Aakash
Medical | IIT-JEE | Foundations

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Udyog Vihar, Gurugram, Haryana - 122015, ***Ph.***+91-1244168300

MM : 720 **Final Test Series(P1)_NEET2026_Test-05B** **Time : 180 Min.**

Topics Covered:
Physics: Electric Charges and Fields, Electrostatic Potential and Capacitance
Chemistry: Organic Chemistry-(Some Basic Principles and Techniques), Hydrocarbons
Botany: Photosynthesis in Higher Plants, Respiration in Plants
Zoology: Chemical Coordination and Integration, Human Reproduction

General Instructions :
Duration of Test is 3 hrs.
The Test consists of 180 questions. The maximum marks are 720.
There are four parts in the question paper consisting of Physics, Chemistry, Botany and Zoology having 45 questions in each part of equal weightage.
Each question carries +4 marks. For every wrong response, –1 mark shall be deducted from the total score. Unanswered/unattempted questions will be given no marks.
Use blue/black ballpoint pen only to darken the appropriate circle.
Mark should be dark and completely fill the circle.
Dark only one circle for each entry.
Dark the circle in the space provided only.
Rough work must not be done on the Answer sheet and do not use white fluid or any other rubbing material on the Answer sheet.
Some parts of this question paper have been masked to maintain its integrity. The missing information will be announced during/before the test.

PHYSICS

1. Two identical charged conducting spheres *A* and *B* have their centres separated by a certain distance. Charge on each sphere is *q* and the force of repulsion between them is *F*. A third identical uncharged conducting sphere is brought in contact with sphere *A* first and then with *B* and finally removed from both. New force of repulsion between spheres *A* and *B* (Radii of *A* and *B* are negligible compared to the distance of separation so that for calculating force between them they can be considered as point charges) is best given as:

(1) $\frac{3F}{8}$

(2) $\frac{3F}{5}$

(3) $\frac{2F}{3}$

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

2. Consider the following statements and choose the correct option
Statement I : In a charge-free region, electrostatic field lines can be taken to be continuous curves without any breaks.
Statement II : Electrostatic field lines do not form any closed loops.

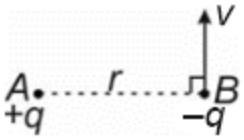
(1) Only statement I is correct

(2) Only statement II is correct

(3) Both statements I and II are correct

(4) Both statements I and II are incorrect

3. In the figure shown, *A* is a fixed charge particle. Another particle *B* of charge –*q* and mass mass *m* is given a velocity *v* perpendicular to line *AB*. At this moment the radius of curvature of the resultant path of particle *B* is (neglect the effect of gravitation)



(1) 0

(2) ∞ (infinity)

(3) $\frac{3r}{2}$

(4) $\frac{4\pi\in_0 r^2 mv^2}{q^2}$

4. For a given surface, the Gauss's law is stated as $\oint \vec{E} \cdot d\vec{A} = 0$, from this we can conclude that

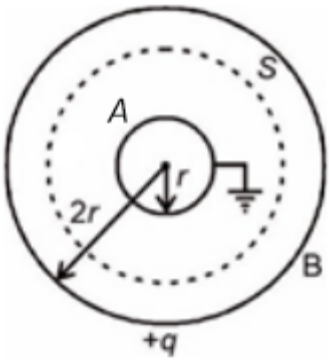
(1) *E* must be zero on the surface

(2) *E* is perpendicular to the closed surface at every point

(3) Total flux through the closed surface is zero

(4) The flux is coming out of the closed surface

5. Two conducting shells *A* and *B* are arranged as shown below. If charge on the shell *B* is *q* then electric flux linked with the spherical Gaussian surface *S* is



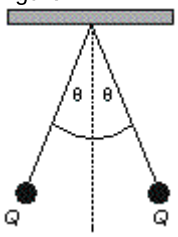
(1) $\frac{q}{\varepsilon_0}$

(2) $-\frac{q}{2\varepsilon_0}$

(3) $-\frac{q}{\varepsilon_0}$

(4) $\frac{q}{2\varepsilon_0}$

6. Two pith balls each of mass *m* are suspended from insulating threads. When the pith balls are given equal positive charge *Q*, they hang in equilibrium as shown in figure



Now the charge on the left pith ball is increased from *Q* to 2*Q* while leaving its mass essentially unchanged. Diagram best representing the new equilibrium configuration is (ϕ> θ)

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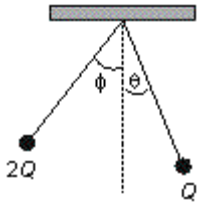

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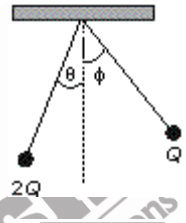

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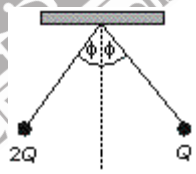

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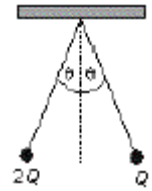
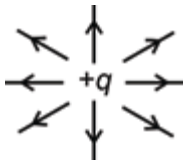
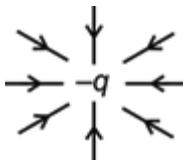
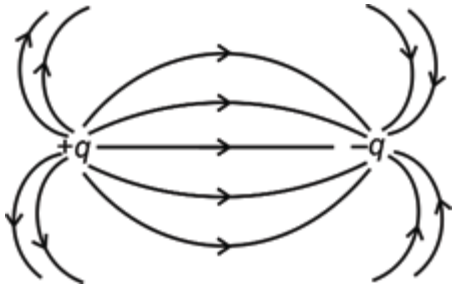
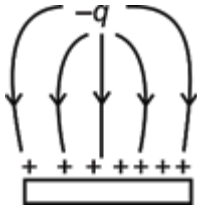


7. Among the following which of the electric field lines are not correctly drawn?

(1) 

(2) 

(3) 

(4) 

8. The insulation property of air breaks down at 3×10^6 V/m. The maximum charge that can be given to a sphere of diameter 5 m is nearly

(1) 2×10^{-2} C

(2) 2×10^{-3} C

(3) 2×10^{-4} C

(4) 2×10^{-5} C

9. The total electric flux through an area 5 m^2 lying in yz-plane due to electric field $\vec{E} = \left(10\hat{i} + 58\hat{j} + 10\hat{k}\right)$ N/C is

(1) 10 Nm^2/C

(2) 58 Nm^2/C

(3) 290 Nm^2/C

(4) 50 Nm^2/C

10. Let there be a spherically symmetric charge distribution with charge density varying as $\rho\left(r\right) = \rho_0\left[\frac{5}{4} - \frac{r}{R}\right]$ upto $r = R$ and $\rho(r) = 0$ for $r > R$, where r is the distance from origin. The electric field at a distance r ($r < R$) from the origin is given by.

(1) $\frac{4\pi\rho_0 r}{3\varepsilon_0}\left[\frac{5}{3} - \frac{r}{R}\right]$

(2) $\frac{\rho_0 r}{4\varepsilon_0}\left[\frac{5}{3} - \frac{r}{R}\right]$

(3) $\frac{4\rho_0 r}{3\varepsilon_0}\left[\frac{5}{3} - \frac{r}{R}\right]$

(4) $\frac{\rho_0 r}{3\varepsilon_0}\left[\frac{5}{3} - \frac{r}{R}\right]$

11. When an electric dipole is placed in uniform electric field making an angle 45° with electric field it experiences a torque τ. The amount of work required in changing the orientation to 90° with field is

(1) $\sqrt{2}\,\tau$

(2) $\left(\sqrt{2} - 1\right)\tau$

(3) τ

(4) $\frac{\tau}{\sqrt{2}}$

12. In the following question, a statement of Assertion (A) is followed by a Reason (R) .
Assertion (A): A finite size charged body may behave like a point charge if it produces an inverse square electric field.
Reason (R): Two charged bodies may be considered as point charges if their distance of separation is very large compared to their dimensions.

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

(2) Both Assertion & Reason are true and the reason is not the correct explanation of the assertion.

(3) Assertion is true statement but Reason is false.

(4) Both Assertion and Reason are false statement.

13. Sixty four identical drops of water having equal amount of charge combine to form a big drop. The factor by which potential of bigger drop change in comparison to a small drop is

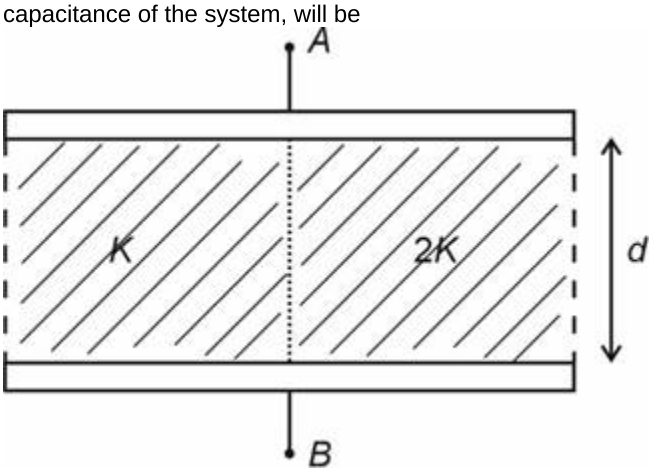
(1) 64

(2) 32

(3) 16

(4) 8

14. Two conducting plates of plate area *A* and separation '*d*' filled with dielectric medium as shown in figure. Given that dimension of both dielectric are same. Equivalent capacitance of the system, will be



(1) $\frac{K\varepsilon_0 A}{2d}$

(2) $\frac{3K\varepsilon_0 A}{2d}$

(3) $\frac{3K\varepsilon_0 A}{4d}$

(4) $\frac{3K\varepsilon_0 A}{d}$

15. Total charge on a conducting sphere of radius 10 cm is 1 μC. The maximum electric potential due to the sphere will be

(1) 50 kV

(2) 90 kV

(3) 70 kV

(4) 120 kV

16. The potential energy of system of two charges, 2 μC and –6 μC placed at a separation of 3 m is

(1) 36×10^{-3} J

(2) -36×10^{-3} J

(3) 18×10^{-3} J

(4) -18×10^{-3} J

17. Two large parallel plates are at potential –10 V and +30 V. If the separation between the plates be 2 cm, then electric field between them is

(1) $2000\ \frac{\text{V}}{\text{m}}$

(2) $1000\ \frac{\text{V}}{\text{m}}$

(3) $3000\ \frac{\text{V}}{\text{m}}$

(4) $500\ \frac{\text{V}}{\text{m}}$

18. If a unit charge is taken from one point to another over an equipotential surface, then in this process

(1) Work done on the charge is positive

(2) Work done on the charge is negative

(3) Work done on the charge may be positive or negative

(4) Work done on the charge is zero

19. **Statement A:** In case of conductors in electrostatics, the field in a cavity inside a conductor is zero.
Statement B: Earthed conductor means that its potential is zero, as potential of earth is assumed to be zero.
Statement C: Isolated conductor can neither gain nor lose charge but redistribution of charge may take place.

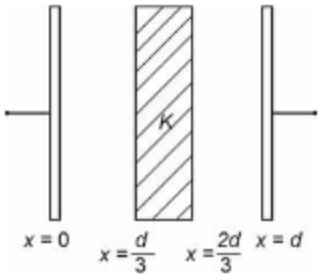
(1) Only statement B is correct

(2) Only statement A and statement C are correct

(3) Only statement B and statement C are correct

(4) All statements A, B and C are correct.

20. A charged capacitor with dielectric medium shown in figure. The correct variation of electric field vs distance (x) would be



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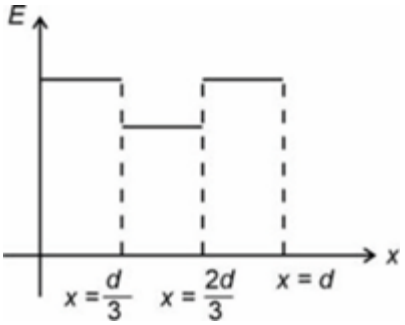

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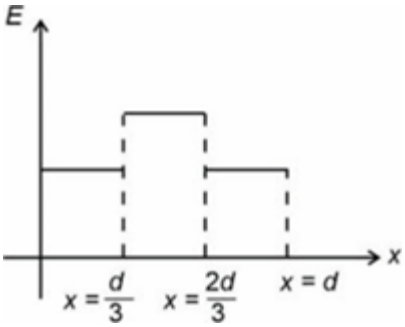

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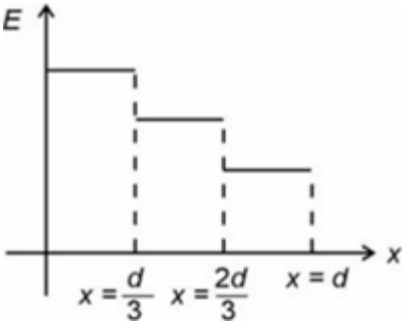

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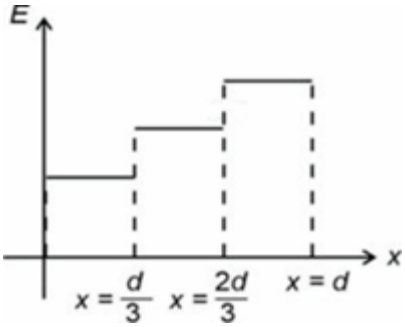


21. Charge stored on a capacitor of capacitance 5 μF when it is charged through battery of emf 5 V is

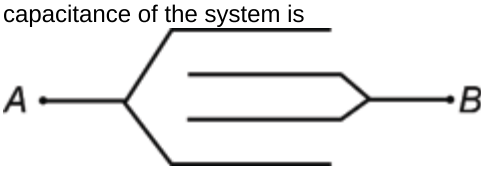
(1) 1 μC

(2) 25 μC

(3) 25 C

(4) 5 μC

22. Four metallic plates each having surface area A, are placed at a distance d from each other. The two outer plates are connected to one point A and the two other inner plates to another point B as shown in the figure. Then the equivalent capacitance of the system is



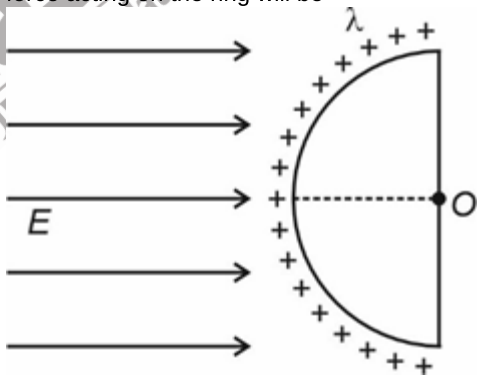
(1) $\frac{A\varepsilon_0}{d}$

(2) $\frac{2A\varepsilon_0}{d}$

(3) $\frac{3\varepsilon_0 A}{d}$

(4) $\frac{4\varepsilon_0 A}{d}$

23. A semicircular ring, of mass M and radius R, with linear charge density λ, is hinged at its centre O as shown in figure. Now an uniform electric field E is switched on. Net electric force acting on the ring will be



(1) $2R\lambda E$

(2) $\pi R\lambda E$

(3) λRE

(4) Zero

24. If the electric potential in a region is given as $V = 2x + 3y - 4z$; Then electric field in that region will be given by

(1) $-2\hat{i}+3\hat{j}+4\hat{k}$

(2) $-2\hat{i}-3\hat{j}+4\hat{k}$

(3) $2\hat{i}-3\hat{j}+4\hat{k}$

(4) $2\hat{i}+3\hat{j}-4\hat{k}$

25. Four equal point charges +Q each are placed at the corners of a square of side 'a'. What should be charge that should be placed at centre of square so that whole system remain in equilibrium.

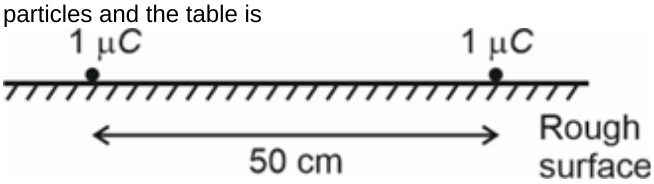
(1) $-\left(\frac{1+2\sqrt{2}}{4}\right)Q$

(2) $\left(\frac{1+2\sqrt{2}}{4}\right)Q$

(3) $-\frac{(2\sqrt{2}-1)}{4}Q$

(4) $\frac{(2\sqrt{2}-1)}{4}Q$

26. Two particles each of mass 10 g and having charge 1μC are in equilibrium on a horizontal rough table at a distance 50 cm. The minimum value of coefficient of friction between particles and the table is



(1) $\frac{3}{25}$

(2) $\frac{4}{25}$

(3) $\frac{6}{25}$

(4) $\frac{9}{25}$

27. A uniform electric field pointing in positive x-direction exists in a region. Let A be the origin, B be the point on the x-axis at x = +2 cm and C be the point on the y-axis at y = +2 cm, then electric potential at the points A, B and C are related as

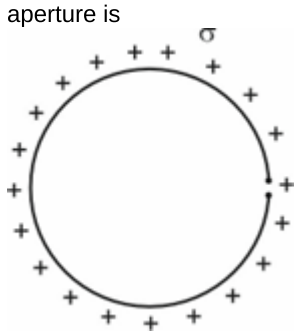
(1) $V_A < V_B$

(2) $V_A < V_C$

(3) $V_A > V_B$

(4) $V_A > V_C$

28. A spherical shell is uniformly charged and it has surface charge density σ. Now a very small portion is removed from the shell then electric field intensity at the mid point of aperture is



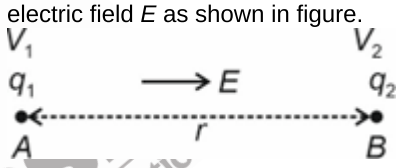
(1) $\frac{\sigma}{\varepsilon_0}$

(2) $\frac{\sigma}{2\varepsilon_0}$

(3) $\frac{\sigma}{3\varepsilon_0}$

(4) $\frac{3}{4}\frac{\sigma}{\varepsilon_0}$

29. Two point charge q_1 and q_2 are placed at points A and B in a region where electric potentials are V_1 and V_2 due to an electric field E as shown in figure.



If separation between points A and B is r then total electric potential energy of the system will be
(Take PE at ∞ is zero)

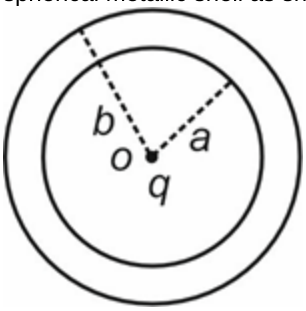
(1) $\frac{1}{4\pi\varepsilon_0}\frac{q_1q_2}{r}$

(2) $q_1V_1 + q_2V_2$

(3) $\frac{1}{4\pi\varepsilon_0}\frac{q_1q_2}{r} + q_1V_1 + q_2V_2$

(4) $\frac{1}{4\pi\varepsilon_0}\frac{q_1q_2}{r} + q_1\left(V_1 - V_2\right)$

30. A point charge *q* is located at the centre of an uncharged spherical metallic shell as shown in figure.



Inner and outer radii of the shell are *a* and *b* respectively. Amount of work done in shifting charge *q* slowly from centre *O* to ∞ will be

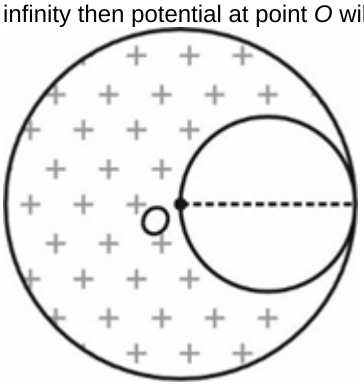
(1) $\frac{q^2}{8\pi\varepsilon_0}\left[\frac{1}{a}-\frac{1}{b}\right]$

(2) $\frac{q^2}{8\pi\varepsilon_0}\left[\frac{2}{a}-\frac{3}{b}\right]$

(3) $\frac{q^2}{8\pi\varepsilon_0}\left[\frac{1}{a}-\frac{3}{b}\right]$

(4) $\frac{q^2}{8\pi\varepsilon_0}\left[\frac{1}{a}+\frac{1}{b}\right]$

31. A solid sphere having uniform charge density ρ and radius *R* is shown in figure. From this sphere a spherical cavity of radius $\frac{R}{2}$ is hollowed out. If potential taken to be zero at infinity then potential at point *O* will be



(1) $\frac{3}{2}\frac{R^2\rho}{\varepsilon_0}$

(2) $\frac{5}{12}\frac{R^2\rho}{\varepsilon_0}$

(3) $\frac{7\rho R^2}{12\varepsilon_0}$

(4) $\frac{11R^2\rho}{24\varepsilon_0}$

32. An equipotential surface is in the form of a plane and cuts cuts *x*-*y* plane in line 3*y* = 4*x*. Direction of electric field vector at a point (3*k*, 4*k*) may be along

(1) $3\hat{i}+4\hat{j}$

(2) $-4\hat{i}+3\hat{j}+5\hat{k}$

(3) $4\hat{i}+3\hat{j}+4\hat{k}$

(4) $3\hat{i}-6\hat{j}+16\hat{k}$

33. A metal sphere *A* of radius *a* is charged to potential *V*. If it is enclosed by an uncharged spherical conducting shell *B* of radius *b* and the two are connected by a wire then its potential will become

(1) $\frac{b}{a}V$

(2) $\frac{a}{b}V$

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

(4) $\frac{b^2}{a}V$

34. A circular ring of radius 5 cm has uniformly distributed charge 10 C. What will be electric flux through a sphere of radius 5 cm having its centre on the periphery of the ring?

(1) Zero

(2) $\frac{5}{2\varepsilon_0}$

(3) $\frac{10}{\varepsilon_0}$

(4) $\frac{10}{3\varepsilon_0}$

35. If n similar small charged drops of mercury each having electrostatic potential energy *E* coalesce to form a big drop. Then energy of big drop will be

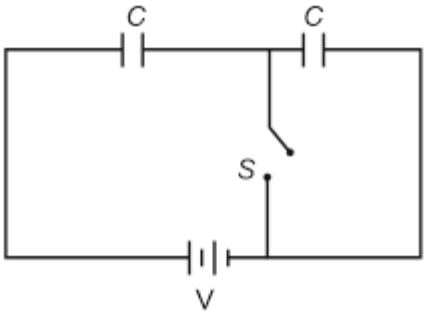
(1) *nE*

(2) $n^{2/3}E$

(3) $n^{5/3}E$

(4) $n^{3/5}E$

36. In the circuit shown below, switch is open for long time and then closed. Let *q* represents charge flown through the battery and *H* represents heat produced in the system after closing the switch then, choose the correct option



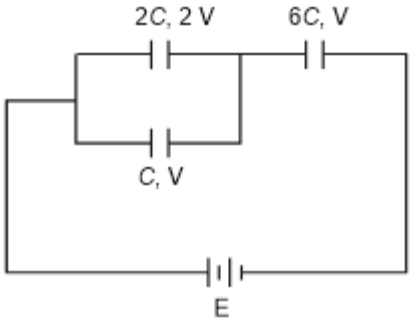
(1) q = CV

(2) $q = \frac{CV}{2}$

(3) $H = \frac{CV^2}{4}$

(4) Both (2) and (3) are correct

37. Diagram shows three capacitors with capacitance and breakdown voltage mentioned



What should be maximum value of external EmF (*E*) of source so that no capacitors breaks down?

(1) V

(2) 2 V

(3) 1.5 V

(4) 4 V

38. Consider the following statements and identify the correct statements.

A. Effective capacitance of a series combination of capacitors is always smaller than the smallest capacitance of the capacitor in the combination.

B. When a dielectric medium is placed between the charged plates of a capacitor, displacement of charges on the plates cannnot occur due to insulation property of dielectric.

C. Increasing of area of capacitor plate or decreasing of thickness of dielectric is an alternate method to increase the capacitance.

D. For a point charge, concentric spherical shells centered at the location of the charge are equipotential surfaces.

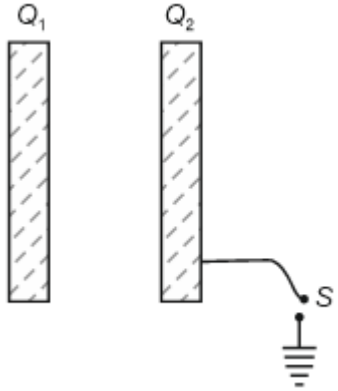
(1) A, C and D only

(2) A, B and C only

(3) B and D only

(4) C and D only

39. Charges $+Q_1$ and $+Q_2$ are given to two plates of a parallel plate capacitor separately, and placed close to each other. (C-capacitance of capacitor) as shown in figure



When switch *S* is closed mark out correct option.

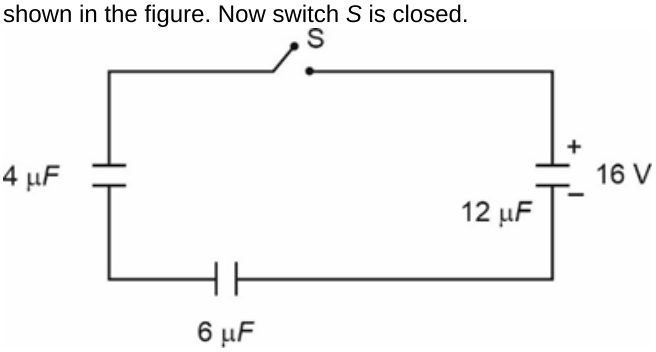
(1) The charge flown through switch is $Q_1 + Q_2$

(2) Potential difference across the capacitor plates is $\frac{Q_1}{C}$

(3) Charge on the capacitor is Q_1

(4) All of the above are correct

40. A 12 μF capacitor is charged with a 16 V battery. After charging it is connected with two uncharged capacitors having capacitance 4 μF and 6 μF in series combination as shown in the figure. Now switch *S* is closed.



Match the column on the basis of information given above.

	Column I		Column II
A.	Final charge on 6 μF capacitor (in μC)	P.	160
B.	Final charge on 12 μF capacitor in (μC)	Q.	32
C.	Final potential difference across 4 μF capacitor (in volt)	R.	$\frac{40}{3}$
D.	Final potential difference across 12 μF capacitor (in volt)	S.	8

(1) A(R); B(P); C(S); D(R)

(2) A(Q); B(R); C(P); D(S)

(3) A(Q); B(P); C(S); D(R)

(4) A(P); B(S); C(R); D(S)

41. Read the following statements carefully

Statement A: When charges are shared between any two bodies, no charge really lost, but some loss of energy does occur.

Statement B: Any where inside bulk material of a polarised dielectric, a small volume element has no net charge.

Choose the correct option from the following.

(1) Both statements A and B are correct

(2) Statement A is correct but B is incorrect

(3) Statement A is incorrect but statement B is correct

(4) Both statements A and B are incorrect

42. A dipole with charges 1 μC magnitude each, at separation 2 μm, is placed between the plates of a parallel plate capacitor such that its axis is parallel to the electric field established between the plates. Separation between the plates of the capacitor is 1 cm and a potential difference of 10 V is applied across it. If dipole is rotated by 30° from its axis, then value of restoring torque acting on it is

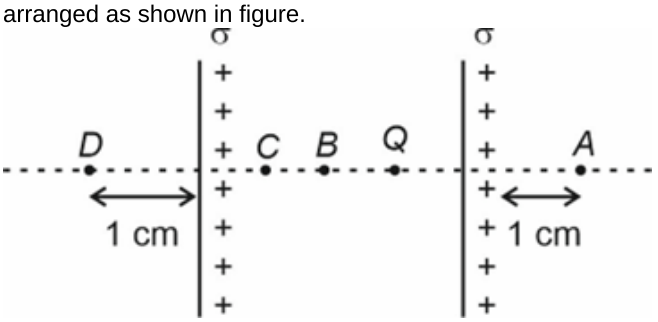
(1) 5×10^{-9} N m

(2) 2×10^{-9} N m

(3) 5×10^{-3} N m

(4) 1×10^{-9} N m

43. Two infinite identical charged plane non conducting sheets and a point charge *Q* between the charged sheets are arranged as shown in figure.



Then correct relation between electric fields at *A, B, C* and *D* points is

(1) $\vec{E}_B = \vec{E}_C;\ \vec{E}_B = \vec{E}_A$

(2) $\left|\vec{E}_B\right| > \left|\vec{E}_C\right|;\ \vec{E}_D = \vec{E}_A$

(3) $\vec{E}_D \neq \vec{E}_A;\ \left|\vec{E}_B\right| > \left|\vec{E}_C\right|$

(4) $\left|\vec{E}_B\right| = \left|\vec{E}_C\right|;\ \left|\vec{E}_D\right| > \left|\vec{E}_A\right|$

44. The electric field $\vec{E}$ in a region is given as $\vec{E} = \frac{\pi a\left(x\hat{i}+y\hat{j}+z\hat{k}\right)}{\left(x^2+y^2+z^2\right)^{3/2}}$; then electric flux through the imaginary spherical surface of radius *r*, which is centred at the origin will be

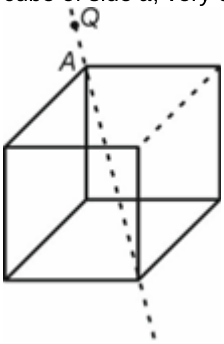
(1) $4\pi^2\varepsilon_0$

(2) $4\pi^2 a$

(3) $16\pi^2 a$

(4) $16\pi^2 a\varepsilon_0$

45. A point charge *Q* is placed at extension of body diagonal of a cube of side *a*, very close to the vertex as shown in figure.



The magnitude of sum of electric flux through the faces of the cube which met at the vertex *A* is

(1) $\frac{Q}{8\varepsilon_0}$

(2) $\frac{Q}{24\varepsilon_0}$

(3) Zero

(4) $\frac{Q}{12\varepsilon_0}$

CHEMISTRY

46. In Carius method of estimation of halogen, 0.1 g of an organic compound gave 0.08 g of AgBr. Find out the percentage of bromine in the compound. (Molar mass of AgBr = 188 g mol^{-1})

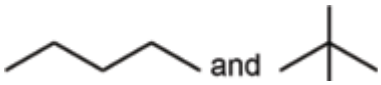
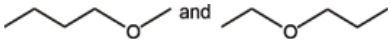
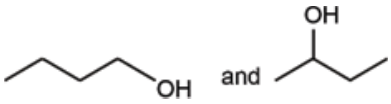
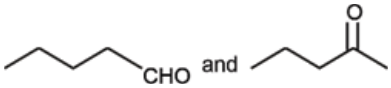
(1) 47.30%

(2) 22.02%

(3) 34.04%

(4) 25.06%

47. Match **List -I** with **List -II**

List -I (Compounds)		**List-II (Isomers)**
(a) 		(i) Position isomers
(b) 		(ii) Functional group isomers
(c) 		(iii) Chain isomers
(d) 		(iv) Metamers

Choose the correct answer from the options given below.

(1) (a)(iv), (b)(iii), (c)(i), (d)(ii)

(2) (a)(i), (b)(iv), (c)(ii), (d)(iii)

(3) (a)(iii), (b)(iv), (c)(ii), (d)(i)

(4) (a)(iii), (b)(iv), (c)(i), (d)(ii)

48. Match List-I with List-II.

List-I (Species)	**List-II (Characteristic)**
a. Tropone	(i) Heterocyclic non-aromatic
b. Tetrahydrofuran	(ii) Heterocyclic aromatic
c. Thiophene	(iii) Benzenoid aromatic
d. Anthracene	(iv) Non-benzenoid aromatic

Choose the **correct** match.

(1) a-(i), b-(ii), c-(iii), d-(iv)

(2) a-(iv), b-(iii), c-(ii), d-(i)

(3) a-(ii), b-(i), c-(iii), d-(iv)

(4) a-(iv), b-(i), c-(ii), d-(iii)

49. Which of the following elements can be detected by "Lassaigne's test"?
(a) Nitrogen
(b) Chlorine
(c) Phosphorus
(d) Sulphur
(e) Boron

(1) (b), (c) and (e) only

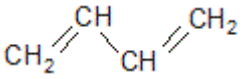
(2) (a), (b), (c) and (d) only

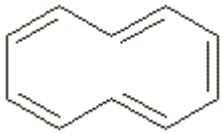
(3) (a), (b) and (d) only

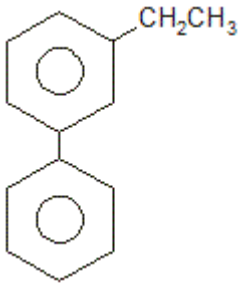
(4) (d) and (e) only

50. In which of the following molecules, all the atoms are in same plane?

(1) $CH_2 = C = CH_2$

(2) 

(3) 

(4) 

51. A sample of 0.2 g of an organic compound was treated according to Kjeldahl's method. The ammonia evolved was absorbed in 20 mL of 0.1 M H_2SO_4. The residual acid required 10 mL of 0.1 M NaOH solution for neutralisation. The percentage of nitrogen in the compound is

(1) 21%

(2) 7%

(3) 28%

(4) 42%

52. Given below are the two statements

Statement-I: Paper chromatography is a type of adsorption chromatography.

Statement-II: Adsorption chromatography is based on the fact that different compounds are adsorbed on an adsorbent to different degrees.

In light of above statements, choose the correct answer

(1) Statement I is correct but statement II is incorrect

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

(3) Both statement I and statement II are correct

(4) Both statement I and statement II are incorrect

53. The hybridisation and shape of $\overset{+}{C}H_3$ are respectively

(1) sp^3, tetrahedral

(2) sp^3, pyramidal

(3) sp^2, trigonal planar

(4) sp^2, bent shape

54. Most stable free radical among the following is

(1) $Ph\dot{C}H_2$

(2) $CH_3\,\dot{C}H\,CH_3$

(3) $CH_2 = CH - \dot{C}H_2$

(4) $\dot{C}H_3$

55. Sec-Butyl and neopentyl groups respectively are

(1) $CH_3-CH_2-\underset{CH_3}{\overset{}{CH}}-$ and $CH_3-\underset{}{\overset{CH_3}{CH}}-CH_2-CH_2-$

(2) $CH_3-CH_2-\underset{CH_3}{\overset{}{CH}}-$ and $CH_3-\underset{CH_3}{\overset{CH_3}{C}}-CH_2-$

(3) $CH_3-\underset{CH_3}{\overset{}{CH}}-CH_2-$ and $CH_3-CH_2-\underset{CH_3}{\overset{}{CH}}-CH_2-$

(4) $CH_3-\underset{CH_3}{\overset{}{CH}}-CH_2-$ and $CH_3-\underset{CH_3}{\overset{CH_3}{C}}-CH_2-$

56. Match list I with list II.

	List I (Mixture)		List II (Separation Technique)
a.	Aniline from aniline-water mixture	(i)	Fractional distillation
b.	Glycerol from spent-lye	(ii)	Distillation
c.	Chloroform and Aniline	(iii)	Distillation under reduced pressure
d.	Different fractions of crude oil	(iv)	Steam distillation

Choose the most appropriate match from the options given below:

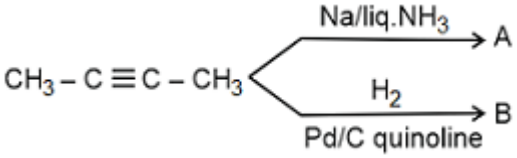
(1) a–(iv), b–(iii), c–(i), d–(ii)

(2) a –(iv), b–(iii), c–(ii), d–(i)

(3) a –(iii), b–(iv), c–(i), d–(ii)

(4) a –(iii), b–(i), c–(ii), d–(iv)

57.



Products A and B respectively are

(1) trans-2-Butene and cis-2-Butene

(2) cis-2-Butene and trans-2-Butene

(3) Both cis-2-Butene

(4) Both trans-2-Butene

58. Number of dichloroderivatives that can be obtained from n-butane (excluding stereoisomerism) is

(1) 3

(2) 4

(3) 5

(4) 6

59. Given below are two statements :
Statement I: Alkynes are relatively less reactive than alkenes towards electrophilic addition.
Statement II: Treating calcium carbide with water gives ethyne.
In the light of the above statements, choose the most appropriate answer from the options given below:

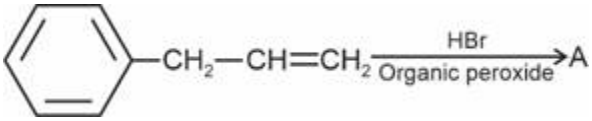
(1) Both statement (I) and statement (II) are correct

(2) Both statement (I) and statement (II) are incorrect

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

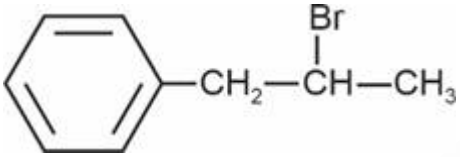
(4) Statement (I) is incorrect but statement (II) is correct

60.

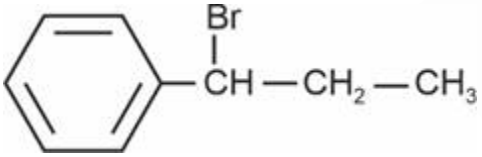


The major product A in above mentioned reaction is

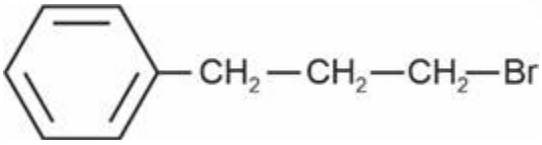
(1)



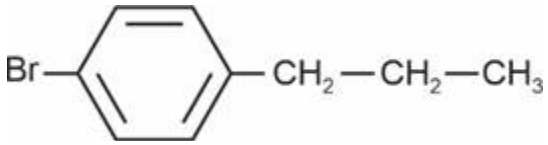
(2)



(3)



(4)



61. The incorrect match for directive influences of groups attached to benzene ring for S_E reaction is

(1) — CH_3 – Ortho/para directing

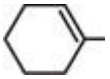
(2) — CCl_3 – Meta directing

(3) — OH – Ortho/para directing

(4) — $NHCOCH_3$ – Meta directing

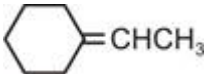
62. Compound which shows geometrical isomerism is

(1)

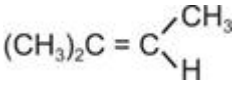


(2)

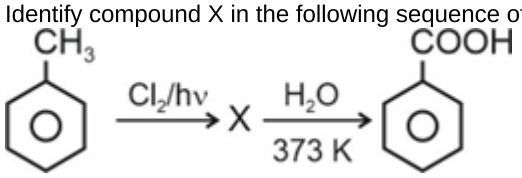
(3)



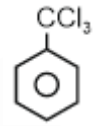
(4)



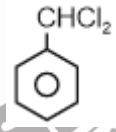
63. Identify compound X in the following sequence of reactions



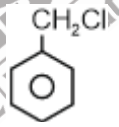
(1)



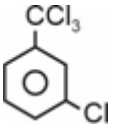
(2)



(3)



(4)



64. Select the correct statements.
I. Ortho and para-directing groups on benzene ring increase electron density at ortho and para positions.
II. Meta-directing groups increase electron density at meta position.
III. Meta-directing groups decrease electron-density at ortho and para positions.
IV. Ortho and para-directing groups decrease electron density at meta position.
Choose the correct option.

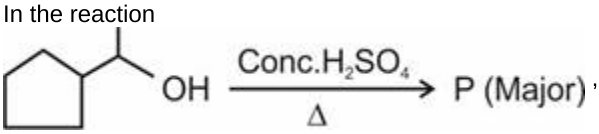
(1) I & II only

(2) I & III only

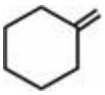
(3) III & IV only

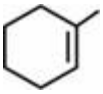
(4) II & IV only

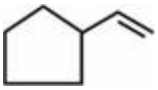
65. In the reaction

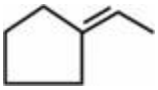


P is

(1) 

(2) 

(3) 

(4) 

66. $\mathrm{Ph-C\equiv CH} \xrightarrow[\mathrm{H_2O,\,333\,K}]{\mathrm{HgSO_4\,/H_2\,SO_4}} (\mathrm{P})$

Major product (P) is

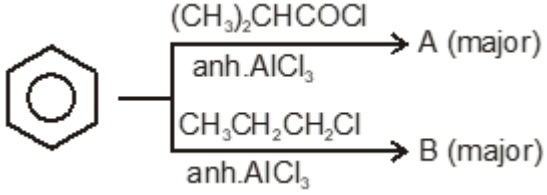
(1) Ph–CH_2–CH_2OH

(2) Ph–CH_2CHO

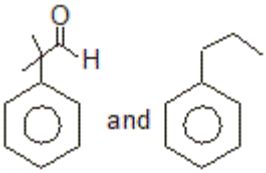
(3) Ph–CO–CH_3

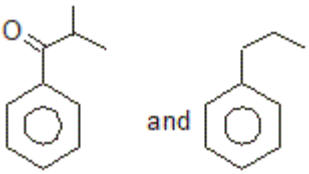
(4) Ph–CH_2–O–CH_3

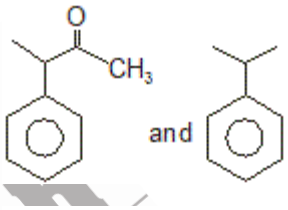
67. Consider the following reaction.

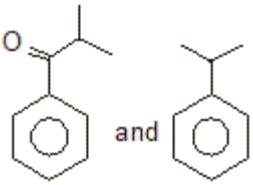


Major products A and B respectively are

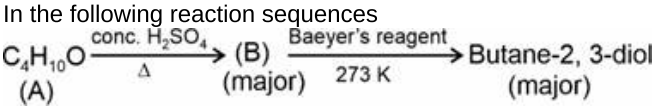
(1) 

(2) 

(3) 

(4) 

68. In the following reaction sequences



The compound (A) could be

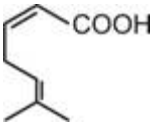
(1) Methoxypropane

(2) Butan-2-ol

(3) Ethoxyethane

(4) 2-Methylpropan-2-ol

69. The IUPAC name of the following compound is



(1) 6-Methylhepta-2,5-dienoic acid

(2) 5-Methylhexa-2,4-dienoic acid

(3) 2-Methylhepta-2,5-dien-7-oic acid

(4) 2-Methylhepta-2,5-dien-6-oic acid

70. Identify the hybridisation shown by C_1 and C_2 carbon atoms, respectively in the given compound.
$OHC - CH_2 - C \equiv C - CH_2 - COOCH_3$

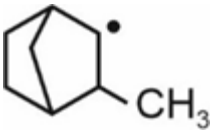
(1) sp^2 and sp^2

(2) sp^2 and sp^3

(3) sp^3 and sp^2

(4) sp^2 and sp

71. Consider the following statements.
Statement I: Both



and $(CH_3)_3C$ – Ph show hyperconjugation.
Statement II: Chlorine is electron withdrawing group but is ortho, para directing in electrophilic aromatic substitution reactions.
In the light of the above statements, choose the most appropriate answer from the options given below :

(1) Both statement (I) and statement (II) are correct

(2) Both statement (I) and statement (II) are incorrect

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

(4) Statement (I) is incorrect but statement (II) is correct

72. Identify the incorrect statement among the following

(1) The boiling point of three isomeric pentanes follow the order; n-pentane > isopentane > neopentane.

(2) Dihedral angle of least stable conformer of ethane is zero degree.

(3) Staggered form of ethane-1,2-diol is the least stable among all its conformations

(4) Most stable conformation of cyclohexane is chair form

73. Identify the incorrect statement among the following

(1) Acetylene with excess HCl gives *gem* dichloride.

(2) Both propene and propyne will decolourise bromine water.

(3) Vicinal dihalides on treatment with zinc metal undergo dehalogenation to form alkanes as products.

(4) Bromo ethane on heating with alcoholic potash undergo β-elimination reaction.

74. Which among the following is not a pyrolysis product of hexane?

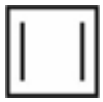
(1) Hexene

(2) Octane

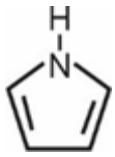
(3) Methane

(4) Butene

75. Identify the non-aromatic species among the following.

(1) 

(2) 

(3) 

(4) 

76. Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Methane cannot be formed by Kolbe's electrolytic method.
Reason (R): In Kolbe's electrolytic method, coupling of two alkyl radicals take place at cathode.
In the light of the above statements, choose the most appropriate answer from the options given below:

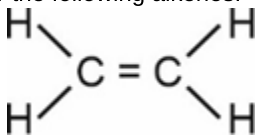
(1) Both (A) and (R) are true and (R) is the correct explanation of (A)

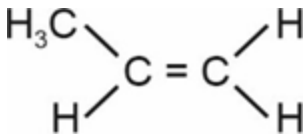
(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)

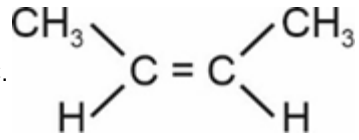
(3) (A) is true but (R) is false

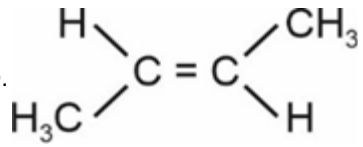
(4) (A) is false but (R) is true

77. Identify the correct order of evolved heat of hydrogenation for the following alkenes.

A. 

B. 

C. 

D. 

Choose the correct option.

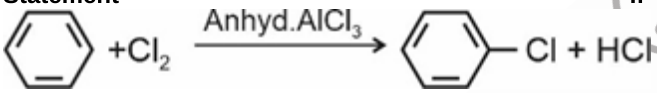
(1) A > B > C > D

(2) D > C > B > A

(3) A > D > C > B

(4) D > A > B > C

78. Given below are two statements:

Statement I: 

is an electrophilic substitution reaction.

Statement II: Methane $\xrightarrow[h\nu]{Br_2}$ Bromomethane, proceeds through nucleophilic substitution reaction.

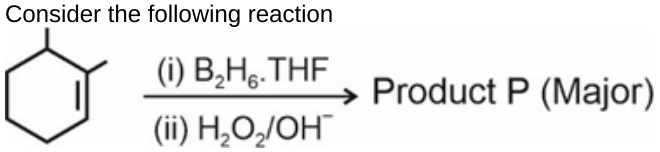
(1) Both statement (I) and statement (II) are correct

(2) Both statement (I) and statement (II) are incorrect

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

(4) Statement (I) is incorrect but statement (II) is correct

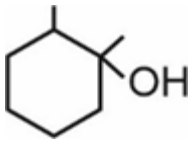
79. Consider the following reaction



Choose the correct statement(s) regarding the above mentioned reaction.

A. The reaction follows Markovnikov's addition rule.

B. No rearrangement takes place.

C. Product 'P' is 

Choose the correct option.

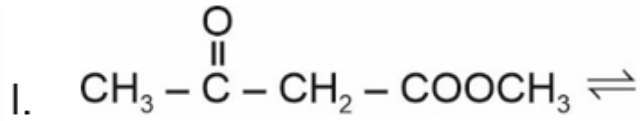
(1) A, B and C

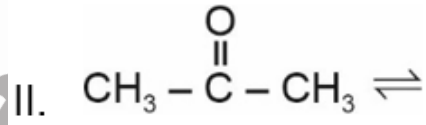
(2) B only

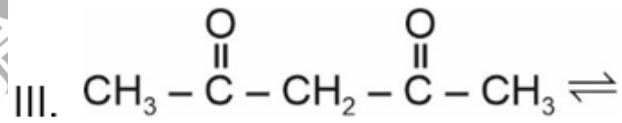
(3) A and C only

(4) A only

80. The order of stability of enolic forms of the compounds is

I. 

II. 

III. 

Choose the correct option.

(1) III > II > I

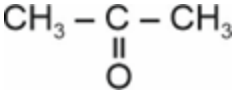
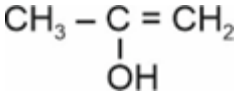
(2) I > II > III

(3) II > III > I

(4) III > I > II

81. Given below are two statements:

Statement I: Resonance can occur when all the atoms involved lie in the same plane.

Statement II:  and  are resonating structure of each other.

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

(1) Both statement (I) and statement (II) are correct

(2) Both statement (I) and statement (II) are incorrect

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

(4) Statement (I) is incorrect but statement (II) is correct

82. Given below are two statements:
Statement I: Under UV light at 500 K, three chlorine molecules add to benzene to produce Gammaxane.
Statement II: Benzene on treatment with excess of chlorine in the presence of anhyd. $AlCl_3$ is chlorinated to Hexachlorobenzene.
In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both statement (I) and statement (II) are correct

(2) Both statement (I) and statement (II) are incorrect

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

(4) Statement (I) is incorrect but statement (II) is correct

83. In Duma's method for estimation of nitrogen, 0.14 g of an organic compound gave 100 mL of nitrogen collected at 300 K and 715 mm of Hg pressure calculate % composition of nitrogen in the compound. (aq. tension at 300 K is 15 mm of Hg)

(1) 74.8%

(2) 85%

(3) 17.46%

(4) 28%

84. Which is/are charactersties condition(s) for a liquid compound (X) to be purified by steam distillation
A. The organics liquid vaporises at lower temperature than boiling point of pure component
B. Steam volatile
C. Immiscible with water
Choose the correct option

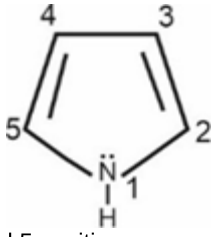
(1) A, B and C

(2) B and C only

(3) A and B only

(4) C only

85. Given below are two statements:
Statement I: Both C_3H_8O and $C_4H_{10}O$ show metamerism.

Statement II: In pyrrole, 

the electron density is maximum on 2 and 5 position.
In the light of the above statements, choose the most appropriate answer from the options given below:

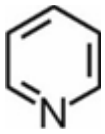
(1) Both statement (I) and statement (II) are correct

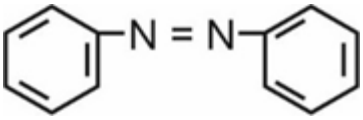
(2) Both statement (I) and statement (II) are incorrect

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

(4) Statement (I) is incorrect but statement (II) is correct

86. Given below are two statements:

Statement I: The amount of nitrogen in both 

and 

compounds can be estimated by Kjeldahl's method.
Statement II: Cyclopentene upon reductive ozonolysis gives pentane –1,5-dial as the major product.
In the light of the above statements, choose the most appropriate answer from the options given below:

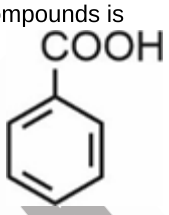
(1) Both statement (I) and statement (II) are correct

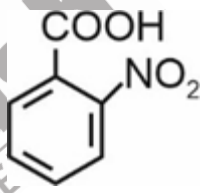
(2) Both statement (I) and statement (II) are incorrect

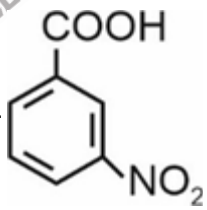
(3) Statement (I) is correct but statement (II) is incorrect

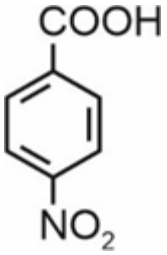
(4) Statement (I) is incorrect but statement (II) is correct

87. The correct decreasing order of acidity for the following compounds is

A. 

B. 

C. 

D. 

Choose the correct option.

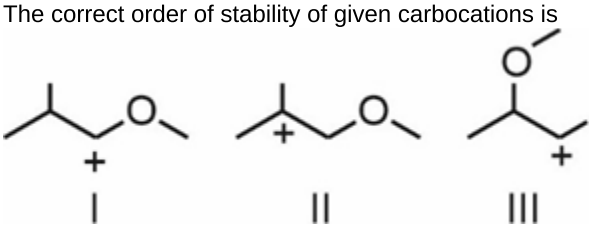
(1) D > C > B > A

(2) B > D > C > A

(3) B > A > C > D

(4) D > A > B > C

88. The correct order of stability of given carbocations is



I II III

Choose the correct option

(1) I > III > II

(2) I > II > III

(3) III > II > I

(4) II > III > I

89. Identify the correct order of decreasing priority for the given functional groups.

(1) –COOH, –COCl, –CN, –HC = O, –OH

(2) –COCl, –COOH, –OH, –CN, –HC = O

(3) –COCl, –HC = O, –COOH, –OH, –CN

(4) –COOH, –COCl, –HC= O, –OH, –CN

90. Match list-I with list-II

	List-I (Species)		List-II (Colour)
a.	$Fe_4[Fe(CN)_6]_3 \cdot xH_2O$	(i)	Violet
b.	$[Fe(CN)_5NOS]^{4-}$	(ii)	Prussian blue
c.	$[Fe(SCN)]^{2+}$	(iii)	Yellow
d.	$(NH_4)_3PO_4 \cdot 12MoO_3$	(iv)	Blood red

Choose the correct option

(1) a(ii), b(i), c(iii), d(iv)

(2) a(ii), b(i), c(iv), d(iii)

(3) a(iv), b(iii), c(ii), d(i)

(4) a(iv), b(ii), c(iii), d(i)

BOTANY

91. Bundle sheath cells in C_4 plants

(1) Have large number of chloroplasts

(2) Have thin walls that facilitate rapid gaseous exchange

(3) Have intercellular spaces

(4) Are located around epidermal cells

92. In C_4 plants, the primary CO_2 acceptor is ____A____ and is present in ___B___.
Complete the above sentence by choosing **correct** option for A and B.

	A		B
(1)	5 carbon molecule	–	Bundle sheath cell
(2)	Phosphoenolpyruvate	–	Bundle sheath cell
(3)	3 carbon molecule	–	Mesophyll cell
(4)	PEP carboxylase	–	Mesophyll cell

(1) (1)

(2) (2)

(3) (3)

(4) (4)

93. Action spectrum of photosynthesis resembles closely to absorption spectrum of

(1) Chlorophyll *a*

(2) Chlorophyll *b*

(3) Carotene

(4) Xanthophyll

94. Which of the following is **not** required in the chemiosmosis process?

(1) Proton pump

(2) ATP synthase

(3) Electron gradient

(4) A membrane

95. Select the **incorrect** option w.r.t. plastocyanin involved in Z-scheme.

(1) It is located on the inner side of the thylakoid membrane

(2) It transfers the electrons to PS I

(3) It is immediate electron donor to P_{680}

(4) It receives electrons from cytochrome b_6f complex

96. The site of light reaction is

(1) Palade particle

(2) Cisternae of golgi

(3) Stroma of chloroplast

(4) Thylakoid

97. The final electron acceptor in non-cyclic photophosphorylation is

(1) H_2O

(2) ADP

(3) $NADP^+$

(4) NAD^+

98. The primary acceptor of CO_2 during the C_3 cycle is a

(1) 2-carbon aldose sugar

(2) 3-carbon ketose sugar

(3) 5-carbon ketose sugar

(4) 4-carbon aldose sugar

99. Substrate level phosphorylation is

(1) Phosphorylation of glucose into glucose-6-phosphate

(2) Direct synthesis of ATP from metabolites

(3) Synthesis of NADH by reducing NAD^+

(4) Interconversion of triose sugars

100. Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Chlorophyll *a* is bright or blue green coloured pigment in the chromatogram.
Reason (R): In PS I, the reaction centre chlorophyll *a* has an absorption peak at 700 nm.
In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both Assertion & Reason are true and the reason is the correct explanation of the assertion

(2) Both Assertion & Reason are true but the reason is not the correct explanation of the assertion

(3) Assertion is true statement but Reason is false

(4) Both Assertion and Reason are false statements

101. Which amongst the following is the terminal electron acceptor in the electron transport system of mitochondria?

(1) Water

(2) Oxygen

(3) ATP

(4) H_2

102. In TCA cycle, the enzyme which is found attached to the inner mitochondrial membrane is

(1) Isocitrate dehydrogenase

(2) Fumarase

(3) Succinate dehydrogenase

(4) Malate dehydrogenase

103. Mark the **wrongly** matched pair for ETS of mitochondria.

(1) Complex II – found in inter membrane space

(2) Complex IV – contains cytochrome *a* and a_3

(3) Complex V – ATP synthase

(4) Complex I – receives electrons from NADH

104. Which of the following is most preferred respiratory substrate?

(1) Fats

(2) Carbohydrates

(3) Proteins

(4) Lipids

105. The ratio of the volume of CO_2 evolved to the volume of O_2 consumed for the substrate which is used in protoplasmic respiration is

(1) 4

(2) 0.7

(3) 0.9

(4) 1

106. Citric acid is formed in Krebs' cycle by the condensation of __A____ with ___B___.
Select the **correct** option for A and B from the following.

(1) (A) - Oxaloacetic acid; (B) - Pyruvic acid and water

(2) (A) - Acetyl CoA; (B) - Malic acid

(3) (A) - Acetyl group; (B) - Oxaloacetic acid and water

(4) (A) - Pyruvic acid; (B) - Malic acid

107. In which of the following processes, CO_2 is **not** released?

(1) Oxidative decarboxylation of pyruvate

(2) Alcoholic fermentation

(3) Lactic acid fermentation

(4) Krebs' cycle

108. Which of the following is a 5C compound?

(1) Acetyl CoA

(2) Malic acid

(3) α-ketoglutaric acid

(4) Succinic acid

109. The enzyme complex, pyruvate dehydrogenase catalyzes the conversion of

(1) Acetaldehyde into ethyl alcohol

(2) Pyruvate into lactic acid

(3) Pyruvate into acetyl CoA

(4) Phosphoenolpyruvate into pyruvic Acid

110. All of the following processes can occur in mitochondria, **except**

(1) Formation of pyruvate

(2) Citric acid formation

(3) Oxidation of NADH + H^+

(4) Formation of Acetyl CoA

111. The first member of citric acid cycle is

(1) Oxaloacetic acid

(2) Citric acid

(3) Acetyl CoA

(4) Pyruvic acid

112. Which of the following **do not** show Kranz anatomy in their leaves?

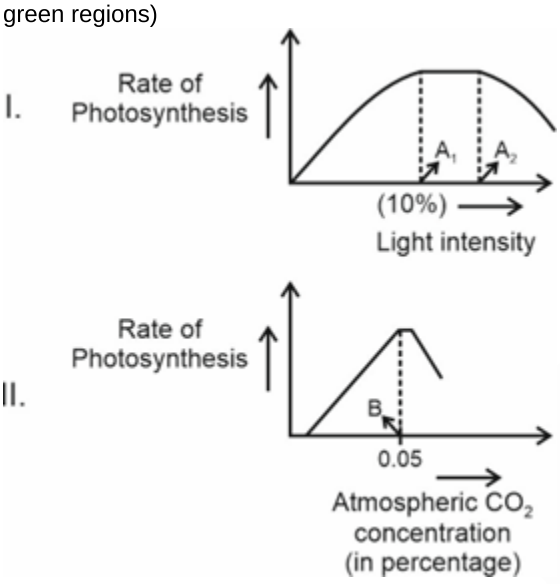
(1) Maize

(2) *Sorghum*

(3) Tomato

(4) Sugarcane

113. The following graphs show the effect of different factors on rate of photosynthesis (measured by release of oxygen from green regions)



Read the following statements carefully w.r.t. the above graphs.

(i) In graph I, A_1 represents a light intensity beyond which any increase can only be detrimental if CO_2 concentration is increased.

(ii) In graph II, B can represent CO_2 saturation point of C_3 plants.

(iii) Plants growing in shade or dense forest do not show curve as shown in graph I.

The **correct** ones are

(1) (ii) and (iii) only

(2) (iii) only

(3) (i) only

(4) All (i), (ii) and (iii)

114. Match the following columns and select the **correct** option.

	Column I		**Column II**
A.	Pyruvate dehydrogenase	I.	The substrate undergoes catalytic reduction by this enzyme where, the reducing agent $NADH+H^+$ is reoxidised to NAD^+
B.	Pyruvate decarboxylase	II.	Its substrate is phosphorylated by the transfer of phosphate from ATP
C.	Phosphofructokinase	III.	Catalyses a reaction where pyruvate is converted to acetaldehyde
D.	Lactate dehydrogenase	IV.	Catalyses the link reaction

Choose the **correct** option.

(1) A(III); B(II); C(I); D(IV)

(2) A(IV); B(III); C(II); D(I)

(3) A(IV); B(III); C(I); D(II)

(4) A(III); B(IV); C(II); D(I)

115. Read the following statements.

A. Productivity and yield of C_4 plants are better than C_3 plants.

B. C_4 plants exhibit photosynthetic preference towards temperatures exceeding 40°C.

C. Carboxylase enzymes used by C_4 plants in both mesophyll and bundle sheath cells show affinity towards CO_2 only.

D. Bundle sheath cells of C_4 plants have CO_2 concentrating mechanism that increases the CO_2 concentration at enzyme site.

Choose the appropriate option.

(1) Only B and C are true

(2) Only A and D are true

(3) Only A, B and D are true

(4) All A, B, C and D are true

116. Role of RuBisCO as carboxylase or oxygenase

(1) Is determined by relative concentration of CO_2 and O_2 near RuBisCO

(2) Is dependent on the available RuBP molecules

(3) Is independent of the affinity of RuBisCO for one of the gases, O_2 or CO_2

(4) Is equally probable in all plants whether C_3 or C_4

117. Read the following assertion (A) and reason (R) carefully.
Assertion (A): All living organisms of earth have the enzymatic machinery to partially oxidise glucose.
Reason (R): All living organisms exhibit glycolysis.
In the light of the above statements, choose the most appropriate answer from the options given below:

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

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

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

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

118. In an experiment, mitochondria isolated from a cell are treated by a detergent to minimally rupture the outer membrane.
The resulting change will immediately:

(1) Show inhibition of oxidation of $NADH+H^+$ and $FADH_2$ by oxygen.

(2) Show decline in the synthesis of the end product of ETS.

(3) Stop ETS due to loss of the mobile e^- carrier cytochrome *c*.

(4) Show decline in ATP synthase activity due to difficulty in maintaining proton gradient.

119. Respiration does **not** involve

(1) Breaking up of C – C bond

(2) Photolysis of water molecule

(3) Release of energy in the form of ATP

(4) Oxidation of macromolecules

120. Select the **mismatched** pair from the following.

(1) Stroma of chloroplast – Fixation of CO_2 to carbohydrates

(2) RuBisCO – The most abundant enzyme on earth

(3) C_4 plant – Maize

(4) C_3 plant – Kranz anatomy

121. Read the following statements regarding cellular respiration in a living system and state **true(T)** or **false(F).**
A. All pathways such as glycolysis, TCA cycle and ETS work simultaneously in an organism.
B. $NADH+H^+$ synthesised in glycolysis is transferred to mitochondria regardless of type of organism.
C. None of the intermediates in the pathway are utilised to synthesise any other compound.
D. Alternative substrates other than glucose can enter the pathway via glycolysis and/or TCA cycle.
Choose the **correct** option.

(1) A(T), B(F), C(F), D(T)

(2) A(F), B(F), C(T), D(T)

(3) A(F), B(F), C(F), D(T)

(4) A(T), B(T), C(T), D(F)

122. The most crucial step of Calvin cycle
(a) Is catalysed by RuBisCO
(b) Utilises NADPH
(c) Is called carboxylation
Select the **correct** one (s).

(1) (a) and (b)

(2) (a) only

(3) (a) and (c)

(4) (c) only

123. Non-cyclic photophosphorylation differs from cyclic photophosphorylation as in the former

(1) Both ATP and NADPH + H^+ are synthesised by the electron flow.

(2) Only the light of wavelength below 680 nm is required.

(3) Only PS I is functional

(4) External electron donor is not required

124. Identify the **incorrect** match.

(1)	Regeneration of PEP	–	Mesophyll cells
(2)	RuBP oxygenase activity	–	Chloroplast
(3)	Photorespiratory loss of CO_2	–	Cytoplasm
(4)	Decarboxylation in C_4 pathway	–	Bundle sheath cell

(1) (1)

(2) (2)

(3) (3)

(4) (4)

125. Read the following statement carefully.
Pyruvate dehydrogenase requires the participation of coenzymes such as A and B while C acts as the metal activator.
Fill in the blanks correctly from the option given below.

	(A)	(B)	(C)
(1)	$NADP^+$	CoA	Mg^{2+}
(2)	FAD	NAD^+	Cu^{2+}
(3)	CoA	NAD^+	Mg^{2+}
(4)	FMN	Co-Q	Mg^{2+}

(1) (1)

(2) (2)

(3) (3)

(4) (4)

126. A green algae, *Cladophora* was used in an experiment to demonstrate all of the following **except**

(1) The first action spectrum of photosynthesis.

(2) The fact that not all colours of split visible spectrum are equally effective for photosynthesis.

(3) The highest CO_2 fixation rate was observed in the region illuminated by blue and red light.

(4) That the aerobic bacteria perform photosynthesis in red and blue region of light

127. Read the following statements carefully.
Statement A: Both unicellular eukaryotes as well as germinating seeds are capable of fermentation under anaerobic condition.
Statement B: The ratio of carbon atoms present in one tripalmitin molecule to the molecules of CO_2 released upon its complete oxidation is 1 : 2.
Choose the **correct** option.

(1) Only statement A is correct

(2) Only statement B is correct

(3) Both statements A and B are correct

(4) Both statements A and B are incorrect

128. Select the **odd** one out w.r.t. the steps of aerobic respiration of glucose that can be called substrate level phosphorylation

(1) Triose phosphate → BPGA

(2) BPGA → PGA

(3) PEP → Pyruvate

(4) Succinyl CoA → Succinate

129. Arrange the following regions of PAR according to their absorption of light by the chief pigment of photosynthesis from least absorbed region to most absorbed region.

Region	Wavelength (nm)
A	600-700
B	400-500
C	500-600

Choose the appropriate option.

(1) ABC

(2) CAB

(3) BAC

(4) CBA

130. Match the following columns.

	Column-I		Column-II
A.	First member of TCA cycle	(i)	Undergoes condensation with OAA in mitochondrial matrix
B.	Common intermediate between fatty acid and sugar breakdown	(ii)	Coupled with formation of GTP
C.	Formation of succinate in mitochondria	(iii)	Is a 4-C molecule
D.	Oxygen	(iv)	Its presence is vital as it drives the whole process of ATP synthesis by removing hydrogen from the system

Choose the **correct** option.

(1) A(iii), B(ii), C(i), D(iv)

(2) A(i), B(iii), C(ii), D(iv)

(3) A(iii), B(i), C(ii), D(iv)

(4) A(iv), B(i), C(iii), D(ii)

131. Read the following statements carefully.
Statement A: The strategy of slow, stepwise and enzymatically controlled catabolism of glucose is exclusive to plant cells.

Statement B: During ATP synthesis, $4H^+$ passes through F_0 from intermembrane space to matrix up the electrochemical proton gradient.
Choose the **correct** option.

(1) Only statement A is correct

(2) Only statement B is correct

(3) Both statements A and B are correct

(4) Both statements A and B are incorrect

132. If glycolysis in an aerobic organism is compared with glycolysis in an anaerobically respiring organism,

(1) The former yields more energy due to some intermediates directly helping in ATP synthesis.

(2) The latter loses 6 ATP per glucose that would have otherwise been formed by oxidative phosphorylation.

(3) The latter releases CO_2 in glycolysis if the organism is yeast

(4) The former requires a steady supply of NAD^+ in order to continue uninterrupted oxidation of triose phosphate.

133. Total number of ATP produced through ETS only from one molecule of 3-phosphoglycerate in aerobic respiration is

(1) 14

(2) 12

(3) 15

(4) 16

134. All of the following facilitate supply of oxygen to plants, **except**

(1) Stomata

(2) Lenticels among dead bark cells

(3) Loosely packed parenchyma cells

(4) Dead mechanical tissue

135. The effect of various factors, intrinsic and extrinsic on a physiological process in living organisms can be gauged by the law proposed by:

(1) Peter Mitchell

(2) Melvin Calvin

(3) Hans Krebs

(4) Blackman

ZOOLOGY

136. In the menstrual cycle of 28 days, which phase will coincides with the proliferative phase?

(1) Luteal phase and lasts for about 13 days

(2) Follicular phase and lasts for about 9-11 days

(3) Secretory phase and lasts for about 14 days

(4) Follicular phase and lasts for about 16 days

137. A wider region, called ampulla is **not** a part of which of the following structures?

(1) Mammary gland

(2) Fallopian tube

(3) Vas deferens

(4) Testes

138. Which of the following is least likely to happen if a mammalian secondary oocyte fails to get fertilized?

(1) Corpus luteum will disintegrate

(2) Progesterone secretion declines towards the end of luteal phase

(3) Endometrium of uterus will not be maintained

(4) Sudden increase in the LH and FSH

139. Why it is scientifically correct to say that sex of the baby is determined by the father and not by the mother?

(1) Human female produces two types of gametes

(2) Human male produces one type of gamete

(3) Human female has XX chromosome pattern, whereas male has XY chromosome pattern, so 50% of sperms carry the X sex chromosome while other 50% carry Y sex chromosome

(4) Human male has XX chromosome pattern whereas human female has XY chromosome pattern, so 50% of ovum carry the X sex chromosome while other 50% carry Y sex chromosome

140. Among the following, which is the **correct** statement regarding the female reproductive system of adult humans?

(1) Each ovary is 2-4 cm in length and connected to pelvic wall and uterus by ligaments.

(2) It consists of a pair of ovaries along with a pair of oviducts, bulbourethral glands, cervix, vagina and external genitalia.

(3) Each fallopian tube is 6-8 cm long and extends from the periphery of each ovary to the uterus.

(4) The shape of uterus in human is like an upright pear and with an outer aglandular layer called endometrium.

141. Select the site where second polar body in humans is released.

(1) Body cavity

(2) Uterine cavity

(3) Fallopian tube

(4) Ovary

142. Match column I and column II w.r.t human embryonic development during pregnancy.

Column I	Column II
a. Embryo's heart is formed	(i) After 1st month
b. Foetal limbs and digits are formed	(ii) During fifth month
c. Well developed external genital organs are formed	(iii) End of second month
d. First foetal movement is observed	(iv) End of first trimester

Select the **correct** option.

(1) a(i), b(iii), c(iv), d(ii)

(2) a(i), b(ii), c(iii), d(iv)

(3) a(ii), b(iii), c(i), d(iv)

(4) a(iv), b(i), c(ii), d(iii)

143. Select the option which is **not** a direct function of gonadotrophins.

(1) Androgen secretion from testes

(2) Maintenance of corpus luteum

(3) Ovulation

(4) Maintenance of secondary sexual characters

144. During menstrual cycle in human females, the hormone that does not attain peak until secretory phase, is secreted mainly by

(1) Secondary oocyte

(2) Stromal cells

(3) Primary oocyte

(4) Corpus luteum

145. Which of the following are **correct** w.r.t. hymen?
(a) Is often torn during first intercourse
(b) Partially covers vaginal opening
(c) It is a part of the female external genitalia
Select the **correct** option.

(1) (a), (b) only

(2) (b), (c) only

(3) (a), (c) only

(4) (a), (b), (c)

146. The steroid hormones secreted by adrenal cortex are synthesized upon stimulation by a trophic hormone, called

(1) MSH

(2) ACTH

(3) ADH

(4) TSH

147. Decrease in the secretion of a steroidal hormone which is released from the growing ovarian follicles can

(1) Increase the bone resorption in females

(2) Decrease the anti-inflammatory reactions in the body

(3) Stimulate the maturation of epididymis in males

(4) Increase the pitch of voice in females

148. All of the following hormones interact with intracellular receptors, **except**

(1) Estradiol

(2) Aldosterone

(3) Glucagon

(4) Cortisol

149. "Despite of production of hormone in trace amounts, hormone can bring changes in target cells".
Amongst the following, which one is the best possible explanation for the above stated fact?

(1) All hormones are lipid-soluble and readily penetrate the membrane of the target cells

(2) The mechanism of every hormone action involves the formation of hormone-receptor complex with the genome

(3) Hormones are large nutrient molecules that remain in blood circulation for a long time

(4) The mechanism of hormone action involves an enzyme cascade that amplifies the response of a hormone

150. A patient shows the following symptoms:
- High blood sugar
- Glycosuria (sugar in urine)
- Frequent urination and thirst

On the basis of the above given information, select the option which gives the correct identification of the defective gland and the probable reason behind the occurrence of the specified symptoms.

(1) Pituitary gland; Excess of luteinizing hormone

(2) Thyroid gland; Deficiency of melanocyte stimulating hormone

(3) Adrenal gland; ADH deficiency

(4) Pancreas; Insulin deficiency

151. Which of the following endocrine glands stores and releases the neurohormone which regulates water balance in our body?

(1) Thyroid gland

(2) Neurohypophysis

(3) Adenohypophysis

(4) Parathyroid glands

152. All of the following features are true for hormone that regulates 24-hour rhythm of human body and influences metabolism as well as pigmentation, **except**

(1) Source gland of this hormone is hypothalamus

(2) Helps in maintenance of body temperature

(3) An amino acid derivative

(4) Influences menstrual cycle in human females

153. Which of the following is a proteinaceous hormone that primarily regulates the immune system?

(1) Glucagon

(2) Thyroxine

(3) Thymosin

(4) Adrenaline

154. The hormone which stimulates secretion of HCl and pepsinogen from stomach is

(1) Gastrin

(2) Secretin

(3) Cholecystokinin

(4) GIP

155. Read the statements given below:
Statement A: If a certain dose of adrenaline is injected intravenously in a patient, his heart rate will increase.
Statement B: Development of tumour in the neurohypophysis can lead to pituitary dwarfism in adults .
Choose the **correct** option.

(1) Both statements A and B are correct

(2) Both statements A and B are incorrect

(3) Only statement A is correct

(4) Only statement B is correct

156. "As the menstrual cycle transitions from ovulation to the early luteal phase, the anterior pituitary reduces its secretion of LH and FSH, despite the recent surge".
Which underlying neuroendocrine mechanism most accurately explains this rapid fall in gonadotropin output?

(1) A rebound peak of GnRH occurs during luteal phase.

(2) Elevated estrogen levels inhibit the secretion of GnRH from anterior pituitary.

(3) Ruptured Graffian follicle releases huge amount of estrogen, lowering the release of gonadotropins.

(4) Rising progesterone level by corpus luteum suppresses the release of GnRH

157. Select the **incorrect** statement w.r.t. human males.

(1) The walls of the seminiferous tubules are lined by primitive germ cells.

(2) Spermatids mature into spermatozoa in deep folds of the cytoplasm of the Sertoli cells.

(3) Spermatozoa leaving the testes are not fully motile.

(4) Secondary spermatocytes are released from the Sertoli cells and freely move in the lumen of the seminiferous tubules.

158. A woman attained menarche at the 14 years of age and is currently 37 years old. She shows normal ovarian activity with regular menstrual cycles and has never been pregnant. Assuming an average menstrual cycle of 28 days, how many first polar bodies have been formed most likely upto the present age?

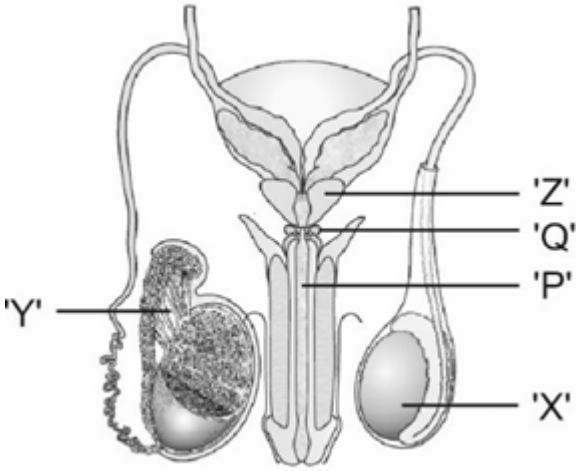
(1) 270 – 285

(2) 290 – 305

(3) 405 – 420

(4) 540 – 555

159. Consider the diagram of male reproductive system given below:



Identify the labelled structures and choose the **incorrect** option w.r.t. them.

(1) 'X' is present in scrotal sacs which is connected with the abdominal cavity.

(2) 'Y' is an accessory duct that is a part of the testicular duct system.

(3) 'Z' lies at the base of the bladder and surrounds the first part of 'P'.

(4) 'Q' is a pea-sized structure that lies behind the bladder and is categorised as secondary male sex organ.

160. In humans, the medulla of an ovary contains
a. Loose connective tissue
b. Elastic fibres
c. Follicular granulosa cells
d. Rich network of blood vessels
Select the **correct** option.

(1) (a) and (c)

(2) (b), (c) and (d)

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

(4) (c) and (d)

161. A hormone named 'P' stimulates contraction of myoepithelial cells surrounding the alveoli of the mammary glands for milk ejection.
Whereas, a hormone named 'Q' is said to be primarily responsible for milk formation.
Identify the hormones 'P' and 'Q' and choose the **incorrect** option w.r.t. their functions in females.

(1) High levels of 'Q' can lead to amenorrhea.

(2) Significant peak levels of 'P' and 'Q' are found in blood plasma of mother during the first trimester of pregnancy.

(3) Both 'P' and 'Q' are proteinaceous hormones.

(4) Labor triggers more release of 'P' *via* positive feedback loop.

162. **Assertion (A):** A healthy man releases only about 50 to 120 million sperms in an ejaculate, even though a single sperm is required for fertilisation.
Reason (R): Sperms travel along the female reproductive tract facing various challenges to penetrate the diploid ootid, so high-volume production helps overcome the odds of finding the potential target and ensures successful fertilization.
In the light of above statements, select the **correct** option.

(1) Both (A) and (R) are true, (R) explains (A) correctly

(2) Both (A) and (R) are true, (R) does not explain (A) correctly

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

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

163. How many of the components mentioned in the box given below are seen in the Graafian follicle?

Antrum, Zona pellucida, Corona radiata, Secondary oocyte, Theca interna, Granulosa cells

Select the **correct** option.

(1) Four

(2) Three

(3) Six

(4) Five

164. During the embryonic development of a normal human baby, which of the following events occurs prior to gastrulation, but right after cleavage divisions?

(1) Placenta formation

(2) Blastulation

(3) Capacitation

(4) Organogenesis

165. Consider the statements given below w.r.t. humans.
Statement (A): Hydrolytic acrosomal enzymes and strong flagellar beating of the sperm's tail, help the sperm to penetrate the cells of the corona radiata and come in contact with the primary egg membrane for syngamy.
Statement (B): After implantation, finger-like projections appear on the trophoblast called chorionic villi, which are surrounded by the uterine tissue and maternal blood.
Select the **correct** option.

(1) Both statements A and B are correct

(2) Both statements A and B are incorrect

(3) Only statement A is incorrect

(4) Only statement B is incorrect

166. Choose the **incorrect** option w.r.t. the placenta of humans.

(1) Can allow passage of some viruses to the foetus

(2) Secretes certain hormones that are also produced by ovary

(3) Yolk sac connects the foetus to the placenta

(4) Is expelled out after parturition

167. **Assertion (A):** The zona pellucida formed around the secondary oocyte, remains intact during the early cleavage divisions.
Reason (R): The zona pellucida functions as a protective cellular layer that regulates sperm binding and ensures uterine implantation.
In the light of the above statements, choose the **correct** answer.

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

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

(3) Both (A) and (R) are false.

(4) (A) is true but (R) is false.

168. All of the following are correct w.r.t. the morula of humans, **except**

(1) It is a solid mass of blastomeres, without a central cavity.

(2) The size of the morula is same as that of zygote.

(3) The 32-cell stage morula, after 3-4 days of post-cleavage, enters the uterus.

(4) It is surrounded by the glycoproteinaceous layer called zona pellucida.

169. A tumour in the zona glomerulosa of the adrenal cortex causes excessive secretion of aldosterone. The most expected physiological change in such a patient will be

(1) Marked decrease in blood sodium concentration

(2) Significant drop in blood calcium levels

(3) Severe dehydration due to increased water loss

(4) Decrease in blood potassium concentration

170. During a surgery, a doctor by mistake removes the glands that are present on the back side of the thyroid gland. Soon, the patient develops spasm and tetany as there have been

(1) Reduced mobilization of Ca^{2+} from bones due to increased osteoclast activity

(2) Reduced deposition of Ca^{2+} in bones due to unopposed calcitonin action

(3) Fall in plasma Ca^{2+} concentration due to the loss of a proteinaceous hormone

(4) Increased production of active vitamin D which affects bone resorption

171. An increase in blood volume leads to stretching of the atrial walls of the heart. In response, a peptide hormone is released that helps restore normal blood pressure. This hormone lowers blood pressure primarily by

(1) Enhancing Na^+ and water reabsorption in renal tubules

(2) Producing generalized vasoconstriction of blood vessels

(3) Inducing vasodilation and increasing renal excretion of Na^+

(4) Stimulating the secretion of antidiuretic hormone from the posterior pituitary

172. **Assertion (A):** Despite being transported uniformly *via* the bloodstream, a circulating hormone elicits a biological response only on selected tissues.
Reason (R): Only those cells that express the appropriate and structurally complementary hormone receptors can form an active hormone–receptor complex, capable of initiating biochemical events.
In the light of above statements, select the **correct** option.

(1) Both (A) and (R) are true, (R) explains (A) correctly

(2) Both (A) and (R) are true, (R) does not explain (A) correctly

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

(4) (A) is false, (R) is true

173. Following consumption of a carbohydrate-rich meal, blood glucose levels rise temporarily. In this condition, which pair of hormone bring changes that most effectively restores glucose homeostasis in the body?

(1) Increased glucagon secretion with decreased insulin release

(2) Decreased glucagon secretion with increased insulin release

(3) Increased secretion of ADH along with aldosterone

(4) Increased secretion of cortisol along with adrenaline

174. Hormones showing calorigenic effect, promoting tissue differentiation and affecting intelligence are primarily secreted by

(1) Posterior pituitary

(2) Thymus

(3) Thyroid gland

(4) Liver

175. Choose the **correct** match w.r.t humans.

(1) Pituitary gland – Lodges in the cavity formed by paired sphenoid bones

(2) Pineal gland – Located on the front side of forebrain

(3) Thymus gland – Atrophies in old individuals

(4) Thyroid gland – Both the lobes are interconnected with a thick flap of connective tissue called infundibulum

176. The structure 'X' is the basal part of the diencephalon, contains thirst and satiety centres, and acts as a major link between the nervous and endocrine systems. Select the **incorrect** fact w.r.t 'X'.

(1) It transports hormones to the anterior pituitary gland axonally

(2) All the hormones secreted by it are heteropolymers

(3) It secretes both inhibiting and releasing hormones

(4) It secretes the hormone that prevents polyuria

177. Select the unorganised endocrine gland that lies in the abdominal cavity and stimulates RBC formation *via* its hormones.

(1) Adrenal cortex

(2) Kidney

(3) Ovary

(4) Testes

178. Choose the odd one w.r.t the hyperglycemic hormone.

(1) Cortisol

(2) Growth hormone

(3) Catecholamine

(4) Melatonin

179. Select the **correct** statement.

(1) Cushing syndrome is characterised by low secretion of cortisol and hypoglycaemia.

(2) Epiphyseal plates open after adolescence so that GH can act on them.

(3) Relaxin and inhibin work antagonistically to support reproductive processes.

(4) Zona reticularis is the innermost layer of the adrenal cortex.

180. Consider the statements given below:
Statement A: Several non-endocrine tissues secrete hormones like growth factors, which are essential for the normal growth of tissues and their repair/regeneration.
Statement B: Glucocorticoids increase blood pressure but inhibit glomerular filtration rate.
Choose the **correct** option.

(1) Both statements A and B are correct

(2) Both statements A and B are incorrect

(3) Only statement A is correct

(4) Only statement B is correct