – (p), C – (r), D – (s)

(2) A – (q), B – (p), C – (s), D – (r)

(3) A – (r), B – (p), C – (s), D – (q)

(4) A – (p), B – (q), C – (r), D – (s)

80. If C_5H_{12} undergoes reaction with chlorine in the presence of sunlight, only one product is formed, than reactant is

(1) 3, 3-dimethylpropane

(2) 2, 3-dimethylpropane

(3) 1, 3-dimethylpropane

(4) 2, 2-dimethylpropane

81. The alcohol which does not give a stable compound on dehydration is

(1) ethyl alcohol (2) methyl alcohol

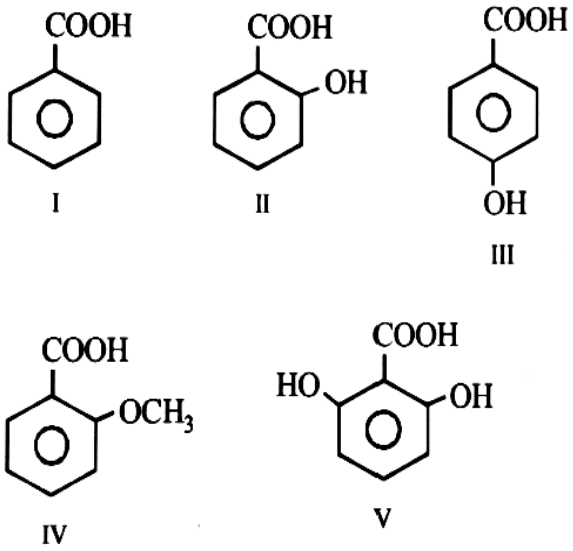
(3) n-Propyl alcohol (4) n-Butyl alcohol

82. A compound of the formula $C_4H_{10}O$ reacts with sodium and undergoes oxidation to give a carbonyl compound which does not reduce Tollen's reagent, the original compound is

(1) Diethyl ether (2) *n*-Butyl alcohol

(3) Isobutyl alcohol (4) *sec*-Butyl alcohol

83. The correct order for the acidic character of the following carboxylic acids is



(1) IV > I > II > III > V (2) V > II > III > I > IV

(3) V > II > IV > III > I (4) V > II > IV > I > III

84. The correct order of decreasing basic character is

$C_6H_5NH_2$, I $\qquad$ $C_6H_5CH_2NH_2$, II

$(C_6H_5)_2NH$, III $\qquad$ $C_6H_{11}NH_2$ IV

(1) II > I > III > IV (2) IV > II > I > III

(3) IV > III > II > I (4) IV > II > III > I

85. Match the columns

	Column-I		Column-II
(A)	Vitamin B6	(p)	Fat soluble
(B)	Vitamin K	(q)	Xerophthalmia
(C)	Vitamin D	(r)	Convulsions
(D)	Vitamin A	(s)	Delayed blood clotting

(1) A – (p, q), B – (p, s), C – (p), D – (r)

(2) A – (r), B – (p, s), C – (p), D – (p, q)

(3) A – (p, s), B – (r), C – (p), D – (p, q)

(4) A – (r), B – (p, s), C – (p, q), D – (p)

SECTION-B (CHEMISTRY)

86. A 600 W mercury lamp emits monochromatic rediation of wavelength 331.3 nm. How many photons are emitted from the lamp per second ? (h = 6.626 × 10^{-34} Js; velocity of light = 3 × 10^{8} ms^{-1})

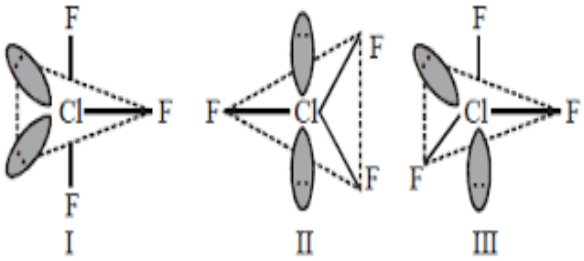
(1) 1×10^{19}

(2) 1×10^{20}

(3) 1×10^{21}

(4) 1×10^{23}

87. Which of the following structure is most stable ?



Choose the correct option.

(1) Only I

(2) Only II

(3) Only III

(4) All three have same stability

88. A piston filled with 0.04 mol of an ideal gas expands reversibly from 50.0 mL to 375 mL at a constant temperature of 37.0°C. As it does so, it absorbs 208 J of heat. The values of q and w for the process will be :
(R = 8.314 J/mol K) (ln 7.5 = 2.01)

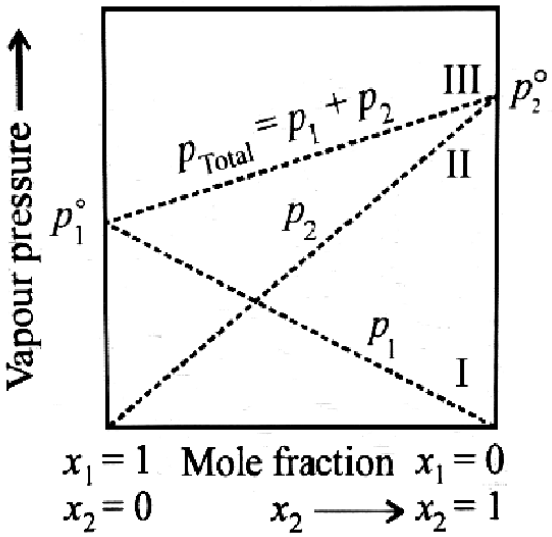
(1) q = + 208 J, w = – 208 J

(2) q = – 208 J, w = – 208 J

(3) q = – 208 J, w = + 208 J

(4) q = + 208 J, w = + 208 J

89. A plot of p_1 or p_2 vs the mole fractions x_1 and x_2 is given as.



In this figure, lines I and II pass through the point for which.

(1) $x_1 \neq 1$; $x_2 = 1$ (2) $x_1 = x_2 \neq 1$

(3) $x_1 = 1$; $x_2 \neq 1$ (4) $x_1 = x_2 = 1$

90. Match the columns

	Column-I		Column-II
(A)	The decomposition of gaseous ammonia on a hot platinum surface	(p)	Zero order reaction
(B)	The thermal decomposition of HI on gold surface	(q)	Pseudo first order reaction.
(C)	All natural and artificial radioactive decay of unstable nuclei	(r)	Zero order reaction at high pressure
(D)	Inversion of can sugar	(s)	First order reaction.

(1) A – (r), B – (p), C – (s), D – (q)

(2) A – (r), B – (s), C – (q), D – (p)

(3) A – (q), B – (s), C – (p), D – (r)

(4) A – (q), B – (p), C – (s), D – (p)

91. Observe the following periodic table :

H 1							He 2
Li 2, 1	Be 2, 2	B 2, 3	C 2, 4	Y 2, 5	O 2, 6	F 2, 7	Ne 2, 8
Na 2,8,1	Ag 2,8,2	Al 2,8,3	Z 2,8,4	P 2,8,5	S 2,8,6	Cl 2,8,7	Ar 2,8,8
K 2,8,8,1	X 2,8,8,2						

Arrange the following elements X, Y, Z in increasing order of their valencies :

(1) X > Z > Y (2) Y > Z > X

(3) Z > Y > X (4) X > Y > Z

92. Which of the following statements are correct ?

(i) Among halogens, radius ratio between iodine and fluorine is maximum.

(ii) Leaving F – F bond, all halogens have weaker X – X bond than X – X' bond in interhalogens.

(iii) Among interhalogen compounds maximum number of atoms are present in iodine fluoride.

(iv) Interhalogen compounds are more reactive than halogen compounds.

(1) (i) and (ii)

(2) (i), (ii) and (iii)

(3) (ii) and (iii)

(4) (i), (iii) and (iv)

93. Highest oxidation state of manganese in fluoride is +4 (MnF_4) but highest oxidation state in oxides is +7 (Mn_2O_7) because _____.

(1) fluorine is more electronegative than oxygen.

(2) fluorine does not possess *d*-orbitals.

(3) fluorine stabilises lower oxidation state.

(4) in covalent compounds fluorine can form single bond only while oxygen forms double bond.

94. What is the secondary valence of following compounds

$PtCl_2.2NH_3$, $CoCl_3.4NH_3$ and $NiCl_2.6H_2O$

if moles of AgCl precipitated per mole of the given compounds with excess $AgNO_3$ respectively are : 0, 1 and 2

(1) 6, 4, 4 (2) 4, 6, 6

(3) 4, 4, 6 (4) 2, 4, 6

95. Which of the following sequence of T and F is current for given statements. Here 'T' stands for True and 'F' stands for False statement.

(i) The relative adsorption of each component of mixture is expressed in terms of its retardation factor (R_F)

(ii) Retardation factor is given as :

$$R_F = \frac{\text{Distance moved by the solvent from base line}}{\text{Distance moved by the substance from base line}}$$

(iii) In TLC the spots of colourless compounds can be detected by ultraviolet light.

(iv) Spots of amino acids may be detected by iodine.

(1) TTTF (2) TFFF

(3) TTTT (4) TFTF

96. Which of the following statements are correct for fractional distillation ?

(i) Fractional distillation method is used if the two liquids have sufficiently large difference in their boiling points.

(ii) A fractionating column provides many surfaces for heat exchange between the ascending vapours and the descending condensed liquid.

(iii) Each successive condensation and vaporisation unit in the fractionating column is called a theoretical plate.

(iv) Fractional distillation method is used to separate different fractions of crude oil in petroleum industry.

(1) (i), (ii) and (iv) (2) (ii), (iii) and (iv)

(3) (i), (ii) and (iii) (4) (i), (ii), (iii) and (iv)

97. A hydrocarbon A on chlorination gives B which on heating with alcoholic potassium hydroxide changes into another hydrocarbon C. The latter decolourises Baeyer's reagent and on ozonolysis forms formaldehyde only. A is

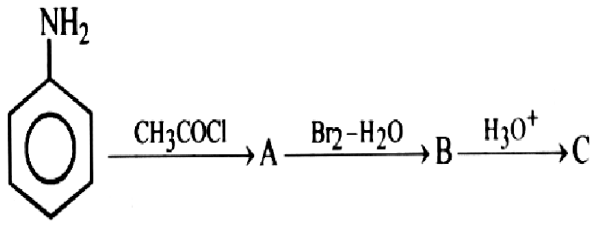
(1) Ethane

(2) Butane

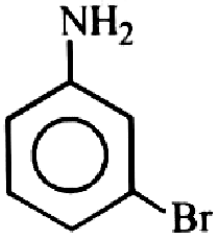
(3) Methane

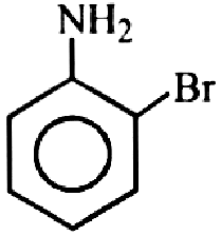
(4) Ethene

98.



C (major product) is –

(1)


(2)


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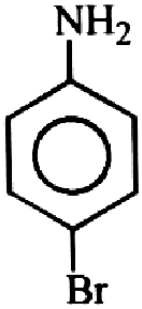
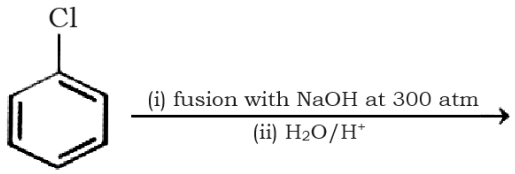
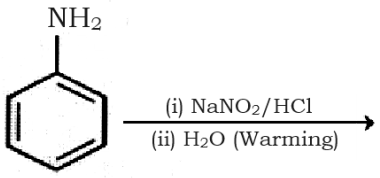
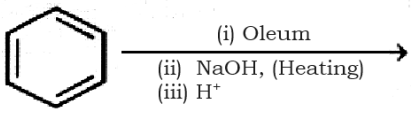


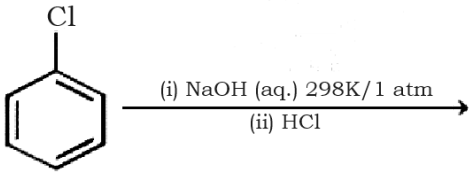
(4) None of these

99. Which of the following reactions will yield phenol ?

(i)


(ii)


(iii)


(iv)


(1) (i), (ii) and (iii) (2) (i) and (iii)

(3) (i), (iii) and (iv) (4) (ii), (iii) and (iv)

100. Addition of alcohols to aldehydes and ketones takes place in presence of dry HCl gas because it

(i) Protonates the oxygen of the carbonyl compounds

(ii) Increases the electrophilicity of the carbonyl carbon

(iii) Removes the excess moisture from the reaction

(iv) Helps the reaction to move in the forward direction

(1) (i), (ii) and (iv)

(2) (i), (ii), (iii) and (iv)

(3) (ii), (iii) and (iv)

(4) (i), (iii) and (iv)

SECTION-A (BOTANY)

101. Which cross yields red, white and pink flowers variety of dog flower:

(1) Rr X rr (2) Rr X Rr

(3) Rr X RR (4) rr X RR

102. Two white flowered sweet pea plant (Ccpp × ccPp) were crossed (assuming colour is controlled by complementary gene interaction). Find the probability of coloured to colourless flowered plants in their progeny.

(1) 9 : 7 (2) 1 : 4

(3) 1 : 3 (4) 1 : 15

103. What will be the phenotypic ratio of offspring of F_2 generation obtained by selfing of F_1 plants having AABbCC genotype?

(1) 3 : 1

(2) 1 : 1

(3) 9 : 3 : 3 : 1

(4) 27 : 9 : 9 : 9 : 3 : 3 : 3 : 1

104. German naturalist and geographer Alexander van Hum boldt is related with

(1) Term biodiversity

(2) Logistic growth of population

(3) Species area relationship

(4) Total global species diversity

105. Stratification is :-

(1) Identification and enumeration of plant and animal species of an ecosystem

(2) Species composition

(3) Vertical distribution of different species occupying different levels

(4) Active nature of all the components of the ecosystem as a unit

106. Choose the incorrect equation amongst following

(1) GPP - R = NPP (2) GPP = NPP + R

(3) $\frac{dN}{dt} = rN$ (4) NPP + R = PAR

107. Select the number of correct statement(s) from the following?

(a) DFC begins with dead organic matter

(b) GFC is major conduit for energy flow is Aquatic ecosystem

(c) Humus is highly resistant to microbial action

(1) Only a (2) Only b

(3) only c (4) All of the above

108. As we go higher from species to kingdom, the number of common characters are ?

(1) Decreases

(2) Increases

(3) Neither increases nor decreases

(4) Increases in the members of kingdom plantae

109. Consider the following four statements (a - d) and select the option which includes all the correct ones only ?

(a) In most algal genera, life cycle is haplontic

(b) Diplontic life cycle is found in spermatophytes

(c) In all Pteridophytes, prothallus is photosynthetic

(d) Protonema stage is found in the life cycle of moss

(1) Statements (a), (c), (d)

(2) Statements (b) and (c)

(3) Statements (a), (b) and (d)

(4) Only statement (d)

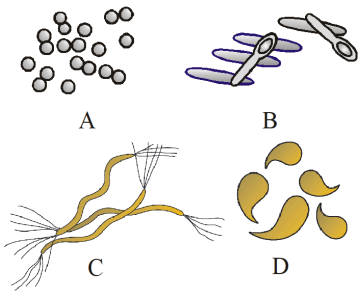
110. The algal and fungal component of a lichen are respectively called _____ and _____

(1) Phycobiont, Mycobiont

(2) Mycobiont, Phycobiont

(3) Mycobiont, Mycobiont

(4) Phycobiont, Phycobiont

111. 

Select option showing correct example for above figure from A to D :-

(1) A-Bacillus, B-Micrococci, C-Spirillum, D-Vibrio cholarae

(2) A-Micrococci, B-Bacillus, C-Spirillum, D-Vibrio cholarae

(3) A-Micrococci, B-Spirillum, C-Bacillus, D-Vibrio cholarae

(4) A-Micrococci, B-Vibrio cholarae, C-Bacillus, D-Spirillum

112. Which phase corresponds to interval between mitosis and initiation of DNA replication?

(1) G_1 - phase (2) G_2 - phase

(3) S-phase (4) M-phase

113. Which is not a plastid?

(1) Chloroplast (2) Mitoplast

(3) Chromoplast (4) Leucoplast

114. All of the following are multicellular fungi, except :-

(1) Yeast (2) *Penicillium*

(3) *Aspergillus* (4) *Puccinia*

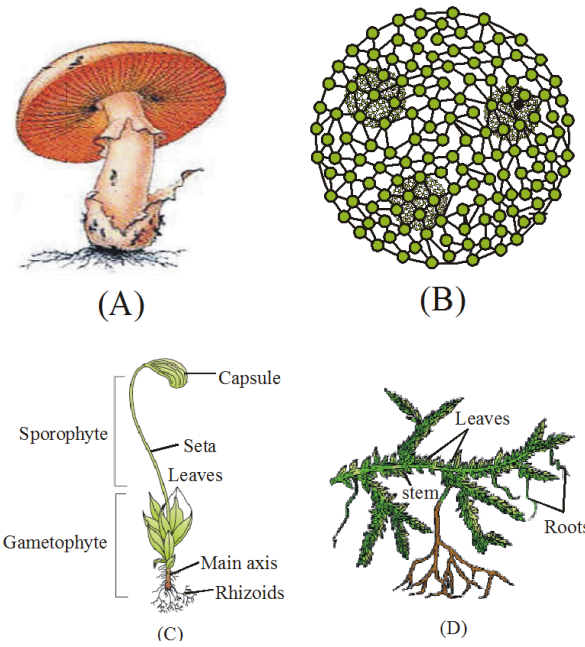
115. In Embden, Meyerhof and Parnas pathway respectively at how many steps ATP is synthesised, NAD+ is reduced and ATP is utilised ?

(1) Two, One and Two

(2) One, Two and One

(3) Five, Two and Two

(4) Three, One and Two

116. 

	A	B	C	D
(1)	Mucor	Laminaria	Sphagnum	Salvinia
(2)	Mucor	Volvox	Funaria	Sphagnum
(3)	Agaricus	Funaria	Volvax	Selaginella
(4)	Agaricus	Volvox	Funaria	Selaginella

117. A fern is different from moss in terms of having:-

(1) Independent gametophyte

(2) Vascular tissue

(3) Swimming antherozoids

(4) Presence of alternation of generation

118. You would expect a cell with an extensive golgi apparatus to :-

(1) make a lot of ATP

(2) secrete a lot of materials

(3) perform photosynthesis

(4) store large quantities of food

119. In addition to the 12 molecules of NADPH(H^+), the energy required for the synthesis of one mole of hexose by C_3 and C_4 pathway is

(1) 18&18 molecules of ATP respectively

(2) 30&30 molecules of ATP respectively

(3) 18&30 molecules of ATP respectively

(4) 30&18 molecules of ATP respectively

120. In E.T.S. of mitochondria cyt-c is part of

(1) Complex-I

(2) Complex-II

(3) Complex-III

(4) Is mobile carrier of electron

121. Find the incorrect match

(1) Tap root : Carrot

(2) Adventitious root : Sweet potato

(3) Prop root : Banyan tree

(4) Stilt root : Turnip

122. A cell has mitochondria, ribosomes, smooth and rough ER and other parts. Based on this information, it could not be

(1) a cell from a tree

(2) a yeast cell

(3) blue green Algae

(4) Algae

123. Which one of the following statements is wrong?

(1) Algae increase the level of dissolved oxygen in the immediate environment

(2) Algin is obtained from red algae, and carrageenan from brown algae

(3) Agar-agar is obtained from *Gelidium* and *Gracilaria*

(4) *Laminaria* and *Sargassum* are used as food

124. Which of the following is/are unit of classification?

(1) Kingdom (2) Species

(3) Genus (4) All of the above

125. The scientific name of mango is *Mangifera indica Linn.* In this name the last word "Linn" indicates.

(1) It is according to trinomial system so it is a third word

(2) It is according to trinomial system so it is a name of variety

(3) This species was first described by Linnaeus

(4) The name of this species was first changed by Linnaeus

126. Linnaeus classified plant kingdom on the basis of only two characters, that are stamen and carpel. His classification would be categorized as ?

(1) Practical classification

(2) Artificial classification

(3) Natural classification

(4) Phylogenetic classification

127. Which of the following suffix is used for order-

(1) - ales (2) - opsida

(3) - aceae (4) - phytina

128. CO_2 fixation occurs twice in different cells at the same time in -

(1) CAM plants (2) C_3 plants

(3) C_4 plants (4) C_2 cycle

129. The tiger census in our national parks and tiger reserves is often based on

(1) Pug marks (2) Fecal pellets

(3) Caught per trap (4) Both (1) and (2)

130. Which of following is surrounded by callose layer :-

(1) Synergid

(2) Microspore mother cell

(3) Male gamete

(4) Egg cell

131. In angiospermic life cycle which of the following is not a part of the sporophytic generation?

(1) Carpel (2) Pollen mother cell

(3) Microspore (4) Ovule

132. Given sequence when translated must form a polypeptide of how many amino acids ?
5'ACCGACGGUAUGCCC
UUGUUAUGCUAAUCGUAG3'

(1) 5 (2) 7 (3) 6 (4) 10

133. What should be base sequence of mRNA if coding strand of DNA has the sequence 5'ACTCGGTACAT3' ?

(1) 3'UGACCAUGUA5'

(2) 5'UGAGCCAUGUA3'

(3) 3'TGAGCCATGTA5'

(4) 5'ACUCGGUACAU3'

134. Which of the following dsDNA samples will have highest melting temperature ?

(1) 90% GC (2) 2% A

(3) 20% T (4) 20% A

135. Which enzyme/s will be produced in a cell in which there is a nonsense mutation in the lac Y gene ?

(1) Lactose permease and transacetylase

(2) β-galactosidase

(3) Lactose permease

(4) Transacetylase

SECTION-B (BOTANY)

136. What will be the no. of Barr bodies in human having two x-chromosomes and one y-chromosome?

(1) 1 (2) 0 (3) 2 (4) 3

137. If a sample of DNA is found to have the base composition of adenine-40%, thymine-22%, guanin-19% and cytoside-19%, what conclusion can be drawn :-

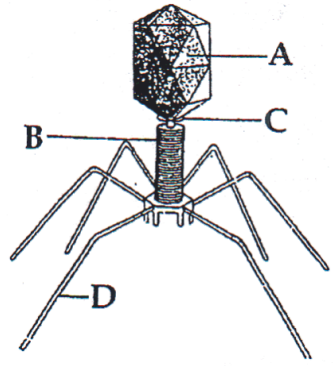
(1) The DNA is circular duplex

(2) The DNA is a linear duplex

(3) The DNA is single stranded

(4) The DNA has highly repetitive sequence

138. Given below is the diagram of a bacteriophage. In which one of the options all the four parts A, B, C and D are correct ?



	A	B	C	D
(1)	Sheath	Collar	Head	Tail fibers
(2)	Head	Sheath	Collar	Tail fibers
(3)	Collar	Tail fibers	Head	Sheath
(4)	Tail fibers	Head	Sheath	Collar

139. Active transport across biomembrane involves

(1) Production of ATP

(2) requirement of energy

(3) production of toxin

(4) release of energy

140. (i) It is a membrane bound space found in the cytoplasm.
(ii) It is bound by a single membrane called tonoplast.
(iii) It contains water, sap,excretory products and other materials not useful to the cell.
(iv) It has higher concentration of sap than the cytoplasm.
The above statements apply to

(1) Golgi apparatus

(2) Lysosomes

(3) Endoplasmic reticulum

(4) Vacuoles

141. Bovine spongiform encephalopathy is a disease caused by prions in :

(1) Cow (2) Sheep

(3) Potato (4) Man

142. Coconut and mango both are drupe. In coconut the edible part differs from mango as in the former it is :

(1) Mesocarp (2) Endosperm

(3) Epicarp (4) Endocarp

143. In trees, the death of protoplasm is essential for a vital function such as

(1) Food transport

(2) Water transport

(3) Both (1) & (2)

(4) Stomatal movements

144. During which of the following phases chromosomes those have reached their respective poles, decondense and lose their individuality ?

(1) Prophase

(2) Metaphase

(3) Anaphase

(4) Telophase

145. Which of the following is not taxonomic category for mango ?

(1) Sapindales

(2) Dicotyledonae

(3) Angiospermae

(4) Poaceae

146. In tissue culture low cytokinins to high auxin ratio cause :

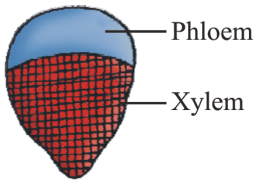
(1) Root differentiation

(2) Shoot differentiation

(3) Both (1) and (2)

(4) Seed formation

147.



Which of the following is **correct** for given diagramatic sketch ?

(1) found in stems of grasses

(2) presence of intra-fascicular cambium

(3) found in stems of sun-flower

(4) presence of secondary xylem and secondary phloem

148. Which one of the following events is incorrect for cell cycle ?

(1) Tubulin protein synthesis occurs in G_2-phase

(2) Maximum cell growth occurs in M-phase

(3) DNA synthesis occurs only during one specific stage

(4) Centriole duplication occurs in S-phase

149. Which one of the following statements is not true -

(1) All gametophytes are non vascular

(2) Gymnosperm is the last group, which has antheridia.

(3) Archegonia are absent in Angiosperm

(4) Gymnosperms cone are just like, flower of angiosperm

150. The terms 'Wood' and 'Bast' respectively refers to :-

(1) Xylem and cork

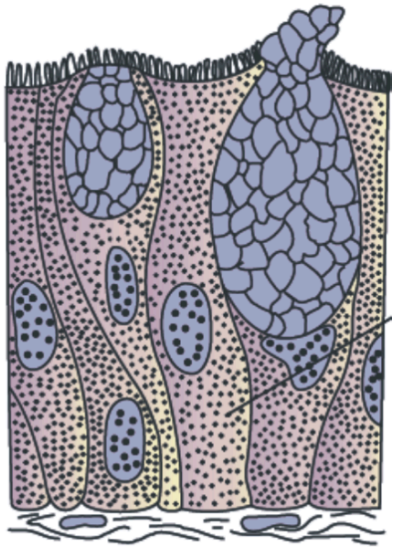
(2) Phloem and xylem

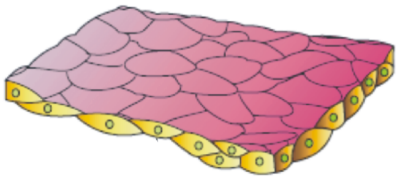
(3) Phloem and cork

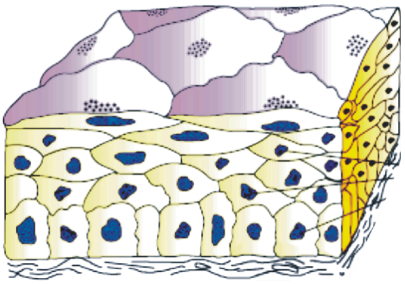
(4) Xylem and phloem

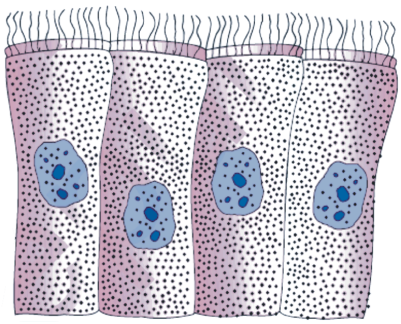
SECTION-A (ZOOLOGY)

151. Which of the following epithelium mainly has a protective function against chemical and mechanical stress?

(1) 

(2) 

(3) 

(4) 

152. Which of the following is mismatched with respect to Rana tigrina ?

(1) **Hepatic portal system :** Special venous connection between liver and intestine

(2) **Renal portal system :** Special venous connection between kidneys and lower parts of the body

(3) **RBCs :** Oval and nucleated

(4) **Lymph :** Has proteins and RBCs

153. **Assertion :** Body of cockroach is covered by hard and chitinous exoskeleton and each segment has hardened plates called sclerites.
Reason : Segments are joined to each other by a thin flexible articular membrane.

(1) Both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.

(2) Both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.

(3) Assertion is True but the Reason is False.

(4) Both Assertion & Reason are False.

154. How many of the following are oviparous and warm - blooded ? Pteropus, Macropus, Neophron, Ornithorhyncus, Echidna, Aptenodytes, Camelus, Macaca, Psittacula, Pavo

(1) Seven (2) Five (3) Four (4) Six

155. Choose the incorrect statement regarding connective tissue :-

(1) Connective tissues are most abundant and widely distributed in the body of complex animals.

(2) They are named connective tissues because of their special function of linking and supporting other tissues/organs of the body.

(3) They range from soft connective tissues to specialised types.

(4) Has protective function as it does in our skin.

156. In some animal groups, the body is found divided into compartments with at least some organs/organ repeated. This characteristic feature is named as

(1) Metastasis (2) Metamerism

(3) Metagenesis (4) Metamorphosis

157. Read the following statements and find out the incorrect statement.

(a) Adenohypophysis consists of two portions, pars distalis and pars intermedia. However, in humans the pars intermedia is almost merged with pars distalis

(b) The pars distalis is called anterior pituitary and pars intermedia called posterior pituitary

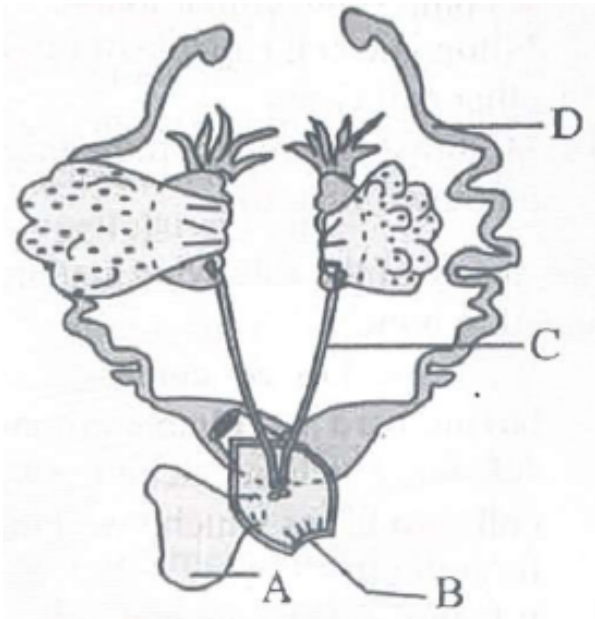
(c) Neurohypophysis is called as pars nervosa, it stores and releases two hormones called oxytocin and vasopressin (ADH)

(d) Pars distalis produces GH, PRL, TSH, ACTH, LH and FSH

(1) a and b (2) b only

(3) c and d (4) None of these

158. The figure below illustrates about the female reproductive system in Frog. Select the option in which labeled parts are correctly identified



(1) A- Cloacal aperture, B- Ova, C- Ureter,D- Urinary bladder

(2) A-Urinary bladder, B- Cloacal aperture, C- Ureter, D-Oviduct

(3) A- Urinary bladder, B- Kidney, C-Ureter, D-Oviduct

(4) A- Urinary bladder, B- cloacal aperture, C- Oviduct, D- Ureter

159. Find out the incorrect statement:

(1) The neural system provides a point-to-point rapid coordination among organs

(2) The neural coordination is fast but short lived

(3) The nerve fibres innervate all the cells of body

(4) The neural system and the endocrine system jointly coordinate and regulate the physiological functions in the body

160. Read the following carefully :

(A) Enzymes are denatured at high temperatures but in certain cases exceptional organisms they are effective even at temperatures 80–90°C.

(B) Enzymes are highly specific.

(C) Most enzymes are proteins but some are lipids.

(D) Enzymes require optimum pH for maximal activity.

How many statement is/are wrong ?

(1) Four

(2) Three

(3) Two

(4) One

161. In the given how many are the secretions of sebaceous glands ?
Sterols, Lactic acid, Hydrocarbons, Waxes, Urea

(1) 5 (2) 4

(3) 3 (4) 4

162. Match the following.

	Column-I		Column-II
A.	FSH	1.	Synthesise the milk in breast.
B.	MSH	2.	Regulate the pigmentation.
C.	ADH	3.	Transported axonally to neurohypophysis
D.	PRL	4.	Stimulate the development of ovarian follicle.

	A	B	C	D
(1)	1	2	3	4
(2)	4	2	3	1
(3)	4	1	2	3
(4)	4	3	2	1

163. Identify the incorrect differences between inspiration and expiration ?

		Inspiration	**Expiration**
(A)	EICM	contract	relax
(B)	Size of thoracic cavity	decreases	increases
(C)	Shape of diaphragm	dome shaped	Flat
(D)	Movement of air	atmosphere to lungs	lungs to atmosphere

(1) A, B (2) B, C

(3) B, D (4) C, D

164. **Statement A:** All the vertebrates are chordates but all the chordates are not vertebrates.

Statement B: All the vertebrates are characterised by the presence of a notochord during embryonic period.

(1) If both statements A and B are true and the statement B is the correct explanation of statement A.

(2) If both statements A and B are true but the statement B is not the correct explanation of statement A.

(3) If statement A is true but statement B is false.

(4) If both statement A and B are false statements.

165. Read the following statements

(i) In continuous culture system recombinant cells can maintain their physiologically most active log phase

(ii) Bioreactors are vessels in which raw materials are non-biologically converted in to specific products

(iii) Bioreactors provides optimum conditions for multiplication of cells and expression of gene of interest

(iv) Sparger of sparged stirred tank bioreactor helps in oxygen delivery.

Select the combination of correct statements.

(1) i and ii

(2) i and iii

(3) ii and iv

(4) i, iii and iv

166. Column I has some structures in cockroach and II has their numbers, select the option which correctly matches them

Column-I		Column-II	
(A)	Eggs in each ootheca	(a)	14 to16
(B)	ovarioles in an ovary	(b)	8
(C)	chitinous teeth in gizzard	(c)	6
(D)	Ommatidia in a compound eye	(d)	2000
(E)	Malpighian tubules	(e)	100-150
(F)	Ootheca	(f)	9-10

(1) A-a, B-b, C-c, D-d, E-e, F-f

(2) A-b, B-a, C-c, D-d, E-f, F-e

(3) A-a, B-c, C-b, D-e, E-d, F-f

(4) A-f, B-e, C-d, D-c, E-b, F-a

167. The cerebrum wrap around a structure called __A__ . Which is major coordinating centre for __B__ signaling. Another very important part of the brain called __C__ lies at the base of thalamus. Choose the **correct** option for A, B and C to complete the given statement :-

	A	B	C
(1)	Pons	Visual	Hypothalamus
(2)	Cerebellum	Smell	Epithalamus
(3)	Thalamus	Sensory & Motor	Hypothalamus
(4)	Pons	Sensory & Motor	Hypothalamus

168. Match the name of the animal in Column I with one characteristic in Column II and the phylum/class in column III to which it belongs.

	Column-I	Column-II	Column-III
(1)	Petromyzon	Ectoparasite	Cyclostomata
(2)	Ichthyophis	Terrestrial	Reptilia
(3)	Limulus	Body covered by chitinous exoskeleton	Pisces
(4)	Catla	Cycloid scales	Chondrichthyes

169. Which of the following is not an organised endocrine gland ?

(1) Pineal gland

(2) Heart

(3) Adrenal gland

(4) Pituitary gland

170. Tissues/organs $\xrightarrow{(a)}$ CNS $\xrightarrow{(b)}$ Concerned peripheral tissue/organs :

Which type of nerve fibres will transmit impulse in (a) & (b).

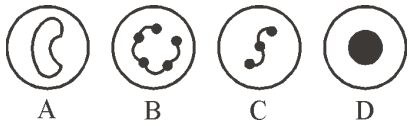
(1) (a) Efferent fibres (b) Afferent fibres

(2) (a) Afferent fibres (b) Efferent fibres

(3) (a) Afferent fibres (b) Afferent fibres

(4) (a) Efferent fibres (b) Efferent fibres

171. Given below is the diagrammatic sketch of a blood corpuscle identify them and select the correct option about them



	A	B	C	D
(1)	Lymphocyte 20-25% of TLC	Neutrophil 60-65% of TLC	Basophil 0.5-1% of TLC	Monocyte 6-8% of TLC
(2)	Monocyte 6-8% of TLC	Neutrophil 60-65% of TLC	Basophil 0.5-1% of TLC	Lymphocyte 20-25% of TLC
(3)	Basophil . 5-1% of TLC	Neutrophil (60-65% of TLC)	Lymphocyte 20-25% of TLC	Monocyte 6-8% of TLC
(4)	Basophil .5-1% of TLC	Lymphocyte 20-25% of TLC	Neutrophil (60-65% of TLC)	Monocyte 6-8% of TLC

172. Select the incorrect statement from the following:

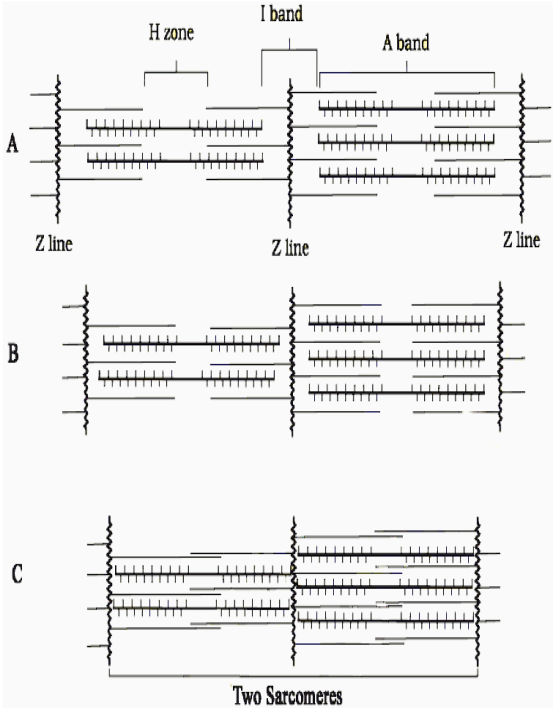
(1) The DCTs of many nephrons opens into a straight tube called collecting duct.

(2) In cortical nephrons (majority), the loop of Henle is too short and extended only very little in medulla.

(3) In juxta medullary nephrons (minority), the loop of Henle is very long and runs deeply into medulla.

(4) Vasa recta is not a part of peritubular network.

173.



The diagrams given above show 3 different condition of sarcomeres. Identify these conditions :

(1) A–contracting, B–relaxed, C–maximally contracted

(2) A–relaxed, B–contracting, C–maximally contracted

(3) A–maximally contracted, B–contracting, C–relaxed

(4) A–relaxed, B–maximally contracted, C–contracting

174. Choose the correct match from given table :-

	Column P	Column Q
(1)	Spices & Gums	Secondary metabolite
(2)	Lipid	Macromolecule
(3)	Protein	Micromolecule
(4)	Nucleic Acid	Micromolecule

175. **Assertion** : FSH acts on Sertoli cells and stimulates secretion of some factors which help in the process of spermiogenesis.
Reason : Human male ejaculates about 200-300 million sperms during coitus.

(1) Both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.

(2) Both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.

(3) Assertion is True but the Reason is False.

(4) Both Assertion & Reason are False.

176. In which of the following options the two examples are correctly matched with their particular type of immunity

	Example	Type of immunity
(1)	Polymorphonuclear leukocytes and monocytes	Cellular barriers
(2)	Anti-tetanus and anti-snake bite injections	Active immunity
(3)	Saliva in mouth &Tears in eyes	Physical barriers
(4)	Mucus coating of epithelium lining the urinogenital tract and the HCl in stomach	Physiological barriers

(1) 1 (2) 2 (3) 3 (4) 4

177. **Assertion** : Embryological support for evolution was also proposed by Ernst Heckle based upon the observation of certain features during embryonic stage common to all vertebrates that are absent in adult.
Reason : The embryos of all vertebrates including human develop a row of vestigial gill slit just behind the head but it is a functional organ only in fish and not found in any other adult vertebrates.

(1) Both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.

(2) Both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.

(3) Assertion is True but the Reason is False.

(4) Both Assertion & Reason are False.

178. **Assertion** : Baculoviruses are especially desirable to aid in IPM, or ecologically sensitive area in which beneficial insects are conserved.
Reason : They have no negative impact on plants, mammals, birds, fish or even on non-target insects, and can be used for species-specific, narrow spectrum insecticidal applications.

(1) A and R correct, R is correct explanation of A

(2) A and R correct, R is not correct explanation of A

(3) A is correct, R is incorrect

(4) Both A and R incorrect

179. Which of the following statements are correct ?

(A) An increase in body fluid volume can activate the osmoreceptor which stimulate hypothalamus.

(B) Aldosterone cause reabsorption of sodium and H_2O from distal part of tubules to prevent diuresis.

(C) ADH affect the kidney function by vasoconstriction.

(D) A fall in GFR, activate JG cells to release renin.

(E) Aldosterone is responsible for decrease in GFR.

Choose the correct answer from the options given below-

(1) B, C and D only (2) A, B and E only

(3) C, D and E only (4) A, B only

180. Two statements are given as Assertion (A) and Reason (R) -

Assertion (A) : Human ribs are bicephalic ribs.

Reason (R) : Human rib has two articulation surface on its ventral end.

Which of the following option is correct regarding given statements -

(1) Both A and R are true and R is correct explaination of A.

(2) Both A and R are true but R is not correct explaination of A .

(3) A is true but R is false.

(4) A is false but R is true.

181. Which of the following element is negligible in human body but present in large amounts in Earth's crust :-

(1) Magnesium (2) Sodium

(3) Silicon (4) Calcium

182. Given below are two statement : one is labelled as assertion (A) and the other is labelled as reason (R).

Assertion (A) : Wings of birds and wings of butterfly are an example of analogous organs.

Reason (R) : Wings of birds and wings of butterfly have different origin but same functions.

In the light of the above statement, choose the most appropriate answer from the options given below :

(1) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

(2) (A) is correct but (R) is not correct

(3) (A) is not correct but (R) is correct

(4) Both (A) and (R) are correct and (R) is the correct explanation of (A)

183. Which of the following are true for causes of cancer ?

(a) Ionising radiation - X-ray

(b) Non ionising radiation- Gamma rays, UV rays

(c) Oncogenic virus

(d) Tobacco smoke

(1) a and c (2) b and d

(3) a, c, d (4) a, b, c, d

184. How many statements are correct ?

(A) Systemic circulation takes place between left ventricle and right atrium of heart

(B) Adrenal medullary hormones can decrease the cardiac output

(C) Heart failure is not the same as cardiac arrest or heart attack

(D) The opening between the right atrium and the right ventricle is guarded by a valve, formed of two muscular flaps

(1) Two (2) One

(3) Four (4) Three

185. **Assertion :** O_2 has to be provided continously to cells.
Reason : O_2 is used to break down glucose to produce energy.

(1) Both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.

(2) Both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.

(3) Assertion is True but the Reason is False.

(4) Both Assertion & Reason are False.

SECTION-B (ZOOLOGY)

186. Select the incorrect statement about Miller's experiment :-

(1) He maintained a high temperature of 800°C

(2) Miller observed the formation of simple amino acid

(3) Miller took CH_4,H_2,NH_3 and water vapours in a large flask

(4) In similar experiments others observed, formation of Nucleic acid, Proteins, Hormones, etc.

187. **Assertion (A) :** Common cold is caused by *Rhino virus.*
Reason (R) : *Rhino virus* infects the nose and respiratory passage but not the lungs.

(1) Both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.

(2) Both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.

(3) Assertion is True but the Reason is False.

(4) Assertion is False but the Reason is True.

188. **Assertion :-** Mammals like whales, bats, cheetah and human. Share similarities in the pattern of bones of forelimbs.
Reason :- The first mammals were like shrews.

(1) Both Assertion & Reason are true but Reason is not a correct explanation of the Assertion.

(2) Assertion is True but the Reason is False.

(3) Assertion is False but the Reason is True.

(4) Both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.

189. How many hormones in addition to hCG, hPL, relaxin, are increased several fold in maternal blood, during pregnancy ? Oestrogen, Progesterone, FSH, LH, Oxytocin, Cortisol, PRL, Zona lysin, Androgen

(1) Four

(2) Five

(3) Six

(4) Three

190. **Assertion:** Natural methods work on the principle of avoiding chances of ovum & sperms meeting.
Reason: Condoms are barriers made of thin rubber/latex sheath.

(1) Both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.

(2) Both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.

(3) Assertion is True but the Reason is False.

(4) Both Assertion & Reason are False.

191. **Assertion (A):** Streptokinase is used as 'clot buster'.
Reason (R): It used for removing clots from the blood vessels of patients who have undergone kidney transplantation.

(1) Both (A) and (R) are true and reason is the correct explanation of the (A)

(2) Both (A) and (R) are true and reason is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

192. **Statement - I:** Restriction enzyme belong to a larger class of enzymes called as nucleases.
Statement - II: Each restriction endonuclease recognise a specific palindromic nucleotide sequence in the DNA.

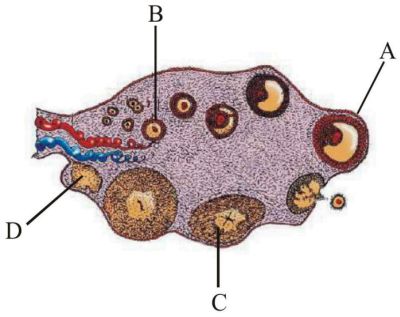
(1) Both Statement - I and Statement - II are incorrect

(2) Statement - I is correct but statement - II is incorrect

(3) Statement - I is incorrect but Statement - II is correct

(4) Both Statement - I and Statement - II are correct

193. The figure below shows development of follicles (A, B, C, D). Select the option giving correct identification together with its function?



(1) B-Secondary Follicle - secrete progesterone

(2) D-Corpus albicans - Secrete estrogen

(3) A-Tertiary follicle - Secrete FSH & LH

(4) C- Corpus luteum - Secrete progesterone

194. Choose the **incorrect** statement among the following.

(1) Different varieties of cheese are known by their characteristic texture, flavour and taste, the specificity coming from the microbes used.

(2) BOD is a measure of the inorganic matter present in the water.

(3) Toddy, a traditional drink of some parts of southern india.

(4) Adenovirus is diamond like in structure and causes respiratory infections.

195. Gene therapy is collection of methods that allows correction of gene defect. Which of the following is/are not a completely curative method for ADA deficiency?

(1) Bone marrow transplantation in adult

(2) Enzyme replacement therapy

(3) Introduction of ADA gene isolated from marrow cells into cells at early embryonic stage

(4) Both (1) and (2)

196. Only two statements are correct among the given five statements. Identify them:
(A) Fitness is the end result of ability to adapt and get selected by nature.
(B) Members of a population don't vary in characteristics.
(C) Mutation is a continuous source of variations.
(D) Evolution is a stochastic process based on chance events in nature.
(E) Evolution is a directed process in the sense of determinism.

(1) A, E (2) A, D

(3) C, D (4) D, E

197. **Assertion :** Amniocentesis for sex determination is one of the strategies of reproductive & child health care programme.

Reason : Ban on amniocentesis check increasing menace of female foeticide.

(1) Both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.

(2) Both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.

(3) Assertion is false but the Reason is True.

(4) Both Assertion & Reason are False.

198. How many of the following are not killed by Bt-toxin ?

Tobacco budworm, Armyworm, Beetles, Flies, Mosquitoes, Cat, Rat, Birds

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

199. Match the following columns :

	Column – I		**Column – II**
(A)	*Ichthyosaurus*	1	Caught in South Africa in 1938
(B)	Coelacanth	2	Fell to form coal deposits
(C)	Giant pteridophytes	3	Disappeared about 65 mya
(D)	Dinosaurs	4	Fish-like reptiles in 200 mya

Codes:

	A	**B**	**C**	**D**
1	3	2	1	4
2	4	1	2	3
3	2	3	4	1
4	3	4	2	1

200. **Assertion:** The first movements of foetus are observed during the third month of pregnancy.

Reason: By the end of first trimester, eyelids separate and eye-lashes are formed.

(1) Both assertion and reason are true and reason is the correct explanation of assertion.

(2) Both assertion and reason are true, but reason is not the correct explanation of assertion.

(3) Assertion is true, but reason is false.

(4) Both assertion and reason are false.

SPACE FOR ROUGH WORK