Test Booklet Code

← Test Booklet No. **ENGLISH**

E1

ADI

This Booklet contains **32** pages, including Rough Page.

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 CODE for this Booklet is E1. Make sure that the CODE printed on the Original Copy of the Answer Sheet is the same as that on this Test Booklet.** In case of discrepancy, the candidate should immediately report the matter to the Invigilator for replacement of both the Test Booklet and the Answer Sheet.
8. 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 Roll No. anywhere else except in the specified space in the Test Booklet/Answer Sheet.
9. Use of white fluid for correction is **NOT** permissible on the Answer Sheet.
10. Each candidate must show on-demand his/her Admit Card to the Invigilator.
11. No candidate, without special permission of the centre Superintendent or Invigilator, would leave his/her seat.
12. 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.**
13. Use of Electronic/Manual Calculator is prohibited.
14. 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.
15. **No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.**
16. The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.
17. 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): _____

Roll Number : In figures _____

: In words _____

Centre of Examination (in Capitals): _____

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

Facsimile signature stamp of Centre Superintendent

Physics : Section-A (Q. No. 1 to 35)

1 Let a wire be suspended from the ceiling (rigid support) and stretched by a weight W attached at its free end. The longitudinal stress at any point of cross-sectional area A of the wire is :

(1) $2W/A$ (2) W/A

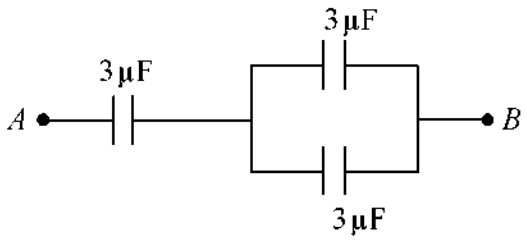
(3) $W/2A$ (4) Zero

2 The ratio of radius of gyration of a solid sphere of mass M and radius R about its own axis to the radius of gyration of the thin hollow sphere of same mass and radius about its axis is :

(1) 3 : 5 (2) 5 : 3

(3) 2 : 5 (4) 5 : 2

3 The equivalent capacitance of the system shown in the following circuit is :



(1) 2 μF (2) 3 μF

(3) 6 μF (4) 9 μF

4 A football player is moving southward and suddenly turns eastward with the same speed to avoid an opponent. The force that acts on the player while turning is :

(1) along eastward

(2) along northward

(3) along north-east

(4) along south-west

5 If $\oint_s \vec{E} \cdot \vec{dS} = 0$ over a surface, then :

(1) the number of flux lines entering the surface must be equal to the number of flux lines leaving it.

(2) the magnitude of electric field on the surface is constant.

(3) all the charges must necessarily be inside the surface.

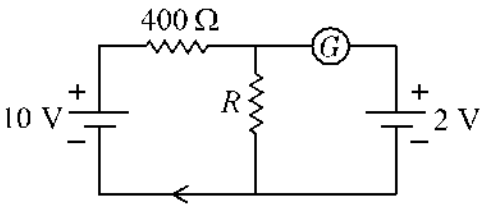
(4) the electric field inside the surface is necessarily uniform.

6 The potential energy of a long spring when stretched by 2 cm is U. If the spring is stretched by 8 cm, potential energy stored in it will be :

(1) 2U (2) 4U

(3) 8U (4) 16U

7 If the galvanometer G does not show any deflection in the circuit shown, the value of R is given by :



(1) 200 Ω (2) 50 Ω

(3) 100 Ω (4) 400 Ω

8 A 12 V, 60 W lamp is connected to the secondary of a step down transformer, whose primary is connected to ac mains of 220 V. Assuming the transformer to be ideal, what is the current in the primary winding?

(1) 0.27 A (2) 2.7 A

(3) 3.7 A (4) 0.37 A

9 A full wave rectifier circuit consists of two p-n junction diodes, a centre-tapped transformer, capacitor and a load resistance. Which of these components remove the ac ripple from the rectified output?

(1) A centre-tapped transformer
(2) p-n junction diodes
(3) Capacitor
(4) Load resistance

10 Light travels a distance x in time t_1 in air and $10x$ in time t_2 in another denser medium. What is the critical angle for this medium?

(1) $\sin^{-1}\left(\frac{t_2}{t_1}\right)$ (2) $\sin^{-1}\left(\frac{10t_2}{t_1}\right)$

(3) $\sin^{-1}\left(\frac{t_1}{10t_2}\right)$ (4) $\sin^{-1}\left(\frac{10t_1}{t_2}\right)$

11 Resistance of a carbon resistor determined from colour codes is $(22000 \pm 5\%)\,\Omega$. The colour of third band must be :

(1) Red (2) Green
(3) Orange (4) Yellow

12 Given below are two statements:

Statement I : Photovoltaic devices can convert optical radiation into electricity.

Statement II : Zener diode is designed to operate under reverse bias in breakdown region.

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.

13 The magnetic energy stored in an inductor of inductance 4 μH carrying a current of 2 A is :

(1) 4 μJ (2) 4 mJ
(3) 8 mJ (4) 8 μJ

14 The angular acceleration of a body, moving along the circumference of a circle, is :

(1) along the radius, away from centre
(2) along the radius towards the centre
(3) along the tangent to its position
(4) along the axis of rotation

15 A Carnot engine has an efficiency of 50% when its source is at a temperature 327° C. The temperature of the sink is :

(1) 27° C (2) 15° C
(3) 100° C (4) 200° C

16 Two bodies of mass m and $9m$ are placed at a distance R. The gravitational potential on the line joining the bodies where the gravitational field equals zero, will be (G = gravitational constant) :

(1) $-\frac{8Gm}{R}$ (2) $-\frac{12Gm}{R}$

(3) $-\frac{16Gm}{R}$ (4) $-\frac{20Gm}{R}$

17 A vehicle travels half the distance with speed ϑ and the remaining distance with speed 2ϑ. Its average speed is:

(1) $\frac{\vartheta}{3}$ (2) $\frac{2\vartheta}{3}$

(3) $\frac{4\vartheta}{3}$ (4) $\frac{3\vartheta}{4}$

18 The amount of energy required to form a soap bubble of radius 2 cm from a soap solution is nearly : (surface tension of soap solution = 0.03 N m^{-1})

(1) 30.16×10^{-4}J (2) 5.06×10^{-4}J

(3) 3.01×10^{-4}J (4) 50.1×10^{-4}J

19 The minimum wavelength of X-rays produced by an electron accelerated through a potential difference of V volts is proportional to:

(1) $\sqrt{V}$ (2) $\frac{1}{V}$

(3) $\frac{1}{\sqrt{V}}$ (4) V^2

20 The half life of a radioactive substance is 20 minutes. In how much time, the activity of substance drops to $\left(\frac{1}{16}\right)^{th}$ of its initial value?

(1) 20 minutes (2) 40 minutes

(3) 60 minutes (4) 80 minutes

21 A metal wire has mass (0.4 ± 0.002) g, radius (0.3 ± 0.001) mm and length (5 ± 0.02) cm. The maximum possible percentage error in the measurement of density will nearly be:

(1) 1.2% (2) 1.3%

(3) 1.6% (4) 1.4%

22 In a plane electromagnetic wave travelling in free space, the electric field component oscillates sinusoidally at a frequency of 2.0×10^{10}Hz and amplitude 48 V m^{-1}. Then the amplitude of oscillating magnetic field is : (Speed of light in free space = 3×10^8 m s^{-1})

(1) 1.6×10^{-9}T (2) 1.6×10^{-8}T

(3) 1.6×10^{-7}T (4) 1.6×10^{-6}T

23 The temperature of a gas is –50° C. To what temperature the gas should be heated so that the rms speed is increased by 3 times?

(1) 669° C (2) 3295° C

(3) 3097 K (4) 223 K

24 An ac source is connected to a capacitor C. Due to decrease in its operating frequency :

(1) capacitive reactance decreases.

(2) displacement current increases.

(3) displacement current decreases.

(4) capacitive reactance remains constant

25 For Young's double slit experiment, two statements are given below:

Statement I : If screen is moved away from the plane of slits, angular separation of the fringes remains constant.

Statement II : If the monochromatic source is replaced by another monochromatic source of larger wavelength, the angular separation of fringes decreases.

In the light of the above statements, choose the *correct* answer from the options given below:

(1) Both **Statement I** and **Statement II** are true.

(2) Both **Statement I** and **Statement II** are false.

(3) **Statement I** is true but **Statement II** is false.

(4) **Statement I** is false but **Statement II** is true.

26 In hydrogen spectrum, the shortest wavelength in the Balmer series is λ. The shortest wavelength in the Bracket series is :

(1) 2λ (2) 4λ

(3) 9λ (4) 16λ

27 The work functions of Caesium (Cs), Potassium (K) and Sodium (Na) are 2.14 eV, 2.30 eV and 2.75 eV respectively. If incident electromagnetic radiation has an incident energy of 2.20 eV, which of these photosensitive surfaces may emit photoelectrons?

(1) Cs only

(2) Both Na and K

(3) K only

(4) Na only

28 The errors in the measurement which arise due to unpredictable fluctuations in temperature and voltage supply are :

(1) Instrumental errors

(2) Personal errors

(3) Least count errors

(4) Random errors

29 In a series *LCR* circuit, the inductance *L* is 10 mH, capacitance *C* is 1 μF and resistance *R* is 100 Ω. The frequency at which resonance occurs is :

(1) 15.9 rad/s (2) 15.9 kHz

(3) 1.59 rad/s (4) 1.59 kHz

30 The venturi-meter works on :

(1) Huygen's principle

(2) Bernoulli's principle

(3) The principle of parallel axes

(4) The principle of perpendicular axes

31 The ratio of frequencies of fundamental harmonic produced by an open pipe to that of closed pipe having the same length is :

(1) 1 : 2 (2) 2 : 1

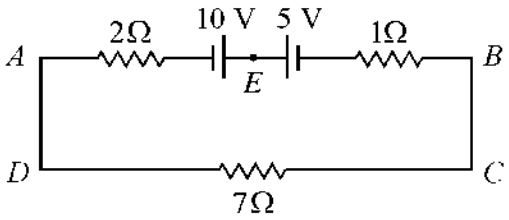
(3) 1 : 3 (4) 3 : 1

32 An electric dipole is placed at an angle of 30° with an electric field of intensity $2\times10^5\,N\,C^{-1}$. It experiences a torque equal to 4 N m. Calculate the magnitude of charge on the dipole, if the dipole length is 2 cm.

(1) 8 mC (2) 6 mC

(3) 4 mC (4) 2 mC

33 The magnitude and direction of the current in the following circuit is



(1) 0.2 A from *B* to *A* through *E*

(2) 0.5 A from *A* to *B* through *E*

(3) $\frac{5}{9}$ A from *A* to *B* through *E*

(4) 1.5 A from *B* to *A* through *E*

34 The net magnetic flux through any closed surface is :

(1) Zero (2) Positive

(3) Infinity (4) Negative

35 A bullet is fired from a gun at the speed of 280 m s^{-1} in the direction 30° above the horizontal. The maximum height attained by the bullet is $\left(g = 9.8\ m\,s^{-2},\ \sin 30° = 0.5\right)$:

(1) 2800 m (2) 2000 m

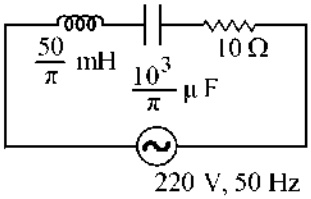
(3) 1000 m (4) 3000 m

36 Two thin lenses are of same focal lengths (f), but one is convex and the other one is concave. When they are placed in contact with each other, the equivalent focal length of the combination will be :

(1) Zero (2) $f/4$

(3) $f/2$ (4) Infinite

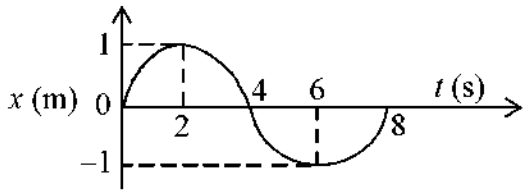
37 The net impedance of circuit (as shown in figure) will be :



(1) $10\sqrt{2}\ \Omega$ (2) $15\ \Omega$

(3) $5\sqrt{5}\ \Omega$ (4) $25\ \Omega$

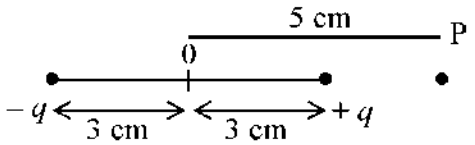
38 The x-t graph of a particle performing simple harmonic motion is shown in the figure. The acceleration of the particle at $t = 2$ s is :



(1) $\frac{\pi^2}{8}\ m\,s^{-2}$ (2) $-\frac{\pi^2}{8}\ m\,s^{-2}$

(3) $\frac{\pi^2}{16}\ m\,s^{-2}$ (4) $-\frac{\pi^2}{16}\ m\,s^{-2}$

39 An electric dipole is placed as shown in the figure.



The electric potential (in 10^2 V) at point P due to the dipole is (ϵ_0 = permittivity of free space and $\frac{1}{4\pi\epsilon_0} = K$):

(1) $\left(\frac{3}{8}\right)qK$ (2) $\left(\frac{5}{8}\right)qK$

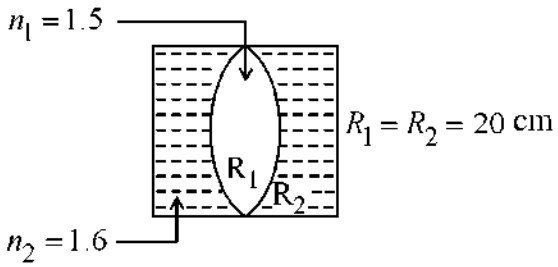
(3) $\left(\frac{8}{5}\right)qK$ (4) $\left(\frac{8}{3}\right)qK$

40 A bullet from a gun is fired on a rectangular wooden block with velocity u. When bullet travels 24 cm through the block along its length horizontally, velocity of bullet becomes $\frac{u}{3}$. Then it further penetrates into the block in the same direction before coming to rest exactly at the other end of the block. The total length of the block is :

(1) 27 cm (2) 24 cm

(3) 28 cm (4) 30 cm

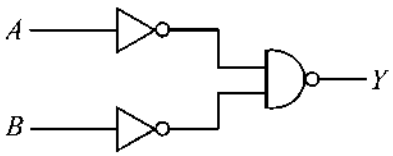
41 In the figure shown here, what is the equivalent focal length of the combination of lenses (Assume that all layers are thin)?



(1) 40 cm (2) − 40 cm

(3) − 100 cm (4) − 50 cm

42 For the following logic circuit, the truth table is:



(1)

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

(2)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

(3)

A	B	Y
0	0	1
0	1	0
1	0	1
1	1	0

(4)

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

43 A horizontal bridge is built across a river. A student standing on the bridge throws a small ball vertically upwards with a velocity $4\ m\ s^{-1}$. The ball strikes the water surface after 4 s. The height of bridge above water surface is (Take $g = 10\ m\ s^{-2}$) :

(1) 56 m (2) 60 m

(3) 64 m (4) 68 m

44 10 resistors, each of resistance R are connected in series to a battery of emf E and negligible internal resistance. Then those are connected in parallel to the same battery, the current is increased n times. The value of n is :

(1) 10 (2) 100

(3) 1 (4) 1000

45 A wire carrying a current I along the positive x-axis has length L. It is kept in a magnetic field $\vec{B} = (2\hat{i} + 3\hat{j} - 4\hat{k})$ T. The magnitude of the magnetic force acting on the wire is :

(1) $3\ IL$ (2) $\sqrt{5}\ IL$

(3) $5\ IL$ (4) $\sqrt{3}\ IL$

46 A satellite is orbiting just above the surface of the earth with period T. If d is the density of the earth and G is the universal constant of gravitation, the quantity $\frac{3\pi}{Gd}$ represents :

(1) T (2) T^2

(3) T^3 (4) $\sqrt{T}$

47 Calculate the maximum acceleration of a moving car so that a body lying on the floor of the car remains stationary. The coefficient of static friction between the body and the floor is 0.15 ($g = 10\ m\ s^{-2}$).

(1) $1.2\ m\ s^{-2}$ (2) $150\ m\ s^{-2}$

(3) $1.5\ m\ s^{-2}$ (4) $50\ m\ s^{-2}$

48 The resistance of platinum wire at 0°C is 2Ω and 6.8Ω at 80°C. The temperature coefficient of resistance of the wire is :

(1) $3\times10^{-4}\ °C^{-1}$ (2) $3\times10^{-3}\ °C^{-1}$

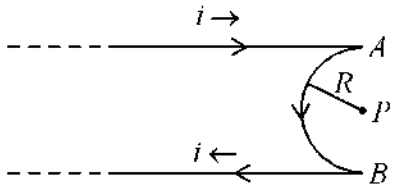
(3) $3\times10^{-2}\ °C^{-1}$ (4) $3\times10^{-1}\ °C^{-1}$

49 The radius of inner most orbit of hydrogen atom is 5.3×10^{-11} m. What is the radius of third allowed orbit of hydrogen atom?

(1) 0.53 Å (2) 1.06 Å

(3) 1.59 Å (4) 4.77 Å

50 A very long conducting wire is bent in a semi-circular shape from A to B as shown in figure. The magnetic field at point P for steady current configuration is given by :



(1) $\frac{\mu_0 i}{4R}$ pointed into the page

(2) $\frac{\mu_0 i}{4R}$ pointed away from the page

(3) $\frac{\mu_0 i}{4R}\left[1-\frac{2}{\pi}\right]$ pointed away from page

(4) $\frac{\mu_0 i}{4R}\left[1-\frac{2}{\pi}\right]$ pointed into the page

51 Which of the following reactions will NOT give primary amine as the product?

(1) $CH_3CONH_2 \xrightarrow{Br_2 / KOH}$ Product

(2) $CH_3CN \xrightarrow[(ii)\ H_3O\oplus]{(i)\ LiAlH_4}$ Product

(3) $CH_3NC \xrightarrow[(ii)\ H_3O\oplus]{(i)\ LiAlH_4}$ Product

(4) $CH_3CONH_2 \xrightarrow[(ii)\ H_3O\oplus]{(i)\ LiAlH_4}$ Product

52 Match **List - I** with **List - II** :

	List - I		**List - II**
A.	Coke	I.	Carbon atoms are sp^3 hybridised.
B.	Diamond	II.	Used as a dry lubricant
C.	Fullerene	III.	Used as a reducing agent
D.	Graphite	IV.	Cage like molecules

Choose the **correct** answer from the options given below :

(1) A-II, B-IV, C-I, D-III
(2) A-IV, B-I, C-II, D-III
(3) A-III, B-I, C-IV, D-II
(4) A-III, B-IV, C-I, D-II

53 Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : Metallic sodium dissolves in liquid ammonia giving a deep blue solution, which is paramagnetic.

Reasons R : The deep blue solution is due to the formation of amide.

In the light of the above statements, choose the **correct** 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.

54 In Lassaigne's extract of an organic compound, both nitrogen and sulphur are present, which gives blood red colour with Fe^{3+} due to the formation of -

(1) $Fe_4\left[Fe(CN)_6\right]_3 \cdot x H_2O$

(2) NaSCN

(3) $\left[Fe(CN)_5 NOS\right]^{4-}$

(4) $\left[Fe(SCN)\right]^{2+}$

55 The conductivity of centimolar solution of KCl at 25°C is 0.0210 $ohm^{-1}\ cm^{-1}$ and the resistance of the cell containing the solution at 25°C is 60 ohm. The value of cell constant is -

(1) 1.34 cm^{-1} (2) 3.28 cm^{-1}
(3) 1.26 cm^{-1} (4) 3.34 cm^{-1}

56 Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : A reaction can have zero activation energy.

Reasons R : The minimum extra amount of energy absorbed by reactant molecules so that their energy becomes equal to threshold value, is called activation energy.

In the light of the above statements, choose the **correct** 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 and **R** is **NOT** the correct explanation of **A**.
(3) **A** is true but **R** is false.
(4) **A** is false but **R** is true.

57 Which one is an example of heterogenous catalysis?

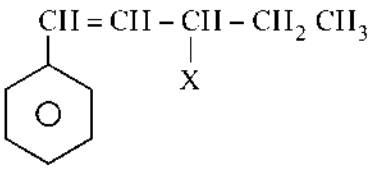
(1) Oxidation of sulphur dioxide into sulphur trioxide in the presence of oxides of nitrogen.

(2) Hydrolysis of sugar catalysed by H^+ ions.

(3) Decomposition of ozone in presence of nitrogen monoxide.

(4) Combination between dinitrogen and dihydrogen to form ammonia in the presence of finely divided iron.

58 The given compound



is an example of _____.

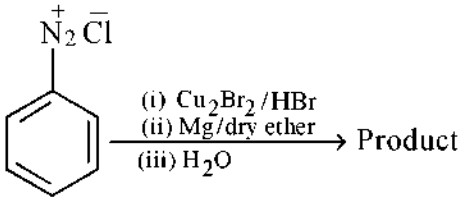
(1) benzylic halide

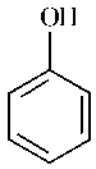
(2) aryl halide

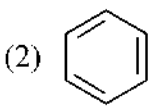
(3) allylic halide

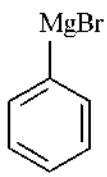
(4) vinylic halide

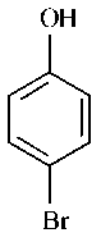
59 Identify the product in the following reaction:



(1) 

(2) 

(3) 

(4) 

60 Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : Helium is used to dilute oxygen in diving apparatus.

Reasons R : Helium has high solubility in O_2.

In the light of the above statements, choose the **correct** 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 and **R** is **NOT** the correct explanation of **A**.

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

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

61 A compound is formed by two elements A and B. The element B forms cubic close packed structure and atoms of A occupy 1/3 of tetrahedral voids. If the formula of the compound is A_xB_y, then the value of $x + y$ is in option

(1) 5 (2) 4

(3) 3 (4) 2

62 Given below are two statements :

Statement I : A unit formed by the attachment of a base to 1' position of sugar is known as nucleoside

Statement II : When nucleoside is linked to phosphorous acid at 5'-position of sugar moiety, we get nucleotide.

In the light of the above statements, choose the **correct** answer from the options given below :

(1) Both Statement **I** and Statement **II** are true.

(2) Both Statement **I** and Statement **II** are false.

(3) Statement **I** is true but Statement **II** is false.

(4) Statement **I** is false but Statement **II** is true.

63 The relation between n_m, (n_m = the number of permissible values of magnetic quantum number (m)) for a given value of azimuthal quantum number (l), is

(1) $l = \frac{n_m - 1}{2}$ (2) $l = 2n_m + 1$

(3) $n_m = 2l^2 + 1$ (4) $n_m = l + 2$

64 Amongst the following, the total number of species NOT having eight electrons around central atom in its outer most shell, is

$NH_3, AlCl_3, BeCl_2, CCl_4, PCl_5$:

(1) 3 (2) 2

(3) 4 (4) 1

65 The **correct** order of energies of molecular orbitals of N_2 molecule, is :

(1) $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < (\pi 2p_x = \pi 2p_y) < \sigma 2p_z < (\pi^* 2p_x = \pi^* 2p_y) < \sigma^* 2p_z$

(2) $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \sigma 2p_z < (\pi 2p_x = \pi 2p_y) < (\pi^* 2p_x = \pi^* 2p_y) < \sigma^* 2p_z$

(3) $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \sigma 2p_z < \sigma^* 2p_z < (\pi 2p_x = \pi 2p_y) < (\pi^* 2p_x = \pi^* 2p_y)$

(4) $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < (\pi 2p_x = \pi 2p_y) < (\pi^* 2p_x = \pi^* 2p_y) < \sigma 2p_z < \sigma^* 2p_z$

66 The number of σ bonds, π bonds and lone pair of electrons in pyridine, respectively are:

(1) 11, 2, 0 (2) 12, 3, 0

(3) 11, 3, 1 (4) 12, 2, 1

67 Intermolecular forces are forces of attraction and repulsion between interacting particles that will include :

A. dipole - dipole forces.

B. dipole - induced dipole forces.

C. hydrogen bonding.

D. covalent bonding.

E. dispersion forces.

Choose the **most appropriate** answer from the options given below :

(1) B, C, D, E are correct.

(2) A, B, C, D are correct.

(3) A, B, C, E are correct.

(4) A, C, D, E are correct.

68 Which of the following statements are **NOT** correct?

A. Hydrogen is used to reduce heavy metal oxides to metals.

B. Heavy water is used to study reaction mechanism.

C. Hydrogen is used to make saturated fats from oils.

D. The H-H bond dissociation enthalpy is lowest as compared to a single bond between two atoms of any element.

E. Hydrogen reduces oxides of metals that are more active than iron.

Choose the **most appropriate** answer from the options given below :

(1) B, C, D, E only

(2) B, D only

(3) D, E only

(4) A, B, C only

69 Which amongst the following molecules on polymerization produces neoprene?

(1) $H_2C = CH - CH = CH_2$

(2) $H_2C = \underset{\displaystyle Cl}{\underset{|}{C}} - CH = CH_2$

(3) $H_2C = CH - C \equiv CH$

(4) $H_2C = \underset{\displaystyle CH_3}{\underset{|}{C}} - CH = CH_2$

70 Some tranquilizers are listed below. Which one from the following belongs to barbiturates?

(1) Chlordiazepoxide
(2) Meprobamate
(3) Valium
(4) Veronal

71 The element expected to form largest ion to achieve the nearest noble gas configuration is :

(1) O (2) F
(3) N (4) Na

72 Select the **correct** statements from the following :

A. Atoms of all elements are composed of two fundamental particles.
B. The mass of the electron is 9.10939×10^{-31} kg.
C. All the isotopes of a given element show same chemical properties.
D. Protons and electrons are collectively known as nucleons.
E. Dalton's atomic theory, regarded the atom as an ultimate particle of matter.

Choose the **correct** answer from the options given below :

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

73 Consider the following reaction and identify the product (P).

$$\underset{\displaystyle CH_3}{\underset{|}{CH}}-\underset{\displaystyle OH}{\underset{|}{CH}}-CH_3 \xrightarrow{HBr} \text{Product (P)}$$

3 – Methylbutan – 2 – ol

(1) $CH_3 - \underset{\displaystyle CH_3}{\overset{\displaystyle Br}{\overset{|}{\underset{|}{C}}}} - CH_2 - CH_3$

(2) $CH_3\,CH = CH - CH_3$

(3) $CH_3 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - \underset{\displaystyle Br}{\underset{|}{CH}} - CH_3$

(4) $CH_3 - \underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}} - CH_2\,Br$

74 The stability of Cu^{2+} is more than Cu^{+} salts in aqueous solution due to -

(1) first ionisation enthalpy.
(2) enthalpy of atomization.
(3) hydration energy.
(4) second ionisation enthalpy.

75 Which one of the following statements is **correct**?

(1) The daily requirement of Mg and Ca in the human body is estimated to be 0.2 - 0.3 g.
(2) All enzymes that utilise ATP in phosphate transfer require Ca as the cofactor.
(3) The bone in human body is an inert and unchanging substance.
(4) Mg plays roles in neuromuscular function and interneuronal transmission.

76 Weight (g) of two moles of the organic compound, which is obtained by heating sodium ethanoate with sodium hydroxide in presence of calcium oxide is :

(1) 16 (2) 32

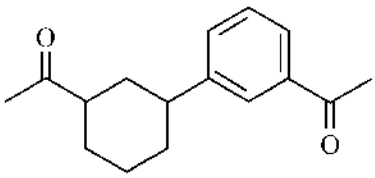
(3) 30 (4) 18

77 Amongst the given options which of the following molecules / ion acts as a Lewis acid?

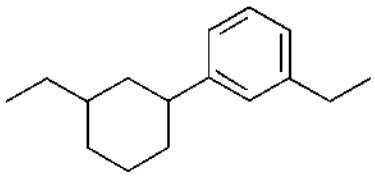
(1) NH_3 (2) H_2O

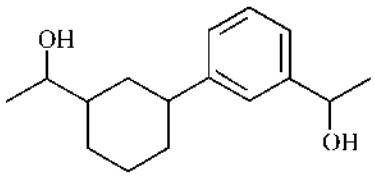
(3) BF_3 (4) OH^-

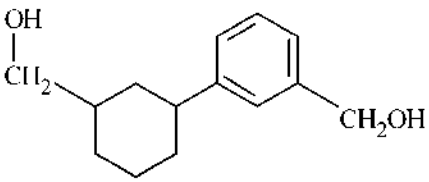
78 Identify product (A) in the following reaction:

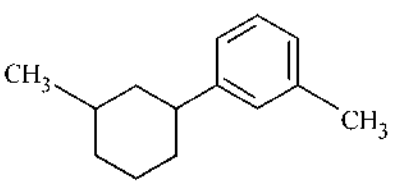


$$\xrightarrow[\text{conc. HCl}]{\text{Zn–Hg}} (A) + 2H_2O$$

(1) 

(2) 

(3) 

(4) 

79 Taking stability as the factor, which one of the following represents **correct** relationship?

(1) $TlCl_3 > TlCl$

(2) $InI_3 > InI$

(3) $AlCl > AlCl_3$

(4) $TlI > TlI_3$

80 Homoleptic complex from the following complexes is :

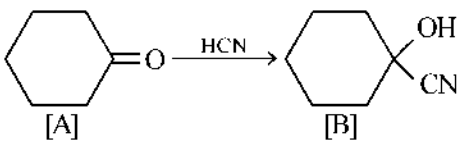
(1) Potassium trioxalatoaluminate (III)

(2) Diamminechloridonitrito - N - platinum (II)

(3) Pentaamminecarbonatocobalt (III) chloride

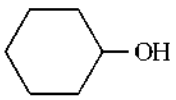
(4) Triamminetriaquachromium (III) chloride

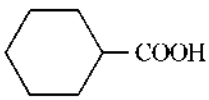
81 Complete the following reaction :

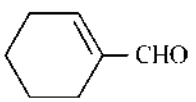


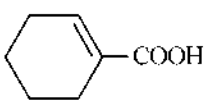
$$\xrightarrow[\Delta]{\text{conc. } H_2SO_4} [C]$$

[C] is _____.

(1) 

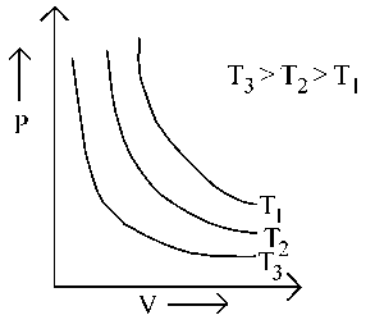
(2) 

(3) 

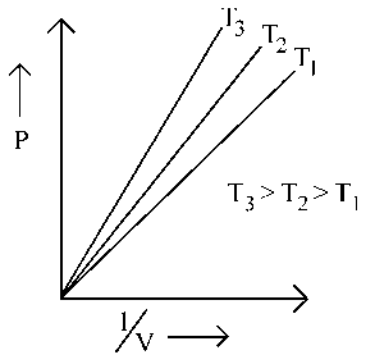
(4) 

82 Which amongst the following options is **correct** graphical representation of Boyle's Law?

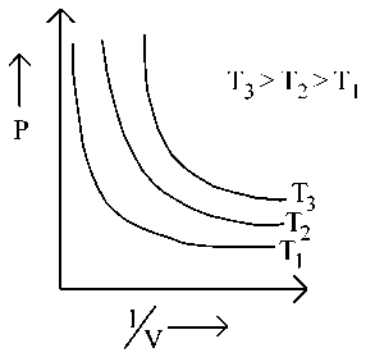
(1)



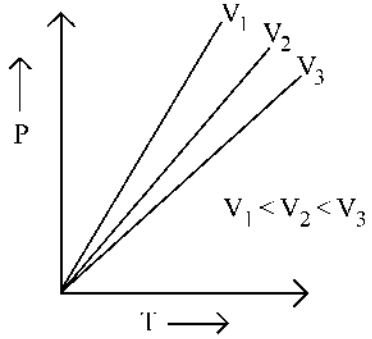
(2)



(3)



(4)



83 The **right** option for the mass of CO_2 produced by heating 20 g of 20% pure limestone is (Atomic mass of Ca = 40)

$$\left[CaCO_3 \xrightarrow{1200\ K} CaO + CO_2\right]$$

(1) 1.12 g (2) 1.76 g

(3) 2.64 g (4) 1.32 g

84 For a certain reaction, the rate = $k[A]^2[B]$, when the initial concentration of A is tripled keeping concentration of B constant, the initial rate would

(1) decrease by a factor of nine.

(2) increase by a factor of six.

(3) increase by a factor of nine.

(4) increase by a factor of three.

85 Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : In equation $\Delta_r G = -nFE_{cell}$, value of $\Delta_r G$ depends on n.

Reasons R : E_{cell} is an intensive property and $\Delta_r G$ is an extensive property.

In the light of the above statements, choose the **correct** 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 and **R** is **NOT** the correct explanation of **A**.

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

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

Chemistry : Section-B (Q. No. 86 to 100)

86 Match **List - I** with **List - II** :

List - I (Oxoacids of Sulphur)	**List - II (Bonds)**
A. Peroxodisulphuric acid	I. Two S-OH, Four S=O, One S-O-S
B. Sulphuric acid	II. Two S-OH, One S=O
C. Pyrosulphuric acid	III. Two S-OH, Four S=O, One S-O-O-S
D. Sulphurous acid	IV. Two S-OH, Two S=O

Choose the **correct** answer from the options given below :

(1) A-I, B-III, C-II, D-IV

(2) A-III, B-IV, C-I, D-II

(3) A-I, B-III, C-IV, D-II

(4) A-III, B-IV, C-II, D-I

87 Which of the following statements are **INCORRECT**?

A. All the transition metals except scandium form MO oxides which are ionic.

B. The highest oxidation number corresponding to the group number in transition metal oxides is attained in Sc_2O_3 to Mn_2O_7.

C. Basic character increases from V_2O_3 to V_2O_4 to V_2O_5.

D. V_2O_4 dissolves in acids to give VO_4^{3-} salts.

E. CrO is basic but Cr_2O_3 is amphoteric.

Choose the **correct** answer from the options given below :

(1) A and E only

(2) B and D only

(3) C and D only

(4) B and C only

88 Which complex compound is most stable?

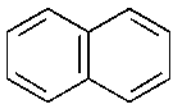
(1) $\left[Co(NH_3)_4(H_2O)Br\right](NO_3)_2$

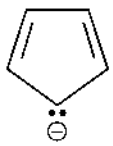
(2) $\left[Co(NH_3)_3(NO_3)_3\right]$

(3) $\left[CoCl_2(en)_2\right]NO_3$

(4) $\left[Co(NH_3)_6\right]_2(SO_4)_3$

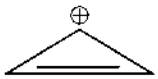
89 Consider the following compounds/species:

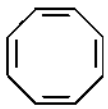
i. 

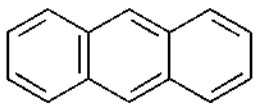
ii. 

iii. 

iv. 

v. 

vi. 

vii. 

The number of compounds/species which obey Huckel's rule is _____.

(1) 4 (2) 6

(3) 2 (4) 5

90 What fraction of one edge centred octahedral void lies in one unit cell of fcc?

(1) $\frac{1}{2}$ (2) $\frac{1}{3}$

(3) $\frac{1}{4}$ (4) $\frac{1}{12}$

91 Which amongst the following options is the **correct** relation between change in enthalpy and change in internal energy?

(1) $\Delta H = \Delta U - \Delta n_g RT$

(2) $\Delta H = \Delta U + \Delta n_g RT$

(3) $\Delta H - \Delta U = -\Delta nRT$

(4) $\Delta H + \Delta U = \Delta nR$

92 On balancing the given redox reaction,

$$a\ Cr_2O_7^{2-} + b\ SO_3^{2-}(aq) + c\ H^+(aq) \rightarrow$$

$$2a\ Cr^{3+}(aq) + b\ SO_4^{2-}(aq) + \frac{c}{2} H_2O(\ell)$$

the coefficients a, b and c are found to be, respectively -

(1) 1, 3, 8 (2) 3, 8, 1

(3) 1, 8, 3 (4) 8, 1, 3

93 The equilibrium concentrations of the species in the reaction $A + B \rightleftharpoons C + D$ are 2, 3, 10 and 6 mol L^{-1}, respectively at 300 K. $\Delta G°$ for the reaction is (R = 2 cal / mol K)

(1) 1372.60 cal (2) – 137.26 cal

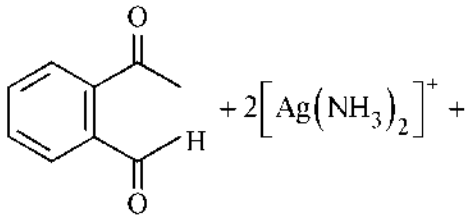
(3) – 1381.80 cal (4) – 13.73 cal

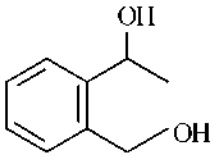
94 Pumice stone is an example of -

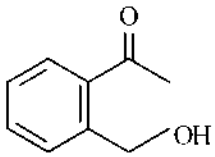
(1) sol (2) gel

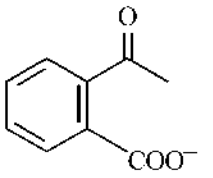
(3) solid sol (4) foam

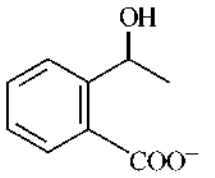
95 Identify the major product obtained in the following reaction :



(1) 

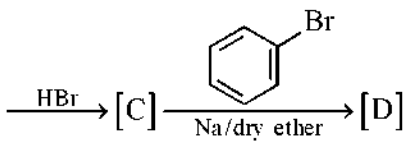
(2) 

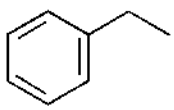
(3) 

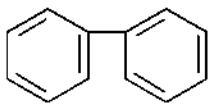
(4) 

96 Identify the final product [D] obtained in the following sequence of reactions.

$$CH_3CHO \xrightarrow[ii)\ H_3O^+]{i)\ LiAlH_4} [A] \xrightarrow[\Delta]{H_2SO_4} [B]$$



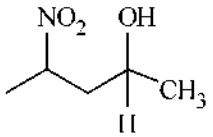
(1) 

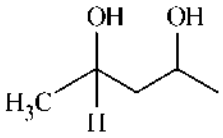
(2) 

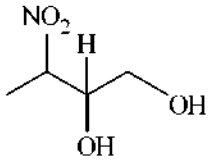
(3) C_4H_{10}

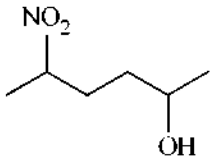
(4) $HC \equiv C^{\ominus}\ Na^+$

97 Which amongst the following will be most readily dehydrated under acidic conditions ?

(1) 

(2) 

(3) 

(4) 

98 Given below are two statements :

Statement I : The nutrient deficient water bodies lead to eutrophication.

Statement II : Eutrophication leads to decrease in the level of oxygen in the water bodies.

In the light of the above statements, choose the **correct** answer from the options given below :

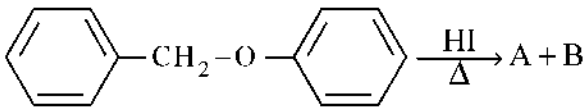
(1) Both **Statement I** and **Statement II** are true.

(2) Both **Statement I** and **Statement II** are false.

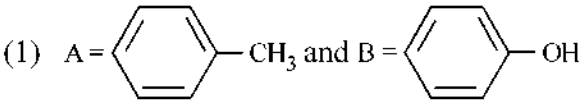
(3) **Statement I** is correct but **Statement II** is false.

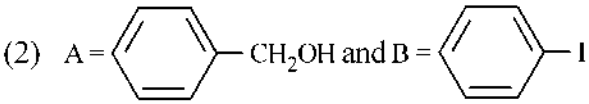
(4) **Statement I** is incorrect but **Statement II** is true.

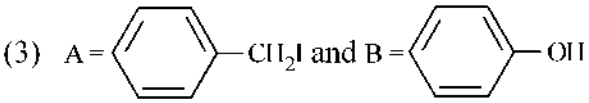
99 Consider the following reaction :

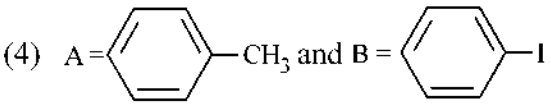


Identify products A and B.

(1) 

(2) 

(3) 

(4) 

100 The reaction that does **NOT** take place in a blast furnace between 900 K to 1500 K temperature range during extraction of iron is :

(1) $Fe_2O_3 + CO \rightarrow 2FeO + CO_2$

(2) $FeO + CO \rightarrow Fe + CO_2$

(3) $C + CO_2 \rightarrow 2CO$

(4) $CaO + SiO_2 \rightarrow CaSiO_3$

Botany : Section-A (Q. No. 101 to 135)

101 Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R** :
Assertion A : The first stage of gametophyte in the life cycle of moss is protonema stage.
Reason R : Protonema develops directly from spores produced in capsule.
In the light of 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.

102 In angiosperm, the haploid, diploid and triploid structures of a fertilized embryo sac sequentially are :
(1) Synergids, Primary endosperm nucleus and zygote
(2) Antipodals, synergids, and primary endosperm nucleus
(3) Synergids, Zygote and Primary endosperm nucleus
(4) Synergids, antipodals and Polar nuclei

103 Movement and accumulation of ions across a membrane against their concentration gradient can be explained by
(1) Osmosis
(2) Facilitated Diffusion
(3) Passive Transport
(4) Active Transport

104 Large, colourful, fragrant flowers with nectar are seen in :
(1) insect pollinated plants
(2) bird pollinated plants
(3) bat pollinated plants
(4) wind pollinated plants

105 The phenomenon of pleiotropism refers to
(1) presence of several alleles of a single gene controlling a single crossover.
(2) presence of two alleles, each of the two genes controlling a single trait.
(3) a single gene affecting multiple phenotypic expression.
(4) more than two genes affecting a single character.

106 Which hormone promotes internode/petiole elongation in deep water rice?
(1) GA_3 (2) Kinetin
(3) Ethylene (4) 2, 4-D

107 Among 'The Evil Quartet', which one is considered the most important cause driving extinction of species?
(1) Habitat loss and fragmentation
(2) Over exploitation for economic gain
(3) Alien species invasions
(4) Co-extinctions

108 Upon exposure to UV radiation, DNA stained with ethidium bromide will show
(1) Bright red colour
(2) Bright blue colour
(3) Bright yellow colour
(4) Bright orange colour

109 Which micronutrient is required for splitting of water molecule during photosynthesis?
(1) manganese (2) molybdenum
(3) magnesium (4) copper

110 Axile placentation is observed in
(1) Mustard, Cucumber and Primrose
(2) China rose, Beans and Lupin
(3) Tomato, Dianthus and Pea
(4) China rose, Petunia and Lemon

111 The process of appearance of recombination nodules occurs at which sub stage of prophase I in meiosis?
(1) Zygotene (2) Pachytene
(3) Diplotene (4) Diakinesis

112 The reaction centre in PS II has an absorption maxima at
(1) 680 nm (2) 700 nm
(3) 660 nm (4) 780 nm

113 Unequivocal proof that DNA is the genetic material was first proposed by
(1) Frederick Griffith
(2) Alfred Hershey and Martha Chase
(3) Avery, Macleoid and McCarthy
(4) Wilkins and Franklin

114 Among eukaryotes, replication of DNA takes place in -
(1) M phase (2) S phase
(3) G_1 phase (4) G_2 phase

115 In tissue culture experiments, leaf mesophyll cells are put in a culture medium to form callus. This phenomenon may be called as -
(1) Differentiation
(2) Dedifferentiation
(3) Development
(4) Senescence

116 Cellulose does not form blue colour with Iodine because
(1) It is a disaccharide.
(2) It is a helical molecule.
(3) It does not contain complex helices and hence cannot hold iodine molecules.
(4) It breakes down when iodine reacts with it.

117 Spraying of which of the following phytohormone on juvenile conifers helps in hastening the maturity period, that leads to early seed production?
(1) Indole-3-butyric Acid
(2) Gibberellic Acid
(3) Zeatin
(4) Abscisic Acid

118 Given below are two statements :
Statement I : The forces generated by transpiration can lift a xylem-sized column of water over 130 meters height.
Statement II : Transpiration cools leaf surfaces sometimes 10 to 15 degrees, by evaporative cooling.
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.

119 Family Fabaceae differs from Solanaceae and Liliaceae. With respect to the stamens, pick out the characteristics specific to family Fabaceae but not found in Solanaceae or Liliaceae.
(1) Diadelphous and Dithecous anthers
(2) Polyadelphous and epipetalous stamens
(3) Monoadelphous and Monothecous anthers
(4) Epiphyllous and Dithecous anthers

120 Expressed Sequence Tags (ESTs) refers to
(1) All genes that are expressed as RNA.
(2) All genes that are expressed as proteins.
(3) All genes whether expressed or unexpressed.
(4) Certain important expressed genes.

121 Identify the **correct** statements :
A. Detrivores perform fragmentation.
B. The humus is further degraded by some microbes during mineralization.
C. Water soluble inorganic nutrients go down into the soil and get precipitated by a process called leaching.
D. The detritus food chain begins with living organisms.
E. Earthworms break down detritus into smaller particles by a process called catabolism.
Choose the **correct** answer from the options given below :
(1) A, B, C only (2) B, C, D only
(3) C, D, E only (4) D, E, A only

122 The thickness of ozone in a column of air in the atmosphere is measured in terms of :
(1) Dobson units (2) Decibels
(3) Decameter (4) Kilobase

123 Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R** :
Assertion A : Late wood has fewer xylary elements with narrow vessels.
Reason R : Cambium is less active in winters.
In the light of the above statements, choose the **correct** 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.

124 Which of the following stages of meiosis involves division of centromere?
(1) Metaphase I (2) Metaphase II
(3) Anaphase II (4) Telophase

125 The historic Convention on Biological Diversity, 'The Earth Summit' was held in Rio de Janeiro in the year :
(1) 1985 (2) 1992
(3) 1986 (4) 2002

126 How many ATP and $NADPH_2$ are required for the synthesis of one molecule of Glucose during Calvin cycle?
(1) 12 ATP and 12 $NADPH_2$
(2) 18 ATP and 12 $NADPH_2$
(3) 12 ATP and 16 $NADPH_2$
(4) 18 ATP and 16 $NADPH_2$

127 In the equation
$\boxed{GPP - R = NPP}$
GPP is Gross Primary Productivity
NPP is Net Primary Productivity
R here is _____.
(1) Photosynthetically active radiation
(2) Respiratory quotient
(3) Respiratory loss
(4) Reproductive allocation

128 During the purification process for recombinant DNA technology, addition of chilled ethanol precipitates out
(1) RNA (2) DNA
(3) Histones (4) Polysaccharides

129 What is the role of RNA polymerase III in the process of transcription in Eukaryotes?
(1) Transcription of rRNAs (28S, 18S and 5.8S)
(2) Transcription of tRNA, 5 srRNA and snRNA
(3) Transcription of precursor of mRNA
(4) Transcription of only snRNAs

130 What is the function of tassels in the corn cob?
(1) To attract insects
(2) To trap pollen grains
(3) To disperse pollen grains
(4) To protect seeds

131 Identify the pair of heterosporous pteridophytes among the following :
(1) *Lycopodium* and *Selaginella*
(2) *Selaginella* and *Salvinia*
(3) *Psilotum* and *Salvinia*
(4) *Equisetum* and *Salvinia*

132 In gene gun method used to introduce alien DNA into host cells, microparticles of _____ metal are used.
(1) Copper
(2) Zinc
(3) Tungsten or gold
(4) Silver

Botany : Section-B (Q. No. 136 to 150)

133 Given below are two statements :
Statement I : Endarch and exarch are the terms often used for describing the position of secondary xylem in the plant body.
Statement II : Exarch condition is the most common feature of the root system.
In the light of the above statements, choose the **correct** answer from the options given below :
(1) Both **Statement I** and **Statement II** are true.
(2) Both **Statement I** and **Statement II** are false.
(3) **Statement I** is correct but **Statement II** is false.
(4) **Statement I** is incorrect but **Statement II** is true.

134 Frequency of recombination between gene pairs on same chromosome as a measure of the distance between genes to map their position on chromosome, was used for the first time by
(1) Thomas Hunt Morgan
(2) Sutton and Boveri
(3) Alfred Sturtevant
(4) Henking

135 Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R** :
Assertion A : ATP is used at two steps in glycolysis.
Reason R : First ATP is used in converting glucose into glucose-6-phosphate and second ATP is used in conversion of fructose-6-phosphate into fructose-1-6-diphosphate.
In the light of the above statements, choose the **correct** 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.

136 Which one of the following statements is **NOT** correct?
(1) The micro-organisms involved in biodegradation of organic matter in a sewage polluted water body consume a lot of oxygen causing the death of aquatic organisms.
(2) Algal blooms caused by excess of organic matter in water improve water quality and promote fisheries.
(3) Water hyacinth grows abundantly in eutrophic water bodies and leads to an imbalance in the ecosystem dynamics of the water body.
(4) The amount of some toxic substances of industrial waste water increases in the organisms at successive trophic levels.

137 How many different proteins does the ribosome consist of?
(1) 80 (2) 60
(3) 40 (4) 20

138 Which of the following statements are correct about Klinefelter's Syndrome?
A. This disorder was first described by Langdon Down (1866).
B. Such an individual has overall masculine development. However, the feminine development is also expressed.
C. The affected individual is short statured.
D. Physical, psychomotor and mental development is retarded.
E. Such individuals are sterile.
Choose the **correct** answer from the options given below :
(1) A and B only (2) C and D only
(3) B and E only (4) A and E only

139 Match **List I** with **List II** :

List I	**List II**
A. Oxidative decarboxylation	I. Citrate synthase
B. Glycolysis	II. Pyruvate dehydrogenase
C. Oxidative phosphorylation	III. Electron transport system
D. Tricarboxylic acid cycle	IV. EMP pathway

Choose the correct answer from the options given below :
(1) A-III, B-IV, C-II, D-I
(2) A-II, B-IV, C-I, D-III
(3) A-III, B-I, C-II, D-IV
(4) A-II, B-IV, C-III, D-I

140 Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : A flower is defined as modified shoot wherein the shoot apical meristem changes to floral meristem.

Reason R : Internode of the shoot gets condensed to produce different floral appendages laterally at successive nodes instead of leaves.

In the light of the above statements, choose the **correct** 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.

141 Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : In gymnosperms the pollen grains are released from the microsporangium and carried by air currents.

Reason R : Air currents carry the pollen grains to the mouth of the archegonia where the male gametes are discharged and pollen tube is not formed.

In the light of the above statements, choose the **correct** 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.

142 Match **List I** with **List II** :

	List I		**List II**
A.	Cohesion	I.	More attraction in liquid phase
B.	Adhesion	II.	Mutual attraction among water molecules
C.	Surface tension	III.	Water loss in liquid phase
D.	Guttation	IV.	Attraction towards polar surfaces

Choose the **correct** answer from the options given below :

(1) A-II, B-IV, C-I, D-III

(2) A-IV, B-III, C-II, D-I

(3) A-III, B-I, C-IV, D-II

(4) A-II, B-I, C-IV, D-III

143 Which of the following combinations is required for chemiosmosis?

(1) membrane, proton pump, proton gradient, ATP synthase

(2) membrane, proton pump, proton gradient, NADP synthase

(3) proton pump, electron gradient, ATP synthase

(4) proton pump, electron gradient, NADP synthase

144 Melonate inhibits the growth of pathogenic bacteria by inhibiting the activity of

(1) Succinic dehydrogenase

(2) Amylase

(3) Lipase

(4) Dinitrogenase

145 Identify the **correct** statements :

A. Lenticels are the lens-shaped openings permitting the exchange of gases.

B. Bark formed early in the season is called hard bark.

C. Bark is a technical term that refers to all tissues exterior to vascular cambium.

D. Bark refers to periderm and secondary phloem.

E. Phellogen is single-layered in thickness.

Choose the correct answer from the options given below :

(1) B, C and E only

(2) A and D only

(3) A, B and D only

(4) B and C only

146 Match **List I** with **List II** :

	List I		**List II**
A.	M Phase	I.	Proteins are synthesized
B.	G_2 Phase	II.	Inactive phase
C.	Quiescent stage	III.	Interval between mitosis and initiation of DNA replication
D.	G_1 Phase	IV.	Equational division

Choose the correct answer from the options given below :

(1) A-III, B-II, C-IV, D-I

(2) A-IV, B-II, C-I, D-III

(3) A-IV, B-I, C-II, D-III

(4) A-II, B-IV, C-I, D-III

147 Match **List I** with **List II** :

List I (Interaction)		**List II (Species A and B)**
A.	Mutualism	I. +(A), O(B)
B.	Commensalism	II. −(A), O(B)
C.	Amensalism	III. +(A), −(B)
D.	Parasitism	IV. +(A), +(B)

Choose the **correct** answer from the options given below :

(1) A-IV, B-II, C-I, D-III

(2) A-IV, B-I, C-II, D-III

(3) A-IV, B-III, C-I, D-II

(4) A-III, B-I, C-IV, D-II

148 Given below are two statements :

Statement I : Gause's 'Competitive Exclusion Principle' states that two closely related species competing for the same resources cannot co-exist indefinitely and competitively inferior one will be eliminated eventually.

Statement II : In general, carnivores are more adversely affected by competition than herbivores.

In the light of the above statements, choose the **correct** answer from the options given below :

(1) Both **Statement I** and **Statement II** are true.

(2) Both **Statement I** and **Statement II** are false.

(3) **Statement I** is correct but **Statement II** is false.

(4) **Statement I** is incorrect but **Statement II** is true.

149 Match **List I** with **List II** :

List I		**List II**
A.	Iron	I. Synthesis of auxin
B.	Zinc	II. Component of nitrate reductase
C.	Boron	III. Activator of catalase
D.	Molybdenum	IV. Cell elongation and differentiation

Choose the correct answer from the options given below :

(1) A-III, B-II, C-I, D-IV

(2) A-II, B-III, C-IV, D-I

(3) A-III, B-I, C-IV, D-II

(4) A-II, B-IV, C-I, D-III

150 Main steps in the formation of Recombinant DNA are given below. Arrange these steps in a correct sequence.

A. Insertion of recombinant DNA into the host cell.

B. Cutting of DNA at specific location by restriction enzyme.

C. Isolation of desired DNA fragment.

D. Amplification of gene of interest using PCR.

Choose the correct answer from the options given below :

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

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

151 Match **List I** with **List II**.

	List I		List II
A.	Vasectomy	I.	Oral method
B.	Coitus interruptus	II.	Barrier method
C.	Cervical caps	III.	Surgical method
D.	Saheli	IV.	Natural method

Choose the **correct** answer from the options given below:

(1) A-III, B-I, C-IV, D-II
(2) A-III, B-IV, C-II, D-I
(3) A-II, B-III, C-I, D-IV
(4) A-IV, B-II, C-I, D-III

152 Given below are two statements:

Statement I: Vas deferens receives a duct from seminal vesicle and opens into urethra as the ejaculatory duct.

Statement II: The cavity of the cervix is called cervical canal which along with vagina forms birth canal.

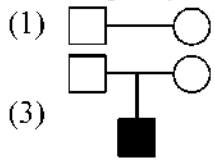
In the light of the above statements, choose the **correct** answer from the options given below:

(1) Both **Statement I** and **Statement II** are true.
(2) Both **Statement I** and **Statement II** are false.
(3) **Statement I** is correct but **Statement II** is false.
(4) **Statement I** incorrect but **Statement II** is true.

153 Which of the following statements is correct?

(1) Eutrophication refers to increase in domestic sewage and waste water in lakes.
(2) Biomagnification refers to increase in concentration of the toxicant at successive trophic levels.
(3) Presence of large amount of nutrients in water restricts 'Algal Bloom'
(4) Algal Bloom decreases fish mortality

154 Which one of the following symbols represents mating between relatives in human pedigree analysis?

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

155 Which one of the following common sexually transmitted diseases is completely curable when detected early and treated properly?

(1) Genital herpes (2) Gonorrhoea
(3) Hepatitis-B (4) HIV Infection

156 Match **List I** with **List II**.

	List I		List II
A.	Heroin	I.	Effect on cardiovascular system
B.	Marijuana	II.	Slow down body function
C.	Cocaine	III.	Painkiller
D.	Morphine	IV.	Interfere with transport of dopamine

Choose the **correct** answer from the options given below:

(1) A-II, B-I, C-IV, D-III
(2) A-I, B-II, C-III, D-IV
(3) A-IV, B-III, C-II, D-I
(4) A-III, B-IV, C-I, D-II

157 Match **List I** with **List II**.

	List I (Type of Joint)		List II (Found between)
A.	Cartilaginous Joint	I.	Between flat skull bones
B.	Ball and Socket Joint	II.	Between adjacent vertebrae in vertebral column
C.	Fibrous Joint	III.	Between carpal and metacarpal of thumb
D.	Saddle Joint	IV.	Between Humerus and Pectoral girdle

Choose the **correct** answer from the options given below:

(1) A-III, B-I, C-II, D-IV
(2) A-II, B-IV, C-I, D-III
(3) A-I, B-IV, C-III, D-II
(4) A-II, B-IV, C-III, D-I

158 Given below are two statements:
Statement I: A protein is imagined as a line, the left end represented by first amino acid (C-terminal) and the right end represented by last amino acid (N-terminal)
Statement II: Adult human haemoglobin, consists of 4 subunits (two subunits of α type and two subunits of β type.)
In the light of the above statements, choose the **correct** answer from the options given below:
(1) Both **Statement I** and **Statement II** are true.
(2) Both **Statement I** and **Statement II** are false.
(3) **Statement I** is true but **Statement II** is false.
(4) **Statement I** is false but **Statement II** is true.

159 Which of the following are NOT considered as the part of endomembrane system?
A. Mitochondria B. Endoplasmic Reticulum
C. Chloroplasts D. Golgi complex
E. Peroxisomes
Choose the **most appropriate** answer from the options given below:
(1) B and D only
(2) A, C and E only
(3) A and D only
(4) A, D and E only

160 Given below are two statements:
Statement I: RNA mutates at a faster rate.
Statement II: Viruses having RNA genome and shorter life span mutate and evolve faster.
In the light of the above statements, choose the **correct** answer from the options given below:
(1) Both **Statement I** and **Statement II** are true.
(2) Both **Statement I** and **Statement II** are false.
(3) **Statement I** is true but **Statement II** is false.
(4) **Statement I** false but **Statement II** is true.

161 Match **List I** with **List II**.

List I		**List II**	
A.	CCK	I.	Kidney
B.	GIP	II.	Heart
C.	ANF	III.	Gastric gland
D.	ADH	IV.	Pancreas

Choose the **correct** answer from the options given below:
(1) A-IV, B-III, C-II, D-I
(2) A-III, B-II, C-IV, D-I
(3) A-II, B-IV, C-I, D-III
(4) A-IV, B-II, C-III, D-I

162 Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R.**
Assertion A: Endometrium is necessary for implantation of blastocyst.
Reason R: In the absence of fertilization, the corpus luteum degenerates that causes disintegration of endometrium.
In the light of the above statements, choose the **correct** 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.

163 Match **List I** with **List II**.

List I		**List II**	
A.	Ringworm	I.	*Haemophilus influenzae*
B.	Filariasis	II.	*Trichophyton*
C.	Malaria	III.	*Wuchereria bancrofti*
D.	Pneumonia	IV.	*Plasmodium vivax*

Choose the **correct** answer from the options given below:
(1) A-II, B-III, C-IV, D-I
(2) A-II, B-III, C-I, D-IV
(3) A-III, B-II, C-I, D-IV
(4) A-III, B-II, C-IV, D-I

164 Given below are two statements:

Statement I: Low temperature preserves the enzyme in a temporarily inactive state whereas high temperature destroys enzymatic activity because proteins are denatured by heat.

Statement II: When the inhibitor closely resembles the substrate in its molecular structure and inhibits the activity of the enzyme, it is known as competitive inhibitor.

In the light of the above statements, choose the **correct** answer from the options given below:

(1) Both **Statement I** and **Statement II** are true.

(2) Both **Statement I** and **Statement II** are false.

(3) **Statement I** is true but **Statement II** is false.

(4) **Statement I** is false but **Statement II** is true.

165 Match **List I** with **List II**.

	List I		**List II**
A.	*Taenia*	I.	Nephridia
B.	*Paramoecium*	II.	Contractile vacuole
C.	*Periplaneta*	III.	Flame cells
D.	*Pheretima*	IV.	Urecose gland

Choose the **correct** answer from the options give below:

(1) A-I, B-II, C-III, D-IV

(2) A-I, B-II, C-IV, D-III

(3) A-III, B-II, C-IV, D-I

(4) A-II, B-I, C-IV, D-III

166 Which one of the following techniques does not serve the purpose of early diagnosis of a disease for its early treatment?

(1) Recombinant DNA Technology

(2) Serum and Urine analysis

(3) Polymerase Chain Reaction (PCR) technique

(4) Enzyme Linked Immuno-Sorbent Assay (ELISA) technique

167 Match **List I** with **List II**.

	List I (Interacting species)		**List II (Name of Interaction)**
A.	A Leopard and a Lion in a forest/ grassland	I.	Competition
B.	A Cuckoo laying egg in a Crow's nest	II.	Brood parasitism
C.	Fungi and root of a higher plant in Mycorrtizae	III.	Mutualism
D.	A cattle egret and a Cattle in a field	IV.	Commensalism

Choose the **correct** answer from the options given below:

(1) A-I, B-II, C-III, D-IV

(2) A-I, B-II, C-IV, D-III

(3) A-III, B-IV, C-I, D-II

(4) A-II, B-III, C-I, D-IV

168 Given below are two statements:

Statement I: Ligaments are dense irregular tissue.

Statement II: Cartilage is dense regular tissue.

In the light of the above statements, choose the **correct** answer from the options given below:

(1) Both **Statement I** and **Statement II** are true.

(2) Both **Statement I** and **Statement II** are false.

(3) **Statement I** is true but **Statement II** is false.

(4) **Statement I** is false but **Statement II** is true.

169 Given below are two statements:

Statement I: In prokaryotes, the positively charged DNA is held with some negatively charged proteins in a region called nucleoid.

Statement II: In eukaryotes, the negatively charged DNA is wrapped around the positively charged histone octamer to form nucleosome.

In the light of the above statements, choose the **correct** answer from the options given below:

(1) Both **Statement I** and **Statement II** are true.

(2) Both **Statement I** and **Statement II** are false.

(3) **Statement I** is correct but **Statement II** is false.

(4) **Statement I** incorrect but **Statement II** is true.

170 Match **List I** with **List II** with respect to human eye.

List I		**List II**
A. Fovea	I.	Visible coloured portion of eye that regulates diameter of pupil.
B. Iris	II.	External layer of eye formed of dense connective tissue.
C. Blind spot	III.	Point of greatest visual acuity or resolution.
D. Sclera	IV.	Point where optic nerve leaves the eyeball and photoreceptor cells are absent.

Choose the **correct** answer from the options given below:

(1) A-III, B-I, C-IV, D-II

(2) A-IV, B-III, C-II, D-I

(3) A-I, B-IV, C-III, D-II

(4) A-II, B-I, C-III, D-IV

171 Select the correct group/set of Australian Marsupials exhibiting adaptive radiation.

(1) Tasmanian wolf, Bobcat, Marsupial mole

(2) Numbat, Spotted cuscus, Flying phalanger

(3) Mole, Flying squirrel, Tasmanian tiger cat

(4) Lemur, Anteater, Wolf

172 Which of the following statements are correct regarding female reproductive cycle?

A. In non-primate mammals cyclical changes during reproduction are called oestrus cycle.

B. First menstrual cycle begins at puberty and is called menopause.

C. Lack of menstruation may be indicative of pregnancy.

D. Cyclic menstruation extends between menarche and menopause.

Choose the **most appropriate** answer from the options given below:

(1) A and D only

(2) A and B only

(3) A, B and C only

(4) A, C and D only

173 Vital capacity of lung is _____.

(1) IRV + ERV

(2) IRV + ERV + TV + RV

(3) IRV + ERV + TV – RV

(4) IRV + ERV + TV

174 Match **List I** with **List II**.

List I		**List II**
A. P - wave	I.	Beginning of systole
B. Q - wave	II.	Repolarisation of ventricles
C. QRS complex	III.	Depolarisation of atria
D. T - wave	IV.	Depolarisation of ventricles

Choose the **correct** answer from the options given below:

(1) A-III, B-I, C-IV, D-II

(2) A-IV, B-III, C-II, D-I

(3) A-II, B-IV, C-I, D-III

(4) A-I, B-II, C-III, D-IV

175 Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R.**

Assertion A: Amniocentesis for sex determination is one of the strategies of Reproductive and Child Health Care Programme.

Reason R: Ban on amniocentesis checks increasing menace of female foeticide.

In the light of the above statements, choose the **correct** 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 and **R** is NOT the correct explanation of **A**.

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

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

176 Once the undigested and unabsorbed substances enter the caecum, their backflow is prevented by-

(1) Sphincter of Oddi

(2) Ileo - caecal valve

(3) Gastro - oesophageal sphincter

(4) Pyloric sphincter

177 Match **List I** with **List II**.

	List I		**List II**
A.	Gene 'a'	I.	β-galactosidase
B.	Gene 'y'	II.	Transacetylase
C.	Gene 'i'	III.	Permease
D.	Gene 'z'	IV.	Repressor protein

Choose the **correct** answer from the options given below:

(1) A-II, B-I, C-IV, D-III

(2) A-II, B-III, C-IV, D-I

(3) A-III, B-IV, C-I, D-II

(4) A-III, B-I, C-IV, D-II

178 Match **List I** with **List II**.

	List I (Cells)		**List II (Secretion)**
A.	Peptic cells	I.	Mucus
B.	Goblet cells	II.	Bile juice
C.	Oxyntic cells	III.	Proenzyme pepsinogen
D.	Hepatic cells	IV.	HCl and intrinsic factor for absorption of vitamin B_{12}

Choose the **correct** answer from the options given below:

(1) A-IV, B-III, C-II, D-I

(2) A-II, B-I, C-III, D-IV

(3) A-III, B-I, C-IV, D-II

(4) A-II, B-IV, C-I, D-III

179 Which of the following functions is carried out by cytoskeleton in a cell?

(1) Nuclear division

(2) Protein synthesis

(3) Motility

(4) Transportation

180 Given below are statements: one is labelled as **Assertion A** and the other is labelled as **Reason R.**

Assertion A: Nephrons are of two types: Cortical & Juxta medullary, based on their relative position in cortex and medulla.

Reason R: Juxta medullary nephrons have short loop of Henle whereas, cortical nephrons have longer loop of Henle.

In the light of the above statements, choose the **correct** 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.

181 Given below are two statements:

Statement I: Electrostatic precipitator is most widely used in thermal power plant.

Statement II: Electrostatic precipitator in thermal power plant removes ionising radiations

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** incorrect but **Statement II** is correct.

182 Broad palm with single palm crease is visible in a person suffering from-

(1) Down's syndrome

(2) Turner's syndrome

(3) Klinefelter's syndrome

(4) Thalassemia

183 Radial symmetry is NOT found in adults of phylum _____.

(1) Ctenophora (2) Hemichordata

(3) Coelenterata (4) Echinodermata

184 In which blood corpuscles, the HIV undergoes replication and produces progeny viruses?

(1) T_H cells (2) B-lymphocytes

(3) Basophils (4) Eosinophils

185 Which of the following is not a cloning vector?

(1) BAC (2) YAC

(3) pBR322 (4) Probe

186 Match **List I** with **List II**.

	List I		**List II**
A.	Logistic growth	I.	Unlimited resource availability condition
B.	Exponential growth	II.	Limited resource availability condition
C.	Expanding age pyramid	III.	The percent individuals of pre-reproductive age is largest followed by reproductive and post reproductive age groups
D.	Stable age pyramid	IV.	The percent individuals of pre-reproductives and reproductive age group are same

Choose the **correct** answer from the options given below:

(1) A-II, B-I, C-III, D-IV

(2) A-II, B-III, C-I, D-IV

(3) A-II, B-IV, C-I, D-III

(4) A-II, B-IV, C-III, D-I

187 Select the correct statements with reference to chordates.

A. Presence of a mid-dorsal, solid and double nerve cord.

B. Presence of closed circulatory system.

C. Presence of paired pharyngeal gillslits.

D. Presence of dorsal heart

E. Triploblastic pseudocoelomate animals.

Choose the **correct** answer from the options given below:

(1) A, C and D only

(2) B and C only

(3) B, D and E only

(4) C, D and E only

188 The parts of human brain that helps in regulation of sexual behaviour, expression of excitement, pleasure, rage, fear etc. are :
(1) Limbic system & hypothalamus
(2) Corpora quadrigemina & hippocampus
(3) Brain stem & epithalamus
(4) Corpus callosum and thalamus

189 The unique mammalian characteristics are:
(1) hairs, tympanic membrane and mammary glands
(2) hairs, pinna and mammary glands
(3) hairs, pinna and indirect development
(4) pinna, monocondylic skull and mammary glands

190 Which of the following are NOT under the control of thyroid hormone?
A. Maintenance of water and electrolyte balance
B. Regulation of basal metabolic rate
C. Normal rhythm of sleep-wake cycle
D. Development of immune system
E. Support the process of R.B.Cs formation
Choose the **correct** answer from the options given below:
(1) A and D only (2) B and C only
(3) C and D only (4) D and E only

191 Select the correct statements.
A. Tetrad formation is seen during Leptotene.
B. During Anaphase, the centromeres split and chromatids separate.
C. Terminalization takes place during Pachytene.
D. Nucleolus, Golgi complex and ER are reformed during Telophase.
E. Crossing over takes place between sister chromatids of homologous chromosome.
Choose the **correct** answer from the options given below:
(1) A and C only
(2) B and D only
(3) A, C and E only
(4) B and E only

192 Match **List I** with **List II**.

List I		**List II**
A. Mast cells	I.	Ciliated epithelium
B. Inner surface of bronchiole	II.	Areolar connective tissue
C. Blood	III.	Cuboidal epithelium
D. Tubular parts of nephron	IV.	specialised connective tissue

Choose the **correct** answer from the options give below:
(1) A-I, B-II, C-IV, D-III
(2) A-II, B-III, C-I, D-IV
(3) A-II, B-I, C-IV, D-III
(4) A-III, B-IV, C-II, D-I

193 Which of the following is characteristic feature of cockroach regarding sexual dimorphism ?
(1) Dark brown body colour and anal cerci
(2) Presence of anal styles
(3) Presence of sclerites
(4) Presence of anal cerci

194 Which one of the following is the sequence on corresponding coding strand, if the sequence on mRNA formed is as follows
5' AUCGAUCGAUCGAUCGAUCG AUCG AUCG 3'?
(1) 5' UAGCUAGCUAGCUAGCUA GCUAGC UAGC 3'
(2) 3' UAGCUAGCUAGCUAGCUA GCUAGCUAGC 5'
(3) 5' ATCGATCGATCGATCGATCG ATCGATCG 3'
(4) 3' ATCGATCGATCGATCGATCG ATCGATCG 5'

195 In cockroach, excretion is brought about by-
A. Phallic gland B. Urecose gland
C. Nephrocytes D. Fat body
E. Collaterial glands
Choose the **correct** answer from the options given below:
(1) A and E only
(2) A, B and E only
(3) B, C and D only
(4) B and D only

196 Given below are two statements:

Statement I: During G_0 phase of cell cycle, the cell is metabolically inactive.

Statement II: The centrosome undergoes duplication during S phase of interphase.

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.

197 Which one of the following is NOT an advantage of inbreeding?

(1) It decreases homozygosity.

(2) It exposes harmful recessive genes that are eliminated by selection.

(3) Elimination of less desirable genes and accumulation of superior genes takes place due to it.

(4) It decreases the productivity of inbred population, after continuous inbreeding.

198 Which of the following statements are correct?

A. An excessive loss of body fluid from the body switches off osmoreceptors.

B. ADH facilitates water reabsorption to prevent diuresis.

C. ANF causes vasodilation.

D. ADH causes increase in blood pressure.

E. ADH is responsible for decrease in GFR.

Choose the **correct** answer from the options given below:

(1) A and B only

(2) B, C and D only

(3) A, B and E only

(4) C, D and E only

199 Which of the following statements are correct regarding skeletal muscle?

A. Muscle bundles are held together by collagenous connective tissue layer called fascicle.

B. Sarcoplasmic reticulum of muscle fibre is a store house of calcium ions.

C. Striated appearance of skeletal muscle fibre is due to distribution pattern of actin and myosin proteins.

D. M line is considered as functional unit of contraction called sarcomere.

Choose the ***most appropriate*** answer from the options given below:

(1) A, B and C only

(2) B and C only

(3) A, C and D only

(4) C and D only

200 Which of the following statements are correct ?

A. Basophils are most abundant cells of the total WBCs

B. Basophils secrete histamine, serotonin and heparin

C. Basophils are involved in inflammatory response

D. Basophils have kidney shaped nucleus

E. Basophils are agranulocytes

Choose the **correct** answer from the options given below:

(1) D and E only

(2) C and E only

(3) B and C only

(4) A and B only

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK

Test Booklet Code

← Test Booklet No. ENGLISH

F1

ADI

This Booklet contains **32** pages, including Rough Page.

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 CODE for this Booklet is F1. Make sure that the CODE printed on the Original Copy of the Answer Sheet is the same as that on this Test Booklet.** In case of discrepancy, the candidate should immediately report the matter to the Invigilator for replacement of both the Test Booklet and the Answer Sheet.
8. 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 Roll No. anywhere else except in the specified space in the Test Booklet/Answer Sheet.
9. Use of white fluid for correction is **NOT** permissible on the Answer Sheet.
10. Each candidate must show on-demand his/her Admit Card to the Invigilator.
11. No candidate, without special permission of the centre Superintendent or Invigilator, would leave his/her seat.
12. 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.**
13. Use of Electronic/Manual Calculator is prohibited.
14. 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.
15. **No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.**
16. The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.
17. 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): _____

Roll Number : In figures _____

: In words _____

Centre of Examination (in Capitals): _____

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

Facsimile signature stamp of Centre Superintendent

Physics : Section-A (Q. No. 1 to 35)

1 The ratio of radius of gyration of a solid sphere of mass M and radius R about its own axis to the radius of gyration of the thin hollow sphere of same mass and radius about its axis is :

(1) 5 : 3 (2) 2 : 5

(3) 5 : 2 (4) 3 : 5

2 The work functions of Caesium (Cs), Potassium (K) and Sodium (Na) are 2.14 eV, 2.30 eV and 2.75 eV respectively. If incident electromagnetic radiation has an incident energy of 2.20 eV, which of these photosensitive surfaces may emit photoelectrons?

(1) Both Na and K

(2) K only

(3) Na only

(4) Cs only

3 The amount of energy required to form a soap bubble of radius 2 cm from a soap solution is nearly : (surface tension of soap solution = 0.03 N m^{-1})

(1) 5.06×10^{-4}J (2) 3.01×10^{-4}J

(3) 50.1×10^{-4}J (4) 30.16×10^{-4}J

4 Resistance of a carbon resistor determined from colour codes is $(22000\pm5\%)\,\Omega$. The colour of third band must be :

(1) Green (2) Orange

(3) Yellow (4) Red

5 In a series LCR circuit, the inductance L is 10 mH, capacitance C is 1 μF and resistance R is 100 Ω. The frequency at which resonance occurs is :

(1) 15.9 kHz (2) 1.59 rad/s

(3) 1.59 kHz (4) 15.9 rad/s

6 In a plane electromagnetic wave travelling in free space, the electric field component oscillates sinusoidally at a frequency of 2.0×10^{10} Hz and amplitude 48 V m^{-1}. Then the amplitude of oscillating magnetic field is : (Speed of light in free space = 3×10^{8} m s^{-1})

(1) 1.6×10^{-8}T (2) 1.6×10^{-7}T

(3) 1.6×10^{-6}T (4) 1.6×10^{-9}T

7 Given below are two statements:

Statement I : Photovoltaic devices can convert optical radiation into electricity.

Statement II : Zener diode is designed to operate under reverse bias in breakdown region.

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 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.

8 The errors in the measurement which arise due to unpredictable fluctuations in temperature and voltage supply are :

(1) Personal errors

(2) Least count errors

(3) Random errors

(4) Instrumental errors

9 If $\oint_S \vec{E}\cdot\vec{dS}=0$ over a surface, then :

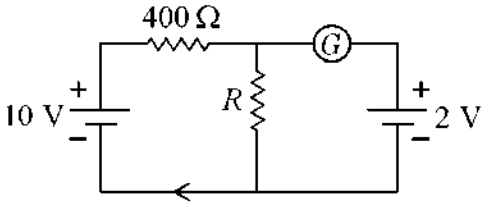
(1) the magnitude of electric field on the surface is constant.

(2) all the charges must necessarily be inside the surface.

(3) the electric field inside the surface is necessarily uniform.

(4) the number of flux lines entering the surface must be equal to the number of flux lines leaving it.

10 If the galvanometer G does not show any deflection in the circuit shown, the value of R is given by :



(1) 50 Ω (2) 100 Ω
(3) 400 Ω (4) 200 Ω

11 An ac source is connected to a capacitor C. Due to decrease in its operating frequency :
(1) displacement current increases.
(2) displacement current decreases.
(3) capacitive reactance remains constant
(4) capacitive reactance decreases.

12 The minimum wavelength of X-rays produced by an electron accelerated through a potential difference of V volts is proportional to:

(1) $\frac{1}{V}$ (2) $\frac{1}{\sqrt{V}}$
(3) V^2 (4) $\sqrt{V}$

13 The venturi-meter works on :
(1) Bernoulli's principle
(2) The principle of parallel axes
(3) The principle of perpendicular axes
(4) Huygen's principle

14 A full wave rectifier circuit consists of two p-n junction diodes, a centre-tapped transformer, capacitor and a load resistance. Which of these components remove the ac ripple from the rectified output?
(1) p-n junction diodes
(2) Capacitor
(3) Load resistance
(4) A centre-tapped transformer

15 A metal wire has mass (0.4 ± 0.002) g, radius (0.3 ± 0.001) mm and length (5 ± 0.02) cm. The maximum possible percentage error in the measurement of density will nearly be:
(1) 1.3% (2) 1.6%
(3) 1.4% (4) 1.2%

16 For Young's double slit experiment, two statements are given below:
Statement I : If screen is moved away from the plane of slits, angular separation of the fringes remains constant.
Statement II : If the monochromatic source is replaced by another monochromatic source of larger wavelength, the angular separation of fringes decreases.
In the light of the above statements, choose the *correct* answer from the options given below:
(1) Both **Statement I** and **Statement II** are false.
(2) **Statement I** is true but **Statement II** is false.
(3) **Statement I** is false but **Statement II** is true.
(4) Both **Statement I** and **Statement II** are true.

17 The potential energy of a long spring when stretched by 2 cm is U. If the spring is stretched by 8 cm, potential energy stored in it will be :
(1) 4U (2) 8U
(3) 16U (4) 2U

18 Light travels a distance x in time t_1 in air and $10x$ in time t_2 in another denser medium. What is the critical angle for this medium?

(1) $\sin^{-1}\left(\frac{10\,t_2}{t_1}\right)$ (2) $\sin^{-1}\left(\frac{t_1}{10\,t_2}\right)$
(3) $\sin^{-1}\left(\frac{10\,t_1}{t_2}\right)$ (4) $\sin^{-1}\left(\frac{t_2}{t_1}\right)$

19 A 12 V, 60 W lamp is connected to the secondary of a step down transformer, whose primary is connected to ac mains of 220 V. Assuming the transformer to be ideal, what is the current in the primary winding?

(1) 2.7 A (2) 3.7 A

(3) 0.37 A (4) 0.27 A

20 A football player is moving southward and suddenly turns eastward with the same speed to avoid an opponent. The force that acts on the player while turning is :

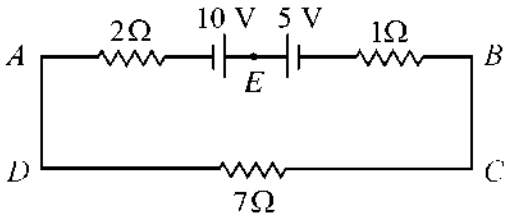
(1) along northward

(2) along north-east

(3) along south-west

(4) along eastward

21 The magnitude and direction of the current in the following circuit is



(1) 0.5 A from A to B through E

(2) $\frac{5}{9}$ A from A to B through E

(3) 1.5 A from B to A through E

(4) 0.2 A from B to A through E

22 The angular acceleration of a body, moving along the circumference of a circle, is :

(1) along the radius towards the centre

(2) along the tangent to its position

(3) along the axis of rotation

(4) along the radius, away from centre

23 A bullet is fired from a gun at the speed of 280 m s^{-1} in the direction 30° above the horizontal. The maximum height attained by the bullet is $\left(g = 9.8\ m\ s^{-2},\ \sin 30° = 0.5\right)$:

(1) 2000 m (2) 1000 m

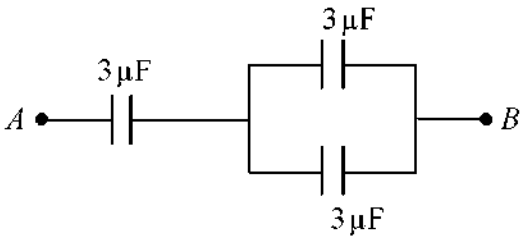
(3) 3000 m (4) 2800 m

24 The net magnetic flux through any closed surface is :

(1) Positive (2) Infinity

(3) Negative (4) Zero

25 The equivalent capacitance of the system shown in the following circuit is :



(1) 3 μF (2) 6 μF

(3) 9 μF (4) 2 μF

26 A vehicle travels half the distance with speed ϑ and the remaining distance with speed 2ϑ. Its average speed is:

(1) $\frac{2\vartheta}{3}$ (2) $\frac{4\vartheta}{3}$

(3) $\frac{3\vartheta}{4}$ (4) $\frac{\vartheta}{3}$

27 The half life of a radioactive substance is 20 minutes. In how much time, the activity of substance drops to $\left(\frac{1}{16}\right)^{th}$ of its initial value?

(1) 40 minutes (2) 60 minutes

(3) 80 minutes (4) 20 minutes

28 The temperature of a gas is –50° C. To what temperature the gas should be heated so that the rms speed is increased by 3 times?

(1) 3295° C (2) 3097 K

(3) 223 K (4) 669° C

29 A Carnot engine has an efficiency of 50% when its source is at a temperature 327° C. The temperature of the sink is :

(1) 15° C (2) 100° C

(3) 200° C (4) 27° C

30 The magnetic energy stored in an inductor of inductance 4 μH carrying a current of 2 A is :

(1) 4 mJ (2) 8 mJ

(3) 8 μJ (4) 4 μJ

31 Let a wire be suspended from the ceiling (rigid support) and stretched by a weight W attached at its free end. The longitudinal stress at any point of cross-sectional area A of the wire is :

(1) W/A (2) $W/2A$

(3) Zero (4) $2W/A$

32 An electric dipole is placed at an angle of 30° with an electric field of intensity $2\times10^5 \text{N C}^{-1}$. It experiences a torque equal to 4 N m. Calculate the magnitude of charge on the dipole, if the dipole length is 2 cm.

(1) 6 mC (2) 4 mC

(3) 2 mC (4) 8 mC

33 In hydrogen spectrum, the shortest wavelength in the Balmer series is λ. The shortest wavelength in the Bracket series is :

(1) 4λ (2) 9λ

(3) 16λ (4) 2λ

34 The ratio of frequencies of fundamental harmonic produced by an open pipe to that of closed pipe having the same length is :

(1) 2 : 1 (2) 1 : 3

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

35 Two bodies of mass m and $9m$ are placed at a distance R. The gravitational potential on the line joining the bodies where the gravitational field equals zero, will be (G = gravitational constant) :

(1) $-\frac{12\,Gm}{R}$ (2) $-\frac{16\,Gm}{R}$

(3) $-\frac{20\,Gm}{R}$ (4) $-\frac{8\,Gm}{R}$

Physics : Section-B (Q. No. 36 to 50)

36 A bullet from a gun is fired on a rectangular wooden block with velocity u. When bullet travels 24 cm through the block along its length horizontally, velocity of bullet becomes $\frac{u}{3}$. Then it further penetrates into the block in the same direction before coming to rest exactly at the other end of the block. The total length of the block is :

(1) 24 cm (2) 28 cm
(3) 30 cm (4) 27 cm

37 The radius of inner most orbit of hydrogen atom is 5.3×10^{-11} m. What is the radius of third allowed orbit of hydrogen atom?

(1) 1.06 Å (2) 1.59 Å
(3) 4.77 Å (4) 0.53 Å

38 Calculate the maximum acceleration of a moving car so that a body lying on the floor of the car remains stationary. The coefficient of static friction between the body and the floor is 0.15 ($g = 10\ m\ s^{-2}$).

(1) $150\ m\ s^{-2}$ (2) $1.5\ m\ s^{-2}$
(3) $50\ m\ s^{-2}$ (4) $1.2\ m\ s^{-2}$

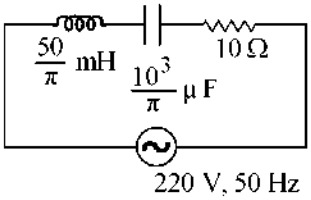
39 10 resistors, each of resistance R are connected in series to a battery of emf E and negligible internal resistance. Then those are connected in parallel to the same battery, the current is increased n times. The value of n is :

(1) 100 (2) 1
(3) 1000 (4) 10

40 A horizontal bridge is built across a river. A student standing on the bridge throws a small ball vertically upwards with a velocity $4\ m\ s^{-1}$. The ball strikes the water surface after 4 s. The height of bridge above water surface is (Take $g = 10\ m\ s^{-2}$) :

(1) 60 m (2) 64 m
(3) 68 m (4) 56 m

41 The net impedance of circuit (as shown in figure) will be :



(1) $15\ \Omega$ (2) $5\sqrt{5}\ \Omega$
(3) $25\ \Omega$ (4) $10\sqrt{2}\ \Omega$

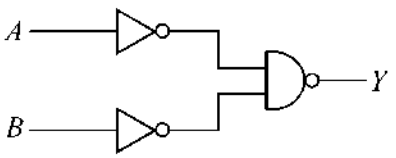
42 A satellite is orbiting just above the surface of the earth with period T. If d is the density of the earth and G is the universal constant of gravitation, the quantity $\frac{3\pi}{Gd}$ represents :

(1) T^2 (2) T^3
(3) $\sqrt{T}$ (4) T

43 Two thin lenses are of same focal lengths (f), but one is convex and the other one is concave. When they are placed in contact with each other, the equivalent focal length of the combination will be :

(1) $f/4$ (2) $f/2$
(3) Infinite (4) Zero

44 For the following logic circuit, the truth table is:



(1)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

(2)

A	B	Y
0	0	1
0	1	0
1	0	1
1	1	0

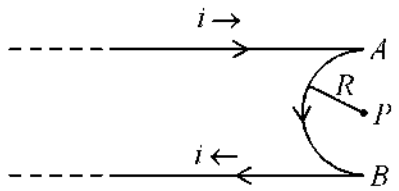
(3)

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

(4)

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

45 A very long conducting wire is bent in a semi-circular shape from A to B as shown in figure. The magnetic field at point P for steady current configuration is given by :



(1) $\frac{\mu_0 i}{4R}$ pointed away from the page

(2) $\frac{\mu_0 i}{4R}\left[1-\frac{2}{\pi}\right]$ pointed away from page

(3) $\frac{\mu_0 i}{4R}\left[1-\frac{2}{\pi}\right]$ pointed into the page

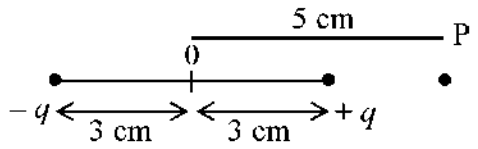
(4) $\frac{\mu_0 i}{4R}$ pointed into the page

46 The resistance of platinum wire at 0°C is 2Ω and 6.8Ω at 80°C. The temperature coefficient of resistance of the wire is :

(1) $3\times10^{-3}\ °C^{-1}$ (2) $3\times10^{-2}\ °C^{-1}$

(3) $3\times10^{-1}\ °C^{-1}$ (4) $3\times10^{-4}\ °C^{-1}$

47 An electric dipole is placed as shown in the figure.

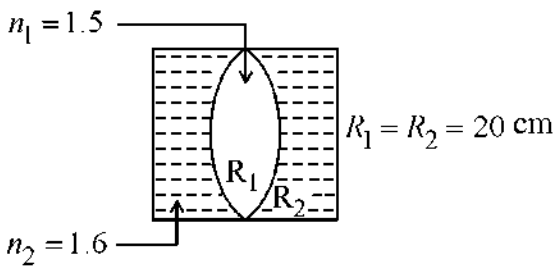


The electric potential (in 10^2 V) at point P due to the dipole is (ϵ_0=permittivity of free space and $\frac{1}{4\pi\epsilon_0}=K$):

(1) $\left(\frac{5}{8}\right)qK$ (2) $\left(\frac{8}{5}\right)qK$

(3) $\left(\frac{8}{3}\right)qK$ (4) $\left(\frac{3}{8}\right)qK$

48 In the figure shown here, what is the equivalent focal length of the combination of lenses (Assume that all layers are thin)?



(1) − 40 cm (2) − 100 cm

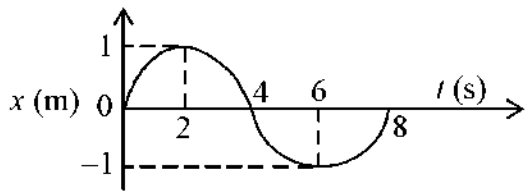
(3) − 50 cm (4) 40 cm

49 A wire carrying a current I along the positive x-axis has length L. It is kept in a magnetic field $\vec{B}=(2\hat{i}+3\hat{j}-4\hat{k})$ T. The magnitude of the magnetic force acting on the wire is :

(1) $\sqrt{5}\,IL$ (2) $5\,IL$

(3) $\sqrt{3}\,IL$ (4) $3\,IL$

50 The x-t graph of a particle performing simple harmonic motion is shown in the figure. The acceleration of the particle at $t=2$ s is :



(1) $-\frac{\pi^2}{8}\ m\,s^{-2}$ (2) $\frac{\pi^2}{16}\ m\,s^{-2}$

(3) $-\frac{\pi^2}{16}\ m\,s^{-2}$ (4) $\frac{\pi^2}{8}\ m\,s^{-2}$

51 The stability of Cu^{2+} is more than Cu^{+} salts in aqueous solution due to -

(1) enthalpy of atomization.

(2) hydration energy.

(3) second ionisation enthalpy.

(4) first ionisation enthalpy.

52 Which one is an example of heterogenous catalysis?

(1) Hydrolysis of sugar catalysed by H^{+} ions.

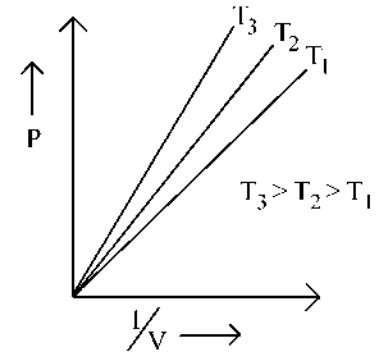
(2) Decomposition of ozone in presence of nitrogen monoxide.

(3) Combination between dinitrogen and dihydrogen to form ammonia in the presence of finely divided iron.

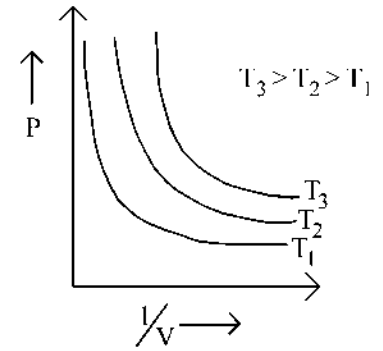
(4) Oxidation of sulphur dioxide into sulphur trioxide in the presence of oxides of nitrogen.

53 Which amongst the following options is **correct** graphical representation of Boyle's Law?

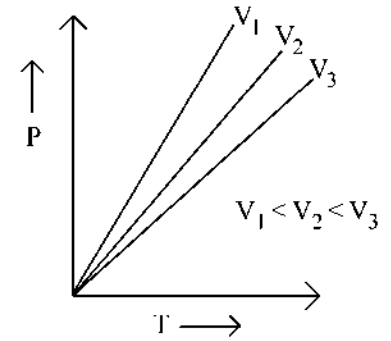
(1)



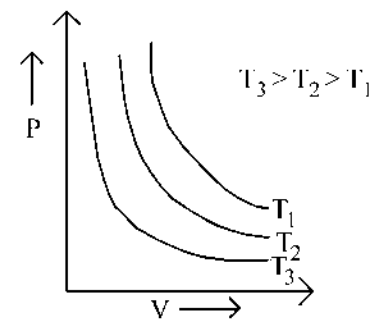
(2)



(3)



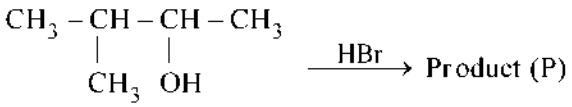
(4)

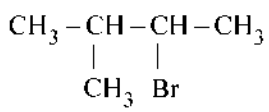
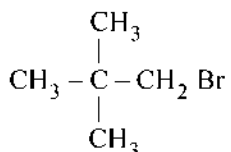
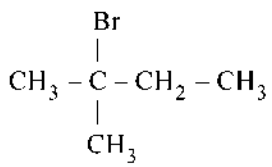


54 Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :
Assertion A : A reaction can have zero activation energy.
Reasons R : The minimum extra amount of energy absorbed by reactant molecules so that their energy becomes equal to threshold value, is called activation energy.
In the light of the above statements, choose the **correct** answer from the options given below :
(1) Both **A** and **R** are true and **R** is **NOT** the correct explanation of **A**.
(2) **A** is true but **R** is false.
(3) **A** is false but **R** is true.
(4) Both **A** and **R** are true and **R** is the correct explanation of **A**.

55 In Lassaigne's extract of an organic compound, both nitrogen and sulphur are present, which gives blood red colour with Fe^{3+} due to the formation of -
(1) NaSCN
(2) $\left[Fe(CN)_5 NOS\right]^{4-}$
(3) $\left[Fe(SCN)\right]^{2+}$
(4) $Fe_4\left[Fe(CN)_6\right]_3 \cdot x H_2O$

56 Consider the following reaction and identify the product (P).



3 – Methylbutan – 2 – ol
(1) $CH_3CH=CH-CH_3$
(2) 
(3) 
(4) 

57 For a certain reaction, the rate = $k[A]^2[B]$, when the initial concentration of A is tripled keeping concentration of B constant, the initial rate would
(1) increase by a factor of six.
(2) increase by a factor of nine.
(3) increase by a factor of three.
(4) decrease by a factor of nine.

58 Match **List - I** with **List - II** :

	List - I		**List - II**
A.	Coke	I.	Carbon atoms are sp^3 hybridised.
B.	Diamond	II.	Used as a dry lubricant
C.	Fullerene	III.	Used as a reducing agent
D.	Graphite	IV.	Cage like molecules

Choose the **correct** answer from the options given below :
(1) A-IV, B-I, C-II, D-III
(2) A-III, B-I, C-IV, D-II
(3) A-III, B-IV, C-I, D-II
(4) A-II, B-IV, C-I, D-III

59 Which one of the following statements is **correct**?
(1) All enzymes that utilise ATP in phosphate transfer require Ca as the cofactor.
(2) The bone in human body is an inert and unchanging substance.
(3) Mg plays roles in neuromuscular function and interneuronal transmission.
(4) The daily requirement of Mg and Ca in the human body is estimated to be 0.2 - 0.3 g.

60 A compound is formed by two elements A and B. The element B forms cubic close packed structure and atoms of A occupy 1/3 of tetrahedral voids. If the formula of the compound is A_xB_y, then the value of $x + y$ is in option

(1) 4 (2) 3

(3) 2 (4) 5

61 Homoleptic complex from the following complexes is :

(1) Diamminechloridonitrito - N - platinum (II)

(2) Pentaamminecarbonatocobalt (III) chloride

(3) Triamminetriaquachromium (III) chloride

(4) Potassium trioxalatoaluminate (III)

62 The **correct** order of energies of molecular orbitals of N_2 molecule, is :

(1) $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \sigma 2p_z < \left(\pi 2p_x = \pi 2p_y\right) < \left(\pi^* 2p_x = \pi^* 2p_y\right) < \sigma^* 2p_z$

(2) $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \sigma 2p_z < \sigma^* 2p_z < \left(\pi 2p_x = \pi 2p_y\right) < \left(\pi^* 2p_x = \pi^* 2p_y\right)$

(3) $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \left(\pi 2p_x = \pi 2p_y\right) < \left(\pi^* 2p_x = \pi^* 2p_y\right) < \sigma 2p_z < \sigma^* 2p_z$

(4) $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \left(\pi 2p_x = \pi 2p_y\right) < \sigma 2p_z < \left(\pi^* 2p_x = \pi^* 2p_y\right) < \sigma^* 2p_z$

63 Taking stability as the factor, which one of the following represents **correct** relationship?

(1) $InI_3 > InI$ (2) $AlCl > AlCl_3$

(3) $TlI > TlI_3$ (4) $TlCl_3 > TlCl$

64 Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : Helium is used to dilute oxygen in diving apparatus.

Reasons R : Helium has high solubility in O_2.

In the light of the above statements, choose the **correct** answer from the options given below :

(1) Both **A** and **R** are true and **R** is **NOT** the correct explanation of **A**.

(2) **A** is true but **R** is false.

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

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

65 Select the **correct** statements from the following :

A. Atoms of all elements are composed of two fundamental particles.

B. The mass of the electron is 9.10939×10^{-31} kg.

C. All the isotopes of a given element show same chemical properties.

D. Protons and electrons are collectively known as nucleons.

E. Dalton's atomic theory, regarded the atom as an ultimate particle of matter.

Choose the **correct** answer from the options given below :

(1) C, D and E only

(2) A and E only

(3) B, C and E only

(4) A, B and C only

66 Which of the following statements are **NOT** correct?

A. Hydrogen is used to reduce heavy metal oxides to metals.

B. Heavy water is used to study reaction mechanism.

C. Hydrogen is used to make saturated fats from oils.

D. The H-H bond dissociation enthalpy is lowest as compared to a single bond between two atoms of any element.

E. Hydrogen reduces oxides of metals that are more active than iron.

Choose the **most appropriate** answer from the options given below :

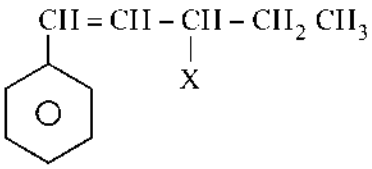
(1) B, D only

(2) D, E only

(3) A, B, C only

(4) B, C, D, E only

67 The given compound



is an example of _____.

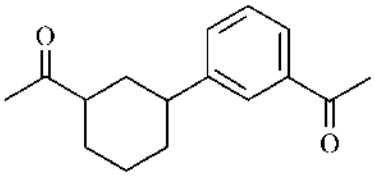
(1) aryl halide

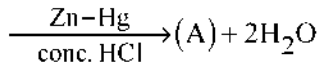
(2) allylic halide

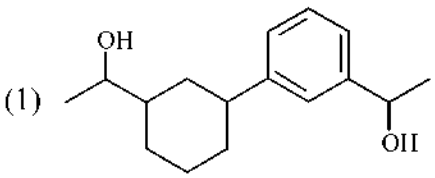
(3) vinylic halide

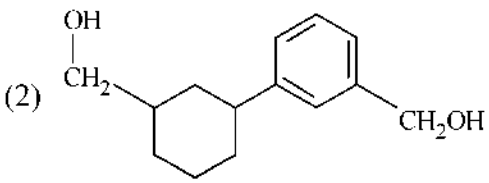
(4) benzylic halide

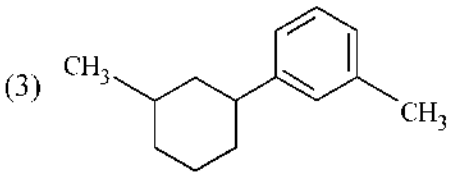
68 Identify product (A) in the following reaction:

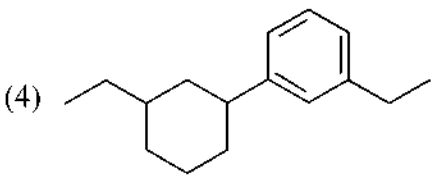




(1) 

(2) 

(3) 

(4) 

69 The conductivity of centimolar solution of KCl at 25°C is 0.0210 ohm^{-1} cm^{-1} and the resistance of the cell containing the solution at 25°C is 60 ohm. The value of cell constant is -

(1) 3.28 cm^{-1} (2) 1.26 cm^{-1}
(3) 3.34 cm^{-1} (4) 1.34 cm^{-1}

70 Amongst the given options which of the following molecules / ion acts as a Lewis acid?

(1) H_2O (2) BF_3
(3) OH^- (4) NH_3

71 Given below are two statements :
Statement I : A unit formed by the attachment of a base to 1' position of sugar is known as nucleoside
Statement II : When nucleoside is linked to phosphorous acid at 5'-position of sugar moiety, we get nucleotide.
In the light of the above statements, choose the **correct** answer from the options given below :
(1) Both Statement **I** and Statement **II** are false.
(2) Statement **I** is true but Statement **II** is false.
(3) Statement **I** is false but Statement **II** is true.
(4) Both Statement **I** and Statement **II** are true.

72 The relation between n_m, (n_m = the number of permissible values of magnetic quantum number (m)) for a given value of azimuthal quantum number (l), is
(1) $l = 2n_m + 1$ (2) $n_m = 2l^2 + 1$
(3) $n_m = l + 2$ (4) $l = \frac{n_m - 1}{2}$

73 Amongst the following, the total number of species NOT having eight electrons around central atom in its outer most shell, is
$NH_3, AlCl_3, BeCl_2, CCl_4, PCl_5$:
(1) 2 (2) 4
(3) 1 (4) 3

74 Intermolecular forces are forces of attraction and repulsion between interacting particles that will include :
A. dipole - dipole forces.
B. dipole - induced dipole forces.
C. hydrogen bonding.
D. covalent bonding.
E. dispersion forces.
Choose the **most appropriate** answer from the options given below :
(1) A, B, C, D are correct.
(2) A, B, C, E are correct.
(3) A, C, D, E are correct.
(4) B, C, D, E are correct.

75 Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :
Assertion A : Metallic sodium dissolves in liquid ammonia giving a deep blue solution, which is paramagnetic.
Reasons R : The deep blue solution is due to the formation of amide.
In the light of the above statements, choose the **correct** answer from the options given below :
(1) Both **A** and **R** are true but **R** is **NOT** the correct explanation of **A**.
(2) **A** is true but **R** is false.
(3) **A** is false but **R** is true.
(4) Both **A** and **R** are true and **R** is the correct explanation of **A**.

76 The element expected to form largest ion to achieve the nearest noble gas configuration is :
(1) F (2) N
(3) Na (4) O

77 Some tranquilizers are listed below. Which one from the following belongs to barbiturates?
(1) Meprobamate
(2) Valium
(3) Veronal
(4) Chlordiazepoxide

78 Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :
Assertion A : In equation $\Delta_r G = -nFE_{cell}$, value of $\Delta_r G$ depends on n.
Reasons R : E_{cell} is an intensive property and $\Delta_r G$ is an extensive property.
In the light of the above statements, choose the **correct** answer from the options given below :
(1) Both **A** and **R** are true and **R** is **NOT** the correct explanation of **A**.
(2) **A** is true but **R** is false.
(3) **A** is false but **R** is true.
(4) Both **A** and **R** are true and **R** is the correct explanation of **A**.

79 Which amongst the following molecules on polymerization produces neoprene?

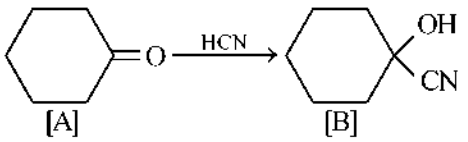
(1) $H_2C = \underset{\displaystyle Cl}{\underset{|}{C}} - CH = CH_2$

(2) $H_2C = CH - C \equiv CH$

(3) $H_2C = \underset{\displaystyle CH_3}{\underset{|}{C}} - CH = CH_2$

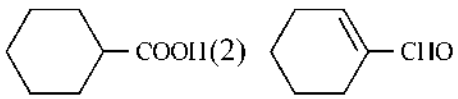
(4) $H_2C = CH - CH = CH_2$

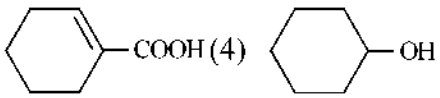
80 Complete the following reaction :



$$\xrightarrow[\Delta]{\text{conc. } H_2SO_4} [C]$$

[C] is _____.

(1) 

(3) 

81 Weight (g) of two moles of the organic compound, which is obtained by heating sodium ethanoate with sodium hydroxide in presence of calcium oxide is :

(1) 32 (2) 30

(3) 18 (4) 16

82 Which of the following reactions will NOT give primary amine as the product?

(1) $CH_3CN \xrightarrow[(ii)\ H_3O\oplus]{(i)\ LiAlH_4}$ Product

(2) $CH_3NC \xrightarrow[(ii)\ H_3O\oplus]{(i)\ LiAlH_4}$ Product

(3) $CH_3CONH_2 \xrightarrow[(ii)\ H_3O\oplus]{(i)\ LiAlH_4}$ Product

(4) $CH_3\ CONH_2 \xrightarrow{Br_2\ /\ KOH}$ Product

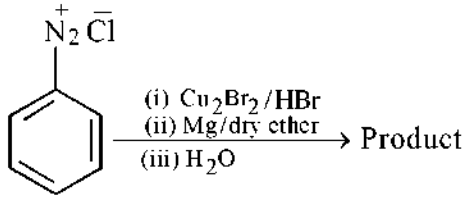
83 The **right** option for the mass of CO_2 produced by heating 20 g of 20% pure limestone is (Atomic mass of Ca = 40)

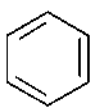
$\left[CaCO_3 \xrightarrow{1200\ K} CaO + CO_2\right]$

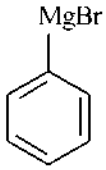
(1) 1.76 g (2) 2.64 g

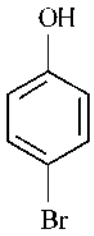
(3) 1.32 g (4) 1.12 g

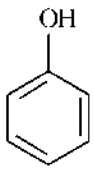
84 Identify the product in the following reaction:



(1) 

(2) 

(3) 

(4) 

85 The number of σ bonds, π bonds and lone pair of electrons in pyridine, respectively are:

(1) 12, 3, 0 (2) 11, 3, 1

(3) 12, 2, 1 (4) 11, 2, 0

86 Which amongst the following options is the **correct** relation between change in enthalpy and change in internal energy?

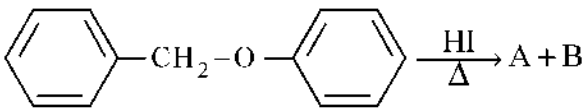
(1) $\Delta H = \Delta U + \Delta n_g RT$

(2) $\Delta H - \Delta U = -\Delta nRT$

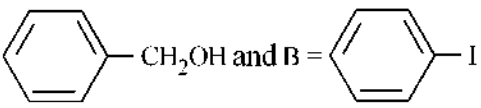
(3) $\Delta H + \Delta U = \Delta nR$

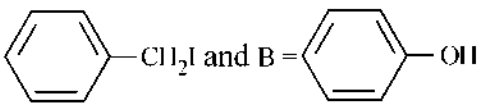
(4) $\Delta H = \Delta U - \Delta n_g RT$

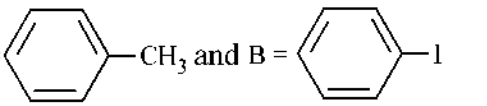
87 Consider the following reaction :

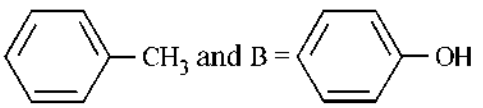


Identify products A and B.

(1) 

(2) 

(3) 

(4) 

88 Which of the following statements are **INCORRECT**?

A. All the transition metals except scandium form MO oxides which are ionic.

B. The highest oxidation number corresponding to the group number in transition metal oxides is attained in Sc_2O_3 to Mn_2O_7.

C. Basic character increases from V_2O_3 to V_2O_4 to V_2O_5.

D. V_2O_4 dissolves in acids to give VO_4^{3-} salts.

E. CrO is basic but Cr_2O_3 is amphoteric.

Choose the **correct** answer from the options given below :

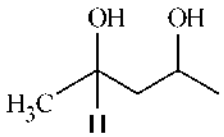
(1) B and D only

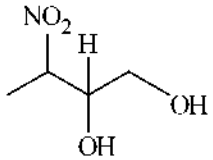
(2) C and D only

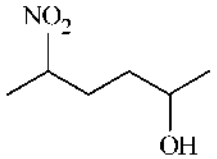
(3) B and C only

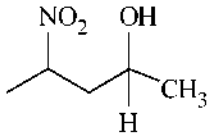
(4) A and E only

89 Which amongst the following will be most readily dehydrated under acidic conditions ?

(1) 

(2) 

(3) 

(4) 

90 The reaction that does **NOT** take place in a blast furnace between 900 K to 1500 K temperature range during extraction of iron is :

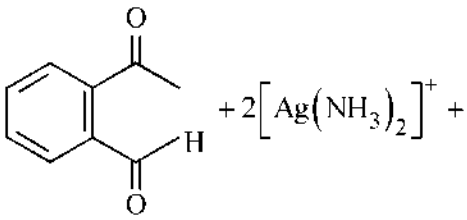
(1) $FeO + CO \rightarrow Fe + CO_2$

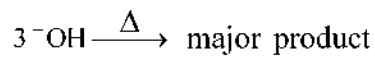
(2) $C + CO_2 \rightarrow 2CO$

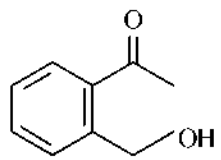
(3) $CaO + SiO_2 \rightarrow CaSiO_3$

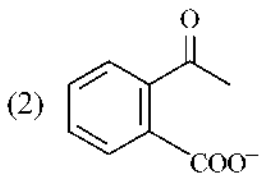
(4) $Fe_2O_3 + CO \rightarrow 2FeO + CO_2$

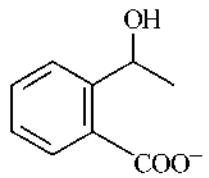
91 Identify the major product obtained in the following reaction :

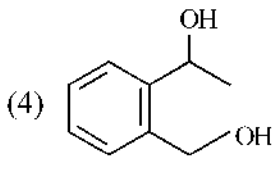




(1) 

(2) 

(3) 

(4) 

92 What fraction of one edge centred octahedral void lies in one unit cell of fcc?

(1) $\frac{1}{3}$ (2) $\frac{1}{4}$

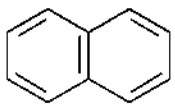
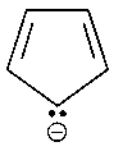
(3) $\frac{1}{12}$ (4) $\frac{1}{2}$

93 The equilibrium concentrations of the species in the reaction $A + B \rightleftharpoons C + D$ are 2, 3, 10 and 6 mol L^{-1}, respectively at 300 K. ΔG° for the reaction is (R = 2 cal / mol K)

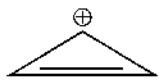
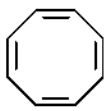
(1) – 137.26 cal (2) – 1381.80 cal

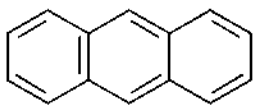
(3) – 13.73 cal (4) 1372.60 cal

94 Consider the following compounds/species:

i.  ii. 

iii.  iv. 

v.  vi. 

vii. 

The number of compounds/species which obey Huckel's rule is _____.

(1) 6 (2) 2

(3) 5 (4) 4

95 Which complex compound is most stable?

(1) $\left[Co(NH_3)_3(NO_3)_3\right]$

(2) $\left[CoCl_2(en)_2\right]NO_3$

(3) $\left[Co(NH_3)_6\right]_2(SO_4)_3$

(4) $\left[Co(NH_3)_4(H_2O)Br\right](NO_3)_2$

96 On balancing the given redox reaction,

$$a\ Cr_2O_7^{2-} + b\ SO_3^{2-}(aq) + c\ H^+(aq) \rightarrow$$

$$2a\ Cr^{3+}(aq) + b\ SO_4^{2-}(aq) + \frac{c}{2} H_2O(\ell)$$

the coefficients a, b and c are found to be, respectively -

(1) 3, 8, 1 (2) 1, 8, 3

(3) 8, 1, 3 (4) 1, 3, 8

97 Given below are two statements :

Statement I : The nutrient deficient water bodies lead to eutrophication.

Statement II : Eutrophication leads to decrease in the level of oxygen in the water bodies.

In the light of the above statements, choose the **correct** answer from the options given below :

(1) Both **Statement I** and **Statement II** are false.

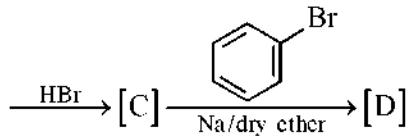
(2) **Statement I** is correct but **Statement II** is false.

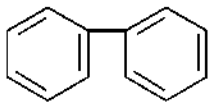
(3) **Statement I** is incorrect but **Statement II** is true.

(4) Both **Statement I** and **Statement II** are true.

98 Identify the final product [D] obtained in the following sequence of reactions.

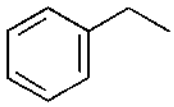
$$CH_3CHO \xrightarrow[ii)\ H_3O^+]{i)\ LiAlH_4} [A] \xrightarrow[\Delta]{H_2SO_4} [B]$$



(1) 

(2) C_4H_{10}

(3) $HC \equiv C^{\ominus}\ Na^+$

(4) 

99 Pumice stone is an example of -

(1) gel (2) solid sol

(3) foam (4) sol

100 Match **List - I** with **List - II** :

List - I (Oxoacids of Sulphur)	**List - II (Bonds)**
A. Peroxodisulphuric acid	I. Two S-OH, Four S=O, One S-O-S
B. Sulphuric acid	II. Two S-OH, One S=O
C. Pyrosulphuric acid	III. Two S-OH, Four S=O, One S-O-O-S
D. Sulphurous acid	IV. Two S-OH, Two S=O

Choose the **correct** answer from the options given below :

(1) A-III, B-IV, C-I, D-II

(2) A-I, B-III, C-IV, D-II

(3) A-III, B-IV, C-II, D-I

(4) A-I, B-III, C-II, D-IV

Botany : Section-A (Q. No. 101 to 135)

101 Which hormone promotes internode/petiole elongation in deep water rice?
(1) Kinetin (2) Ethylene
(3) 2, 4-D (4) GA_3

102 Movement and accumulation of ions across a membrane against their concentration gradient can be explained by
(1) Facilitated Diffusion
(2) Passive Transport
(3) Active Transport
(4) Osmosis

103 Large, colourful, fragrant flowers with nectar are seen in :
(1) bird pollinated plants
(2) bat pollinated plants
(3) wind pollinated plants
(4) insect pollinated plants

104 In tissue culture experiments, leaf mesophyll cells are put in a culture medium to form callus. This phenomenon may be called as -
(1) Dedifferentiation
(2) Development
(3) Senescence
(4) Differentiation

105 The historic Convention on Biological Diversity, 'The Earth Summit' was held in Rio de Janeiro in the year :
(1) 1992 (2) 1986
(3) 2002 (4) 1985

106 During the purification process for recombinant DNA technology, addition of chilled ethanol precipitates out
(1) DNA (2) Histones
(3) Polysaccharides (4) RNA

107 How many ATP and $NADPH_2$ are required for the synthesis of one molecule of Glucose during Calvin cycle?
(1) 18 ATP and 12 $NADPH_2$
(2) 12 ATP and 16 $NADPH_2$
(3) 18 ATP and 16 $NADPH_2$
(4) 12 ATP and 12 $NADPH_2$

108 In the equation

$$GPP - R = NPP$$

GPP is Gross Primary Productivity
NPP is Net Primary Productivity
R here is _____.
(1) Respiratory quotient
(2) Respiratory loss
(3) Reproductive allocation
(4) Photosynthetically active radiation

109 In gene gun method used to introduce alien DNA into host cells, microparticles of _____ metal are used.
(1) Zinc
(2) Tungsten or gold
(3) Silver
(4) Copper

110 The phenomenon of pleiotropism refers to
(1) presence of two alleles, each of the two genes controlling a single trait.
(2) a single gene affecting multiple phenotypic expression.
(3) more than two genes affecting a single character.
(4) presence of several alleles of a single gene controlling a single crossover.

111 Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R** :
Assertion A : Late wood has fewer xylary elements with narrow vessels.
Reason R : Cambium is less active in winters.
In the light of the above statements, choose the **correct** answer from the options given below :
(1) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**.
(2) **A** is true but **R** is false.
(3) **A** is false but **R** is true.
(4) Both **A** and **R** are true and R is the correct explanation of **A**.

112 Among eukaryotes, replication of DNA takes place in -

(1) S phase (2) G_1 phase

(3) G_2 phase (4) M phase

113 Family Fabaceae differs from Solanaceae and Liliaceae. With respect to the stamens, pick out the characteristics specific to family Fabaceae but not found in Solanaceae or Liliaceae.

(1) Polyadelphous and epipetalous stamens

(2) Monoadelphous and Monothecous anthers

(3) Epiphyllous and Dithecous anthers

(4) Diadelphous and Dithecous anthers

114 Axile placentation is observed in

(1) China rose, Beans and Lupin

(2) Tomato, Dianthus and Pea

(3) China rose, Petunia and Lemon

(4) Mustard, Cucumber and Primrose

115 Identify the pair of heterosporous pteridophytes among the following :

(1) *Selaginella* and *Salvinia*

(2) *Psilotum* and *Salvinia*

(3) *Equisetum* and *Salvinia*

(4) *Lycopodium* and *Selaginella*

116 The thickness of ozone in a column of air in the atmosphere is measured in terms of :

(1) Decibels (2) Decameter

(3) Kilobase (4) Dobson units

117 What is the function of tassels in the corn cob?

(1) To trap pollen grains

(2) To disperse pollen grains

(3) To protect seeds

(4) To attract insects

118 Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : The first stage of gametophyte in the life cycle of moss is protonema stage.

Reason R : Protonema develops directly from spores produced in capsule.

In the light of the above statements, 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**.

119 Given below are two statements :

Statement I : The forces generated by transpiration can lift a xylem-sized column of water over 130 meters height.

Statement II : Transpiration cools leaf surfaces sometimes 10 to 15 degrees, by evaporative cooling.

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 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.

120 Spraying of which of the following phytohormone on juvenile conifers helps in hastening the maturity period, that leads to early seed production?

(1) Gibberellic Acid

(2) Zeatin

(3) Abscisic Acid

(4) Indole-3-butyric Acid

121 Frequency of recombination between gene pairs on same chromosome as a measure of the distance between genes to map their position on chromosome, was used for the first time by
(1) Sutton and Boveri
(2) Alfred Sturtevant
(3) Henking
(4) Thomas Hunt Morgan

122 Expressed Sequence Tags (ESTs) refers to
(1) All genes that are expressed as proteins.
(2) All genes whether expressed or unexpressed.
(3) Certain important expressed genes.
(4) All genes that are expressed as RNA.

123 Upon exposure to UV radiation, DNA stained with ethidium bromide will show
(1) Bright blue colour
(2) Bright yellow colour
(3) Bright orange colour
(4) Bright red colour

124 Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R** :
Assertion A : ATP is used at two steps in glycolysis.
Reason R : First ATP is used in converting glucose into glucose-6-phosphate and second ATP is used in conversion of fructose-6-phosphate into fructose-1-6-diphosphate.
In the light of the above statements, choose the **correct** answer from the options given below :
(1) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**.
(2) **A** is true but **R** is false.
(3) **A** is false but **R** is true.
(4) Both **A** and **R** are true and **R** is the correct explanation of **A**.

125 Unequivocal proof that DNA is the genetic material was first proposed by
(1) Alfred Hershey and Martha Chase
(2) Avery, Macleoid and McCarthy
(3) Wilkins and Franklin
(4) Frederick Griffith

126 Identify the **correct** statements :
A. Detrivores perform fragmentation.
B. The humus is further degraded by some microbes during mineralization.
C. Water soluble inorganic nutrients go down into the soil and get precipitated by a process called leaching.
D. The detritus food chain begins with living organisms.
E. Earthworms break down detritus into smaller particles by a process called catabolism.
Choose the **correct** answer from the options given below :
(1) B, C, D only (2) C, D, E only
(3) D, E, A only (4) A, B, C only

127 The reaction centre in PS II has an absorption maxima at
(1) 700 nm (2) 660 nm
(3) 780 nm (4) 680 nm

128 In angiosperm, the haploid, diploid and triploid structures of a fertilized embryo sac sequentially are :
(1) Antipodals, synergids, and primary endosperm nucleus
(2) Synergids, Zygote and Primary endosperm nucleus
(3) Synergids, antipodals and Polar nuclei
(4) Synergids, Primary endosperm nucleus and zygote

129 Which micronutrient is required for splitting of water molecule during photosynthesis?
(1) molybdenum (2) magnesium
(3) copper (4) manganese

130 Which of the following stages of meiosis involves division of centromere?
(1) Metaphase II (2) Anaphase II
(3) Telophase (4) Metaphase I

131 Cellulose does not form blue colour with Iodine because
(1) It is a helical molecule.
(2) It does not contain complex helices and hence cannot hold iodine molecules.
(3) It breakes down when iodine reacts with it.
(4) It is a disaccharide.

132 Among 'The Evil Quartet', which one is considered the most important cause driving extinction of species?
(1) Over exploitation for economic gain
(2) Alien species invasions
(3) Co-extinctions
(4) Habitat loss and fragmentation

133 What is the role of RNA polymerase III in the process of transcription in Eukaryotes?
(1) Transcription of tRNA, 5 srRNA and snRNA
(2) Transcription of precursor of mRNA
(3) Transcription of only snRNAs
(4) Transcription of rRNAs (28S, 18S and 5.8S)

134 Given below are two statements :
Statement I : Endarch and exarch are the terms often used for describing the position of secondary xylem in the plant body.
Statement II : Exarch condition is the most common feature of the root system.
In the light of the above statements, choose the **correct** answer from the options given below :
(1) Both **Statement I** and **Statement II** are false.
(2) **Statement I** is correct but **Statement II** is false.
(3) **Statement I** is incorrect but **Statement II** is true.
(4) Both **Statement I** and **Statement II** are true.

135 The process of appearance of recombination nodules occurs at which sub stage of prophase I in meiosis?
(1) Pachytene (2) Diplotene
(3) Diakinesis (4) Zygotene

136 Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R** :
Assertion A : In gymnosperms the pollen grains are released from the microsporangium and carried by air currents.
Reason R : Air currents carry the pollen grains to the mouth of the archegonia where the male gametes are discharged and pollen tube is not formed.
In the light of the above statements, choose the **correct** answer from the options given below :
(1) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**.
(2) **A** is true but **R** is false.
(3) **A** is false but **R** is true.
(4) Both **A** and **R** are true and **R** is the correct explanation of **A**.

137 Which one of the following statements is **NOT** correct?
(1) Algal blooms caused by excess of organic matter in water improve water quality and promote fisheries.
(2) Water hyacinth grows abundantly in eutrophic water bodies and leads to an imbalance in the ecosystem dynamics of the water body.
(3) The amount of some toxic substances of industrial waste water increases in the organisms at successive trophic levels.
(4) The micro-organisms involved in biodegradation of organic matter in a sewage polluted water body consume a lot of oxygen causing the death of aquatic organisms.

138 Which of the following combinations is required for chemiosmosis?
(1) membrane, proton pump, proton gradient, NADP synthase
(2) proton pump, electron gradient, ATP synthase
(3) proton pump, electron gradient, NADP synthase
(4) membrane, proton pump, proton gradient, ATP synthase

139 Match **List I** with **List II** :

	List I		**List II**
A.	M Phase	I.	Proteins are synthesized
B.	G_2 Phase	II.	Inactive phase
C.	Quiescent stage	III.	Interval between mitosis and initiation of DNA replication
D.	G_1 Phase	IV.	Equational division

Choose the correct answer from the options given below :
(1) A-IV, B-II, C-I, D-III
(2) A-IV, B-I, C-II, D-III
(3) A-II, B-IV, C-I, D-III
(4) A-III, B-II, C-IV, D-I

140 Match **List I** with **List II** :

List I (Interaction)		**List II (Species A and B)**
A.	Mutualism	I. +(A), O(B)
B.	Commensalism	II. −(A), O(B)
C.	Amensalism	III. +(A), −(B)
D.	Parasitism	IV. +(A), +(B)

Choose the **correct** answer from the options given below :
(1) A-IV, B-I, C-II, D-III
(2) A-IV, B-III, C-I, D-II
(3) A-III, B-I, C-IV, D-II
(4) A-IV, B-II, C-I, D-III

141 Given below are two statements :
Statement I : Gause's 'Competitive Exclusion Principle' states that two closely related species competing for the same resources cannot co-exist indefinitely and competitively inferior one will be eliminated eventually.
Statement II : In general, carnivores are more adversely affected by competition than herbivores.
In the light of the above statements, choose the **correct** answer from the options given below :
(1) Both **Statement I** and **Statement II** are false.
(2) **Statement I** is correct but **Statement II** is false.
(3) **Statement I** is incorrect but **Statement II** is true.
(4) Both **Statement I** and **Statement II** are true.

142 Match **List I** with **List II** :

	List I		**List II**
A.	Iron	I.	Synthesis of auxin
B.	Zinc	II.	Component of nitrate reductase
C.	Boron	III.	Activator of catalase
D.	Molybdenum	IV.	Cell elongation and differentiation

Choose the correct answer from the options given below :
(1) A-II, B-III, C-IV, D-I
(2) A-III, B-I, C-IV, D-II
(3) A-II, B-IV, C-I, D-III
(4) A-III, B-II, C-I, D-IV

143 Which of the following statements are correct about Klinefelter's Syndrome?
A. This disorder was first described by Langdon Down (1866).
B. Such an individual has overall masculine development. However, the feminine development is also expressed.
C. The affected individual is short statured.
D. Physical, psychomotor and mental development is retarded.
E. Such individuals are sterile.
Choose the **correct** answer from the options given below :
(1) C and D only (2) B and E only
(3) A and E only (4) A and B only

144 Identify the **correct** statements :
A. Lenticels are the lens-shaped openings permitting the exchange of gases.
B. Bark formed early in the season is called hard bark.
C. Bark is a technical term that refers to all tissues exterior to vascular cambium.
D. Bark refers to periderm and secondary phloem.
E. Phellogen is single-layered in thickness.
Choose the correct answer from the options given below :
(1) A and D only
(2) A, B and D only
(3) B and C only
(4) B, C and E only

145 How many different proteins does the ribosome consist of?

(1) 60 (2) 40
(3) 20 (4) 80

146 Melonate inhibits the growth of pathogenic bacteria by inhibiting the activity of

(1) Amylase
(2) Lipase
(3) Dinitrogenase
(4) Succinic dehydrogenase

147 Match **List I** with **List II** :

	List I		**List II**
A.	Cohesion	I.	More attraction in liquid phase
B.	Adhesion	II.	Mutual attraction among water molecules
C.	Surface tension	III.	Water loss in liquid phase
D.	Guttation	IV.	Attraction towards polar surfaces

Choose the **correct** answer from the options given below :

(1) A-IV, B-III, C-II, D-I
(2) A-III, B-I, C-IV, D-II
(3) A-II, B-I, C-IV, D-III
(4) A-II, B-IV, C-I, D-III

148 Match **List I** with **List II** :

	List I		**List II**
A.	Oxidative decarboxylation	I.	Citrate synthase
B.	Glycolysis	II.	Pyruvate dehydrogenase
C.	Oxidative phosphorylation	III.	Electron transport system
D.	Tricarboxylic acid cycle	IV.	EMP pathway

Choose the correct answer from the options given below :

(1) A-II, B-IV, C-I, D-III
(2) A-III, B-I, C-II, D-IV
(3) A-II, B-IV, C-III, D-I
(4) A-III, B-IV, C-II, D-I

149 Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : A flower is defined as modified shoot wherein the shoot apical meristem changes to floral meristem.

Reason R : Internode of the shoot gets condensed to produce different floral appendages laterally at successive nodes instead of leaves.

In the light of the above statements, choose the **correct** answer from the options given below :

(1) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**.

(2) **A** is true but **R** is false.

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

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

150 Main steps in the formation of Recombinant DNA are given below. Arrange these steps in a correct sequence.

A. Insertion of recombinant DNA into the host cell.

B. Cutting of DNA at specific location by restriction enzyme.

C. Isolation of desired DNA fragment.

D. Amplification of gene of interest using PCR.

Choose the correct answer from the options given below :

(1) C, A, B, D

(2) C, B, D, A

(3) B, D, A, C

(4) B, C, D, A

151 Which of the following statements are correct regarding female reproductive cycle?

A. In non-primate mammals cyclical changes during reproduction are called oestrus cycle.

B. First menstrual cycle begins at puberty and is called menopause.

C. Lack of menstruation may be indicative of pregnancy.

D. Cyclic menstruation extends between menarche and menopause.

Choose the **most appropriate** answer from the options given below:

(1) A and B only

(2) A, B and C only

(3) A, C and D only

(4) A and D only

152 Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R.**

Assertion A: Amniocentesis for sex determination is one of the strategies of Reproductive and Child Health Care Programme.

Reason R: Ban on amniocentesis checks increasing menace of female foeticide.

In the light of the above statements, choose the **correct** answer from the options given below:

(1) Both **A** and **R** are true and **R** is NOT the correct explanation of **A**.

(2) **A** is true but **R** is false.

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

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

153 Match **List I** with **List II**.

	List I (Interacting species)		**List II (Name of Interaction)**
A.	A Leopard and a Lion in a forest/ grassland	I.	Competition
B.	A Cuckoo laying egg in a Crow's nest	II.	Brood parasitism
C.	Fungi and root of a higher plant in Mycorrtizae	III.	Mutualism
D.	A cattle egret and a Cattle in a field	IV.	Commensalism

Choose the **correct** answer from the options given below:

(1) A-I, B-II, C-IV, D-III

(2) A-III, B-IV, C-I, D-II

(3) A-II, B-III, C-I, D-IV

(4) A-I, B-II, C-III, D-IV

154 Vital capacity of lung is _____.

(1) IRV + ERV + TV + RV

(2) IRV + ERV + TV – RV

(3) IRV + ERV + TV

(4) IRV + ERV

155 Which one of the following common sexually transmitted diseases is completely curable when detected early and treated properly?

(1) Gonorrhoea (2) Hepatitis-B

(3) HIV Infection (4) Genital herpes

156 Match **List I** with **List II**.

	List I		**List II**
A.	CCK	I.	Kidney
B.	GIP	II.	Heart
C.	ANF	III.	Gastric gland
D.	ADH	IV.	Pancreas

Choose the **correct** answer from the options given below:

(1) A-III, B-II, C-IV, D-I

(2) A-II, B-IV, C-I, D-III

(3) A-IV, B-II, C-III, D-I

(4) A-IV, B-III, C-II, D-I

157 Match **List I** with **List II.**

List I		**List II**
A. Ringworm	I.	*Haemophilus influenzae*
B. Filariasis	II.	*Trichophyton*
C. Malaria	III.	*Wuchereria bancrofti*
D. Pneumonia	IV.	*Plasmodium vivax*

Choose the **correct** answer from the options given below:
(1) A-II, B-III, C-I, D-IV
(2) A-III, B-II, C-I, D-IV
(3) A-III, B-II, C-IV, D-I
(4) A-II, B-III, C-IV, D-I

158 Match **List I** with **List II.**

List I		**List II**
A. P - wave	I.	Beginning of systole
B. Q - wave	II.	Repolarisation of ventricles
C. QRS complex	III.	Depolarisation of atria
D. T - wave	IV.	Depolarisation of ventricles

Choose the **correct** answer from the options given below:
(1) A-IV, B-III, C-II, D-I
(2) A-II, B-IV, C-I, D-III
(3) A-I, B-II, C-III, D-IV
(4) A-III, B-I, C-IV, D-II

159 In which blood corpuscles, the HIV undergoes replication and produces progeny viruses?
(1) B-lymphocytes (2) Basophils
(3) Eosinophils (4) T_H cells

160 Given below are two statements:
Statement I: Low temperature preserves the enzyme in a temporarily inactive state whereas high temperature destroys enzymatic activity because proteins are denatured by heat.
Statement II: When the inhibitor closely resembles the substrate in its molecular structure and inhibits the activity of the enzyme, it is known as competitive inhibitor.
In the light of the above statements, choose the **correct** answer from the options given below:
(1) Both **Statement I** and **Statement II** are false.
(2) **Statement I** is true but **Statement II** is false.
(3) **Statement I** is false but **Statement II** is true.
(4) Both **Statement I** and **Statement II** are true.

161 Given below are two statements:
Statement I: Ligaments are dense irregular tissue.
Statement II: Cartilage is dense regular tissue.
In the light of the above statements, choose the **correct** answer from the options given below:
(1) Both **Statement I** and **Statement II** are false.
(2) **Statement I** is true but **Statement II** is false.
(3) **Statement I** is false but **Statement II** is true.
(4) Both **Statement I** and **Statement II** are true.

162 Which of the following are NOT considered as the part of endomembrane system?
A. Mitochondria B. Endoplasmic Reticulum
C. Chloroplasts D. Golgi complex
E. Peroxisomes
Choose the **most appropriate** answer from the options given below:
(1) A, C and E only
(2) A and D only
(3) A, D and E only
(4) B and D only

163 Given below are two statements:
Statement I: A protein is imagined as a line, the left end represented by first amino acid (C-terminal) and the right end represented by last amino acid (N-terminal)
Statement II: Adult human haemoglobin, consists of 4 subunits (two subunits of α type and two subunits of β type.)
In the light of the above statements, choose the **correct** answer from the options given below:
(1) Both **Statement I** and **Statement II** are false.
(2) **Statement I** is true but **Statement II** is false.
(3) **Statement I** is false but **Statement II** is true.
(4) Both **Statement I** and **Statement II** are true.

164 Broad palm with single palm crease is visible in a person suffering from-
(1) Turner's syndrome
(2) Klinefelter's syndrome
(3) Thalassemia
(4) Down's syndrome

165 Which of the following statements is correct?
(1) Biomagnification refers to increase in concentration of the toxicant at successive trophic levels.
(2) Presence of large amount of nutrients in water restricts 'Algal Bloom'
(3) Algal Bloom decreases fish mortality
(4) Eutrophication refers to increase in domestic sewage and waste water in lakes.

166 Match **List I** with **List II**.

	List I		**List II**
A.	*Taenia*	I.	Nephridia
B.	*Paramoecium*	II.	Contractile vacuole
C.	*Periplaneta*	III.	Flame cells
D.	*Pheretima*	IV.	Urecose gland

Choose the **correct** answer from the options give below:
(1) A-I, B-II, C-IV, D-III
(2) A-III, B-II, C-IV, D-I
(3) A-II, B-I, C-IV, D-III
(4) A-I, B-II, C-III, D-IV

167 Given below are two statements:
Statement I: Electrostatic precipitator is most widely used in thermal power plant.
Statement II: Electrostatic precipitator in thermal power plant removes ionising radiations
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 incorrect.
(2) **Statement I** is correct but **Statement II** is incorrect.
(3) **Statement I** incorrect but **Statement II** is correct.
(4) Both **Statement I** and **Statement II** are correct.

168 Given below are two statements:
Statement I: Vas deferens receives a duct from seminal vesicle and opens into urethra as the ejaculatory duct.
Statement II: The cavity of the cervix is called cervical canal which along with vagina forms birth canal.
In the light of the above statements, choose the **correct** answer from the options given below:
(1) Both **Statement I** and **Statement II** are false.
(2) **Statement I** is correct but **Statement II** is false.
(3) **Statement I** incorrect but **Statement II** is true.
(4) Both **Statement I** and **Statement II** are true.

169 Radial symmetry is NOT found in adults of phylum _____.
(1) Hemichordata (2) Coelenterata
(3) Echinodermata (4) Ctenophora

170 Match **List I** with **List II**.

	List I (Cells)		**List II (Secretion)**
A.	Peptic cells	I.	Mucus
B.	Goblet cells	II.	Bile juice
C.	Oxyntic cells	III.	Proenzyme pepsinogen
D.	Hepatic cells	IV.	HCl and intrinsic factor for absorption of vitamin B_{12}

Choose the **correct** answer from the options given below:
(1) A-II, B-I, C-III, D-IV
(2) A-III, B-I, C-IV, D-II
(3) A-II, B-IV, C-I, D-III
(4) A-IV, B-III, C-II, D-I

171 Match **List I** with **List II** with respect to human eye.

	List I		**List II**
A.	Fovea	I.	Visible coloured portion of eye that regulates diameter of pupil.
B.	Iris	II.	External layer of eye formed of dense connective tissue.
C.	Blind spot	III.	Point of greatest visual acuity or resolution.
D.	Sclera	IV.	Point where optic nerve leaves the eyeball and photoreceptor cells are absent.

Choose the **correct** answer from the options given below:

(1) A-IV, B-III, C-II, D-I

(2) A-I, B-IV, C-III, D-II

(3) A-II, B-I, C-III, D-IV

(4) A-III, B-I, C-IV, D-II

172 Which of the following functions is carried out by cytoskeleton in a cell?

(1) Protein synthesis

(2) Motility

(3) Transportation

(4) Nuclear division

173 Once the undigested and unabsorbed substances enter the caecum, their backflow is prevented by-

(1) Ileo - caecal valve

(2) Gastro - oesophageal sphincter

(3) Pyloric sphincter

(4) Sphincter of Oddi

174 Match **List I** with **List II**.

	List I		**List II**
A.	Vasectomy	I.	Oral method
B.	Coitus interruptus	II.	Barrier method
C.	Cervical caps	III.	Surgical method
D.	Saheli	IV.	Natural method

Choose the **correct** answer from the options given below:

(1) A-III, B-IV, C-II, D-I

(2) A-II, B-III, C-I, D-IV

(3) A-IV, B-II, C-I, D-III

(4) A-III, B-I, C-IV, D-II

175 Match **List I** with **List II**.

	List I (Type of Joint)		**List II (Found between)**
A.	Cartilaginous Joint	I.	Between flat skull bones
B.	Ball and Socket Joint	II.	Between adjacent vertebrae in vertebral column
C.	Fibrous Joint	III.	Between carpal and metacarpal of thumb
D.	Saddle Joint	IV.	Between Humerus and Pectoral girdle

Choose the **correct** answer from the options given below:

(1) A-II, B-IV, C-I, D-III

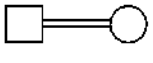
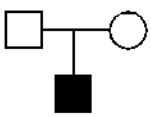
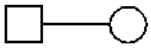
(2) A-I, B-IV, C-III, D-II

(3) A-II, B-IV, C-III, D-I

(4) A-III, B-I, C-II, D-IV

176 Given below are two statements:
Statement I: RNA mutates at a faster rate.
Statement II: Viruses having RNA genome and shorter life span mutate and evolve faster.
In the light of the above statements, choose the **correct** answer from the options given below:
(1) Both **Statement I** and **Statement II** are false.
(2) **Statement I** is true but **Statement II** is false.
(3) **Statement I** false but **Statement II** is true.
(4) Both **Statement I** and **Statement II** are true.

177 Given below are two statements:
Statement I: In prokaryotes, the positively charged DNA is held with some negatively charged proteins in a region called nucleoid.
Statement II: In eukaryotes, the negatively charged DNA is wrapped around the positively charged histone octamer to form nucleosome.
In the light of the above statements, choose the **correct** answer from the options given below:
(1) Both **Statement I** and **Statement II** are false.
(2) **Statement I** is correct but **Statement II** is false.
(3) **Statement I** incorrect but **Statement II** is true.
(4) Both **Statement I** and **Statement II** are true.

178 Which one of the following symbols represents mating between relatives in human pedigree analysis?
(1) 
(2) 
(3) 
(4) 

179 Select the correct group/set of Australian Marsupials exhibiting adaptive radiation.
(1) Numbat, Spotted cuscus, Flying phalanger
(2) Mole, Flying squirrel, Tasmanian tiger cat
(3) Lemur, Anteater, Wolf
(4) Tasmanian wolf, Bobcat, Marsupial mole

180 Which of the following is not a cloning vector?
(1) YAC (2) pBR322
(3) Probe (4) BAC

181 Match **List I** with **List II**.

List I		**List II**
A. Heroin	I.	Effect on cardiovascular system
B. Marijuana	II.	Slow down body function
C. Cocaine	III.	Painkiller
D. Morphine	IV.	Interfere with transport of dopamine

Choose the **correct** answer from the options given below:
(1) A-I, B-II, C-III, D-IV
(2) A-IV, B-III, C-II, D-I
(3) A-III, B-IV, C-I, D-II
(4) A-II, B-I, C-IV, D-III

182 Which one of the following techniques does not serve the purpose of early diagnosis of a disease for its early treatment?
(1) Serum and Urine analysis
(2) Polymerase Chain Reaction (PCR) technique
(3) Enzyme Linked Immuno-Sorbent Assay (ELISA) technique
(4) Recombinant DNA Technology

183 Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R.**

Assertion A: Endometrium is necessary for implantation of blastocyst.

Reason R: In the absence of fertilization, the corpus luteum degenerates that causes disintegration of endometrium.

In the light of the above statements, choose the **correct** answer from the options given below:

(1) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**.
(2) **A** is true but **R** is false.
(3) **A** is false but **R** is true.
(4) Both **A** and **R** are true and **R** is the correct explanation of **A**.

184 Match **List I** with **List II**.

	List I		**List II**
A.	Gene 'a'	I.	β-galactosidase
B.	Gene 'y'	II.	Transacetylase
C.	Gene 'i'	III.	Permease
D.	Gene 'z'	IV.	Repressor protein

Choose the **correct** answer from the options given below:

(1) A-II, B-III, C-IV, D-I
(2) A-III, B-IV, C-I, D-II
(3) A-III, B-I, C-IV, D-II
(4) A-II, B-I, C-IV, D-III

185 Given below are statements: one is labelled as **Assertion A** and the other is labelled as **Reason R.**

Assertion A: Nephrons are of two types: Cortical & Juxta medullary, based on their relative position in cortex and medulla.

Reason R: Juxta medullary nephrons have short loop of Henle whereas, cortical nephrons have longer loop of Henle.

In the light of the above statements, choose the **correct** answer from the options given below:

(1) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**.
(2) **A** is true but **R** is false.
(3) **A** is false but **R** is true.
(4) Both **A** and **R** are true and **R** is the correct explanation of **A**.

186 Which of the following is characteristic feature of cockroach regarding sexual dimorphism ?

(1) Presence of anal styles
(2) Presence of sclerites
(3) Presence of anal cerci
(4) Dark brown body colour and anal cerci

187 Select the correct statements.

A. Tetrad formation is seen during Leptotene.
B. During Anaphase, the centromeres split and chromatids separate.
C. Terminalization takes place during Pachytene.
D. Nucleolus, Golgi complex and ER are reformed during Telophase.
E. Crossing over takes place between sister chromatids of homologous chromosome.

Choose the **correct** answer from the options given below:

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

188 Which of the following statements are correct?

A. An excessive loss of body fluid from the body switches off osmoreceptors.
B. ADH facilitates water reabsorption to prevent diuresis.
C. ANF causes vasodilation.
D. ADH causes increase in blood pressure.
E. ADH 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 and B only

189 Given below are two statements:
Statement I: During G_0 phase of cell cycle, the cell is metabolically inactive.
Statement II: The centrosome undergoes duplication during S phase of interphase.
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 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.

190 Which one of the following is NOT an advantage of inbreeding?
(1) It exposes harmful recessive genes that are eliminated by selection.
(2) Elimination of less desirable genes and accumulation of superior genes takes place due to it.
(3) It decreases the productivity of inbred population, after continuous inbreeding.
(4) It decreases homozygosity.

191 Match **List I** with **List II**.

List I	**List II**
A. Logistic growth	I. Unlimited resource availability condition
B. Exponential growth	II. Limited resource availability condition
C. Expanding age pyramid	III. The percent individuals of pre-reproductive age is largest followed by reproductive and post reproductive age groups
D. Stable age pyramid	IV. The percent individuals of pre-reproductives and reproductive age group are same

Choose the **correct** answer from the options given below:
(1) A-II, B-III, C-I, D-IV
(2) A-II, B-IV, C-I, D-III
(3) A-II, B-IV, C-III, D-I
(4) A-II, B-I, C-III, D-IV

192 Which of the following are NOT under the control of thyroid hormone?
A. Maintenance of water and electrolyte balance
B. Regulation of basal metabolic rate
C. Normal rhythm of sleep-wake cycle
D. Development of immune system
E. Support the process of R.B.Cs formation
Choose the **correct** answer from the options given below:
(1) B and C only (2) C and D only
(3) D and E only (4) A and D only

193 The unique mammalian characteristics are:
(1) hairs, pinna and mammary glands
(2) hairs, pinna and indirect development
(3) pinna, monocondylic skull and mammary glands
(4) hairs, tympanic membrane and mammary glands

194 Which of the following statements are correct regarding skeletal muscle?
A. Muscle bundles are held together by collagenous connective tissue layer called fascicle.
B. Sarcoplasmic reticulum of muscle fibre is a store house of calcium ions.
C. Striated appearance of skeletal muscle fibre is due to distribution pattern of actin and myosin proteins.
D. M line is considered as functional unit of contraction called sarcomere.
Choose the ***most appropriate*** answer from the options given below:
(1) B and C only
(2) A, C and D only
(3) C and D only
(4) A, B and C only

195 Which of the following statements are correct ?

A. Basophils are most abundant cells of the total WBCs

B. Basophils secrete histamine, serotonin and heparin

C. Basophils are involved in inflammatory response

D. Basophils have kidney shaped nucleus

E. Basophils are agranulocytes

Choose the **correct** answer from the options given below:

(1) C and E only (2) B and C only

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

196 Which one of the following is the sequence on corresponding coding strand, if the sequence on mRNA formed is as follows

5' AUCGAUCGAUCGAUCGAUCG AUCG AUCG 3'?

(1) 3' UAGCUAGCUAGCUAGCUA GCUAGCUAGC 5'

(2) 5' ATCGATCGATCGATCGATCG ATCGATCG 3'

(3) 3' ATCGATCGATCGATCGATCG ATCGATCG 5'

(4) 5' UAGCUAGCUAGCUAGCUA GCUAGC UAGC 3'

197 The parts of human brain that helps in regulation of sexual behaviour, expression of excitement, pleasure, rage, fear etc. are :

(1) Corpora quadrigemina & hippocampus

(2) Brain stem & epithalamus

(3) Corpus callosum and thalamus

(4) Limbic system & hypothalamus

198 Match **List I** with **List II**.

List I	**List II**
A. Mast cells	I. Ciliated epithelium
B. Inner surface of bronchiole	II. Areolar connective tissue
C. Blood	III. Cuboidal epithelium
D. Tubular parts of nephron	IV. specialised connective tissue

Choose the **correct** answer from the options give below:

(1) A-II, B-III, C-I, D-IV

(2) A-II, B-I, C-IV, D-III

(3) A-III, B-IV, C-II, D-I

(4) A-I, B-II, C-IV, D-III

199 In cockroach, excretion is brought about by-

A. Phallic gland B. Urecose gland

C. Nephrocytes D. Fat body

E. Collaterial glands

Choose the **correct** answer from the options given below:

(1) A, B and E only

(2) B, C and D only

(3) B and D only

(4) A and E only

200 Select the correct statements with reference to chordates.

A. Presence of a mid-dorsal, solid and double nerve cord.

B. Presence of closed circulatory system.

C. Presence of paired pharyngeal gillslits.

D. Presence of dorsal heart

E. Triploblastic pseudocoelomate animals.

Choose the **correct** answer from the options given below:

(1) B and C only

(2) B, D and E only

(3) C, D and E only

(4) A, C and D only

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK

Test Booklet Code

← Test Booklet No. **ENGLISH**

G1

ADI

This Booklet contains **32** pages, including Rough Page.

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 CODE for this Booklet is G1. Make sure that the CODE printed on the Original Copy of the Answer Sheet is the same as that on this Test Booklet.** In case of discrepancy, the candidate should immediately report the matter to the Invigilator for replacement of both the Test Booklet and the Answer Sheet.
8. 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 Roll No. anywhere else except in the specified space in the Test Booklet/Answer Sheet.
9. Use of white fluid for correction is **NOT** permissible on the Answer Sheet.
10. Each candidate must show on-demand his/her Admit Card to the Invigilator.
11. No candidate, without special permission of the centre Superintendent or Invigilator, would leave his/her seat.
12. 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.**
13. Use of Electronic/Manual Calculator is prohibited.
14. 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.
15. **No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.**
16. The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.
17. 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): _____

Roll Number : In figures _____

: In words _____

Centre of Examination (in Capitals): _____

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

Facsimile signature stamp of Centre Superintendent

Physics : Section-A (Q. No. 1 to 35)

1 A bullet is fired from a gun at the speed of 280 m s^{-1} in the direction 30° above the horizontal. The maximum height attained by the bullet is $\left(g = 9.8 \text{ m s}^{-2}, \sin 30° = 0.5\right)$:

(1) 3000 m (2) 2800 m

(3) 2000 m (4) 1000 m

2 An electric dipole is placed at an angle of 30° with an electric field of intensity $2\times10^5 \text{ N C}^{-1}$. It experiences a torque equal to 4 N m. Calculate the magnitude of charge on the dipole, if the dipole length is 2 cm.

(1) 2 mC (2) 8 mC

(3) 6 mC (4) 4 mC

3 The amount of energy required to form a soap bubble of radius 2 cm from a soap solution is nearly : (surface tension of soap solution = 0.03 N m^{-1})

(1) 50.1×10^{-4}J (2) 30.16×10^{-4}J

(3) 5.06×10^{-4}J (4) 3.01×10^{-4}J

4 Let a wire be suspended from the ceiling (rigid support) and stretched by a weight W attached at its free end. The longitudinal stress at any point of cross-sectional area A of the wire is :

(1) Zero (2) $2W/A$

(3) W/A (4) $W/2A$

5 Light travels a distance x in time t_1 in air and $10x$ in time t_2 in another denser medium. What is the critical angle for this medium?

(1) $\sin^{-1}\left(\frac{10t_1}{t_2}\right)$ (2) $\sin^{-1}\left(\frac{t_2}{t_1}\right)$

(3) $\sin^{-1}\left(\frac{10t_2}{t_1}\right)$ (4) $\sin^{-1}\left(\frac{t_1}{10t_2}\right)$

6 For Young's double slit experiment, two statements are given below:

Statement I : If screen is moved away from the plane of slits, angular separation of the fringes remains constant.

Statement II : If the monochromatic source is replaced by another monochromatic source of larger wavelength, the angular separation of fringes decreases.

In the light of the above statements, choose the *correct* answer from the options given below:

(1) **Statement I** is false but **Statement II** is true.

(2) Both **Statement I** and **Statement II** are true.

(3) Both **Statement I** and **Statement II** are false.

(4) **Statement I** is true but **Statement II** is false.

7 Two bodies of mass m and $9m$ are placed at a distance R. The gravitational potential on the line joining the bodies where the gravitational field equals zero, will be (G = gravitational constant) :

(1) $-\frac{20Gm}{R}$ (2) $-\frac{8Gm}{R}$

(3) $-\frac{12Gm}{R}$ (4) $-\frac{16Gm}{R}$

8 The temperature of a gas is –50° C. To what temperature the gas should be heated so that the rms speed is increased by 3 times?

(1) 223 K (2) 669° C

(3) 3295° C (4) 3097 K

9 In a series LCR circuit, the inductance L is 10 mH, capacitance C is $1\ \mu F$ and resistance R is $100\ \Omega$. The frequency at which resonance occurs is :

(1) 1.59 kHz (2) 15.9 rad/s
(3) 15.9 kHz (4) 1.59 rad/s

10 A football player is moving southward and suddenly turns eastward with the same speed to avoid an opponent. The force that acts on the player while turning is :

(1) along south-west
(2) along eastward
(3) along northward
(4) along north-east

11 The errors in the measurement which arise due to unpredictable fluctuations in temperature and voltage supply are :

(1) Random errors
(2) Instrumental errors
(3) Personal errors
(4) Least count errors

12 The ratio of radius of gyration of a solid sphere of mass M and radius R about its own axis to the radius of gyration of the thin hollow sphere of same mass and radius about its axis is :

(1) 5 : 2 (2) 3 : 5
(3) 5 : 3 (4) 2 : 5

13 If $\oint_S \vec{E} \cdot \vec{dS} = 0$ over a surface, then :

(1) the electric field inside the surface is necessarily uniform.
(2) the number of flux lines entering the surface must be equal to the number of flux lines leaving it.
(3) the magnitude of electric field on the surface is constant.
(4) all the charges must necessarily be inside the surface.

14 A Carnot engine has an efficiency of 50% when its source is at a temperature 327° C. The temperature of the sink is :

(1) 200° C (2) 27° C
(3) 15° C (4) 100° C

15 A 12 V, 60 W lamp is connected to the secondary of a step down transformer, whose primary is connected to ac mains of 220 V. Assuming the transformer to be ideal, what is the current in the primary winding?

(1) 0.37 A (2) 0.27 A
(3) 2.7 A (4) 3.7 A

16 Given below are two statements:

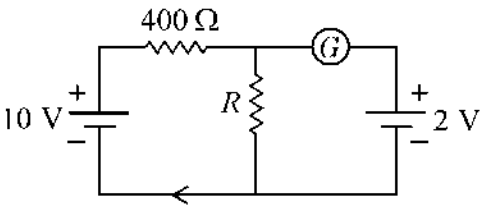
Statement I : Photovoltaic devices can convert optical radiation into electricity.

Statement II : Zener diode is designed to operate under reverse bias in breakdown region.

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

(1) **Statement I** is incorrect but **Statement II** is correct.
(2) Both **Statement I** and **Statement II** are correct.
(3) Both **Statement I** and **Statement II** are incorrect.
(4) **Statement I** is correct but **Statement II** is incorrect.

17 If the galvanometer G does not show any deflection in the circuit shown, the value of R is given by :



(1) $400\ \Omega$ (2) $200\ \Omega$
(3) $50\ \Omega$ (4) $100\ \Omega$

18 The ratio of frequencies of fundamental harmonic produced by an open pipe to that of closed pipe having the same length is :

(1) 3 : 1 (2) 1 : 2

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

19 The angular acceleration of a body, moving along the circumference of a circle, is :

(1) along the axis of rotation

(2) along the radius, away from centre

(3) along the radius towards the centre

(4) along the tangent to its position

20 The minimum wavelength of X-rays produced by an electron accelerated through a potential difference of V volts is proportional to:

(1) V^2 (2) $\sqrt{V}$

(3) $\frac{1}{V}$ (4) $\frac{1}{\sqrt{V}}$

21 The work functions of Caesium (Cs), Potassium (K) and Sodium (Na) are 2.14 eV, 2.30 eV and 2.75 eV respectively. If incident electromagnetic radiation has an incident energy of 2.20 eV, which of these photosensitive surfaces may emit photoelectrons?

(1) Na only

(2) Cs only

(3) Both Na and K

(4) K only

22 The net magnetic flux through any closed surface is :

(1) Negative (2) Zero

(3) Positive (4) Infinity

23 A full wave rectifier circuit consists of two p-n junction diodes, a centre-tapped transformer, capacitor and a load resistance. Which of these components remove the ac ripple from the rectified output?

(1) Load resistance

(2) A centre-tapped transformer

(3) p-n junction diodes

(4) Capacitor

24 An ac source is connected to a capacitor C. Due to decrease in its operating frequency :

(1) capacitive reactance remains constant

(2) capacitive reactance decreases.

(3) displacement current increases.

(4) displacement current decreases.

25 In a plane electromagnetic wave travelling in free space, the electric field component oscillates sinusoidally at a frequency of 2.0×10^{10} Hz and amplitude $48\ \text{V m}^{-1}$. Then the amplitude of oscillating magnetic field is : (Speed of light in free space = $3 \times 10^8\ \text{m s}^{-1}$)

(1) 1.6×10^{-6} T (2) 1.6×10^{-9} T

(3) 1.6×10^{-8} T (4) 1.6×10^{-7} T

26 Resistance of a carbon resistor determined from colour codes is $(22000 \pm 5\%)\ \Omega$. The colour of third band must be :

(1) Yellow (2) Red

(3) Green (4) Orange

27 A vehicle travels half the distance with speed ϑ and the remaining distance with speed 2ϑ. Its average speed is:

(1) $\frac{3\vartheta}{4}$ (2) $\frac{\vartheta}{3}$

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

28 The potential energy of a long spring when stretched by 2 cm is U. If the spring is stretched by 8 cm, potential energy stored in it will be :

(1) 16U (2) 2U

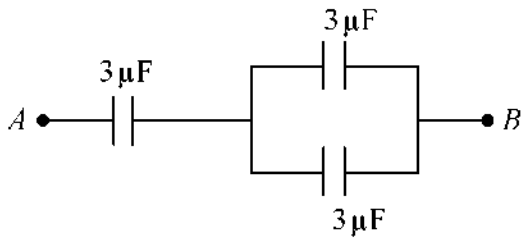
(3) 4U (4) 8U

29 In hydrogen spectrum, the shortest wavelength in the Balmer series is λ. The shortest wavelength in the Bracket series is :

(1) 16λ (2) 2λ

(3) 4λ (4) 9λ

30 The equivalent capacitance of the system shown in the following circuit is :



(1) 9 μF (2) 2 μF

(3) 3 μF (4) 6 μF

31 A metal wire has mass (0.4 ± 0.002) g, radius (0.3 ± 0.001) mm and length (5 ± 0.02) cm. The maximum possible percentage error in the measurement of density will nearly be:

(1) 1.4% (2) 1.2%

(3) 1.3% (4) 1.6%

32 The venturi-meter works on :

(1) The principle of perpendicular axes

(2) Huygen's principle

(3) Bernoulli's principle

(4) The principle of parallel axes

33 The half life of a radioactive substance is 20 minutes. In how much time, the activity of substance drops to $\left(\frac{1}{16}\right)^{th}$ of its initial value?

(1) 80 minutes (2) 20 minutes

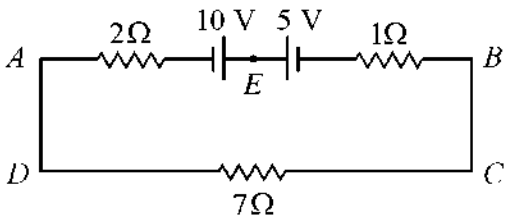
(3) 40 minutes (4) 60 minutes

34 The magnetic energy stored in an inductor of inductance 4 μH carrying a current of 2 A is :

(1) 8 μJ (2) 4 μJ

(3) 4 mJ (4) 8 mJ

35 The magnitude and direction of the current in the following circuit is



(1) 1.5 A from B to A through E

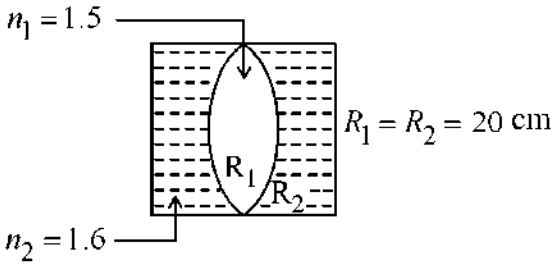
(2) 0.2 A from B to A through E

(3) 0.5 A from A to B through E

(4) $\frac{5}{9}$ A from A to B through E

Physics : Section-B (Q. No. 36 to 50)

36 In the figure shown here, what is the equivalent focal length of the combination of lenses (Assume that all layers are thin)?

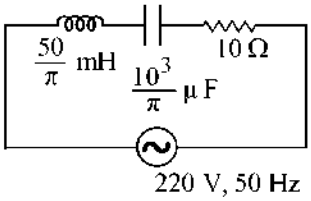


(1) -50 cm (2) 40 cm
(3) -40 cm (4) -100 cm

37 Calculate the maximum acceleration of a moving car so that a body lying on the floor of the car remains stationary. The coefficient of static friction between the body and the floor is 0.15 ($g = 10\ m\ s^{-2}$).

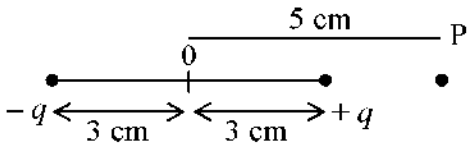
(1) $50\ m\ s^{-2}$ (2) $1.2\ m\ s^{-2}$
(3) $150\ m\ s^{-2}$ (4) $1.5\ m\ s^{-2}$

38 The net impedance of circuit (as shown in figure) will be :



(1) $25\ \Omega$ (2) $10\sqrt{2}\ \Omega$
(3) $15\ \Omega$ (4) $5\sqrt{5}\ \Omega$

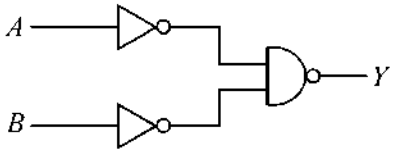
39 An electric dipole is placed as shown in the figure.



The electric potential (in 10^2 V) at point P due to the dipole is (ϵ_0 = permittivity of free space and $\frac{1}{4\pi\epsilon_0} = K$):

(1) $\left(\frac{8}{3}\right)qK$ (2) $\left(\frac{3}{8}\right)qK$
(3) $\left(\frac{5}{8}\right)qK$ (4) $\left(\frac{8}{5}\right)qK$

40 For the following logic circuit, the truth table is:



(1)

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

(2)

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

(3)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

(4)

A	B	Y
0	0	1
0	1	0
1	0	1
1	1	0

41 10 resistors, each of resistance R are connected in series to a battery of emf E and negligible internal resistance. Then those are connected in parallel to the same battery, the current is increased n times. The value of n is :

(1) 1000 (2) 10
(3) 100 (4) 1

42 The resistance of platinum wire at 0°C is 2Ω and 6.8Ω at 80°C. The temperature coefficient of resistance of the wire is :

(1) $3\times10^{-1}\ °C^{-1}$ (2) $3\times10^{-4}\ °C^{-1}$
(3) $3\times10^{-3}\ °C^{-1}$ (4) $3\times10^{-2}\ °C^{-1}$

43 A horizontal bridge is built across a river. A student standing on the bridge throws a small ball vertically upwards with a velocity $4\ m\ s^{-1}$. The ball strikes the water surface after 4 s. The height of bridge above water surface is (Take $g = 10\ m\ s^{-2}$) :

(1) 68 m (2) 56 m
(3) 60 m (4) 64 m

44 A bullet from a gun is fired on a rectangular wooden block with velocity u. When bullet travels 24 cm through the block along its length horizontally, velocity of bullet becomes $\frac{u}{3}$. Then it further penetrates into the block in the same direction before coming to rest exactly at the other end of the block. The total length of the block is :

(1) 30 cm (2) 27 cm

(3) 24 cm (4) 28 cm

45 A satellite is orbiting just above the surface of the earth with period T. If d is the density of the earth and G is the universal constant of gravitation, the quantity $\frac{3\pi}{Gd}$ represents :

(1) $\sqrt{T}$ (2) T

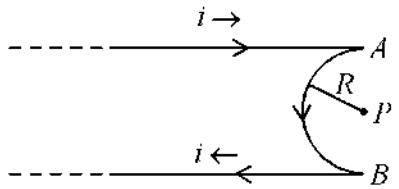
(3) T^2 (4) T^3

46 Two thin lenses are of same focal lengths (f), but one is convex and the other one is concave. When they are placed in contact with each other, the equivalent focal length of the combination will be :

(1) Infinite (2) Zero

(3) $f/4$ (4) $f/2$

47 A very long conducting wire is bent in a semi-circular shape from A to B as shown in figure. The magnetic field at point P for steady current configuration is given by :



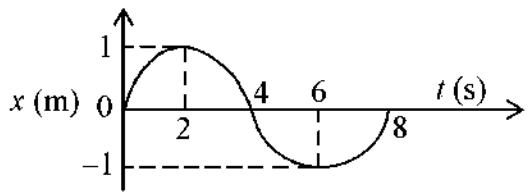
(1) $\frac{\mu_0 i}{4R}\left[1-\frac{2}{\pi}\right]$ pointed into the page

(2) $\frac{\mu_0 i}{4R}$ pointed into the page

(3) $\frac{\mu_0 i}{4R}$ pointed away from the page

(4) $\frac{\mu_0 i}{4R}\left[1-\frac{2}{\pi}\right]$ pointed away from page

48 The x-t graph of a particle performing simple harmonic motion is shown in the figure. The acceleration of the particle at $t = 2$ s is :



(1) $-\frac{\pi^2}{16}\text{ m s}^{-2}$ (2) $\frac{\pi^2}{8}\text{ m s}^{-2}$

(3) $-\frac{\pi^2}{8}\text{ m s}^{-2}$ (4) $\frac{\pi^2}{16}\text{ m s}^{-2}$

49 A wire carrying a current I along the positive x-axis has length L. It is kept in a magnetic field $\vec{B} = (2\hat{i} + 3\hat{j} - 4\hat{k})$ T. The magnitude of the magnetic force acting on the wire is :

(1) $\sqrt{3}\,IL$ (2) $3\,IL$

(3) $\sqrt{5}\,IL$ (4) $5\,IL$

50 The radius of inner most orbit of hydrogen atom is 5.3×10^{-11} m. What is the radius of third allowed orbit of hydrogen atom?

(1) 4.77 Å (2) 0.53 Å

(3) 1.06 Å (4) 1.59 Å

51 Match **List - I** with **List - II** :

	List - I		**List - II**
A.	Coke	I.	Carbon atoms are sp^3 hybridised.
B.	Diamond	II.	Used as a dry lubricant
C.	Fullerene	III.	Used as a reducing agent
D.	Graphite	IV.	Cage like molecules

Choose the **correct** answer from the options given below :

(1) A-III, B-IV, C-I, D-II

(2) A-II, B-IV, C-I, D-III

(3) A-IV, B-I, C-II, D-III

(4) A-III, B-I, C-IV, D-II

52 Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : Metallic sodium dissolves in liquid ammonia giving a deep blue solution, which is paramagnetic.

Reasons R : The deep blue solution is due to the formation of amide.

In the light of the above statements, choose the **correct** answer from the options given below :

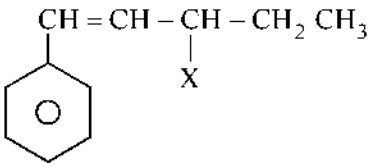
(1) **A** is false but **R** is true.

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

(3) Both **A** and **R** are true but **R** is **NOT** the correct explanation of **A**.

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

53 The given compound



is an example of _____.

(1) vinylic halide

(2) benzylic halide

(3) aryl halide

(4) allylic halide

54 Some tranquilizers are listed below. Which one from the following belongs to barbiturates?

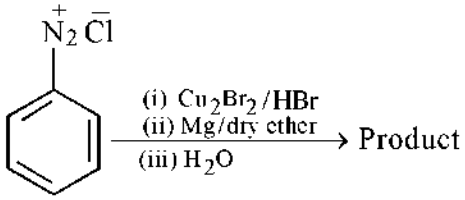
(1) Veronal

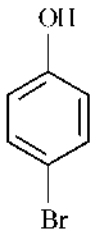
(2) Chlordiazepoxide

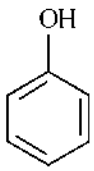
(3) Meprobamate

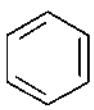
(4) Valium

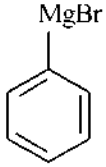
55 Identify the product in the following reaction:



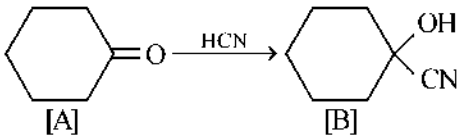
(1) 

(2) 

(3) 

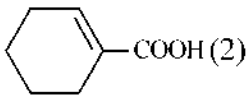
(4) 

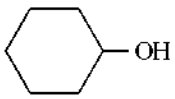
56 Complete the following reaction :

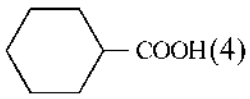


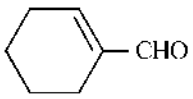
$$\xrightarrow[\Delta]{\text{conc. } H_2SO_4} [C]$$

[C] is _____.

(1) 

(2) 

(3) 

(4) 

57 The stability of Cu^{2+} is more than Cu^{+} salts in aqueous solution due to -

(1) second ionisation enthalpy.

(2) first ionisation enthalpy.

(3) enthalpy of atomization.

(4) hydration energy.

58 The **right** option for the mass of CO_2 produced by heating 20 g of 20% pure limestone is (Atomic mass of Ca = 40)

$$\left[CaCO_3 \xrightarrow{1200\ K} CaO + CO_2\right]$$

(1) 1.32 g (2) 1.12 g

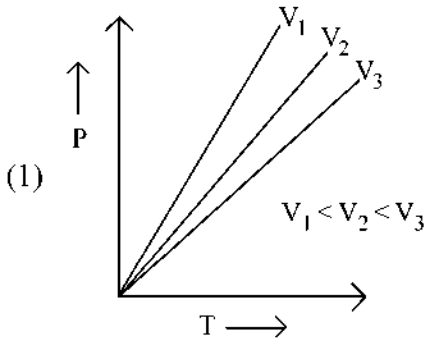
(3) 1.76 g (4) 2.64 g

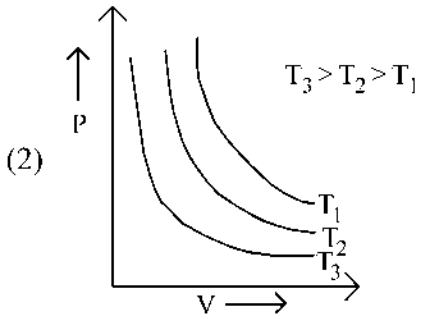
59 The conductivity of centimolar solution of KCl at 25°C is 0.0210 ohm^{-1} cm^{-1} and the resistance of the cell containing the solution at 25°C is 60 ohm. The value of cell constant is -

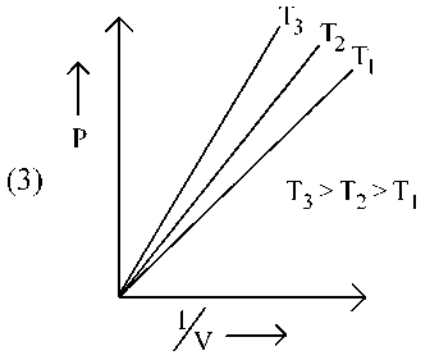
(1) 3.34 cm^{-1} (2) 1.34 cm^{-1}

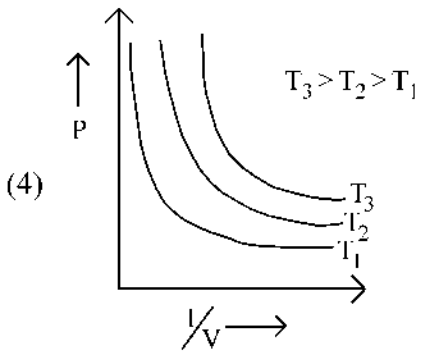
(3) 3.28 cm^{-1} (4) 1.26 cm^{-1}

60 Which amongst the following options is **correct** graphical representation of Boyle's Law?

(1) 

(2) 

(3) 

(4) 

61 Which amongst the following molecules on polymerization produces neoprene?

(1) $H_2C = \underset{\displaystyle CH_3}{\underset{|}{C}} - CH = CH_2$

(2) $H_2C = CH - CH = CH_2$

(3) $H_2C = \underset{\displaystyle Cl}{\underset{|}{C}} - CH = CH_2$

(4) $H_2C = CH - C \equiv CH$

62 Which of the following reactions will NOT give primary amine as the product?

(1) $CH_3CONH_2 \xrightarrow[(ii)\ H_3O\oplus]{(i)\ LiAlH_4}$ Product

(2) $CH_3\ CONH_2 \xrightarrow{Br_2\ /\ KOH}$ Product

(3) $CH_3CN \xrightarrow[(ii)\ H_3O\oplus]{(i)\ LiAlH_4}$ Product

(4) $CH_3NC \xrightarrow[(ii)\ H_3O\oplus]{(i)\ LiAlH_4}$ Product

63 Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : A reaction can have zero activation energy.

Reasons R : The minimum extra amount of energy absorbed by reactant molecules so that their energy becomes equal to threshold value, is called activation energy.

In the light of the above statements, choose the **correct** answer from the options given below :

(1) **A** is false but **R** is true.

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

(3) Both **A** and **R** are true and **R** is **NOT** the correct explanation of **A**.

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

64 Which one is an example of heterogenous catalysis?

(1) Combination between dinitrogen and dihydrogen to form ammonia in the presence of finely divided iron.

(2) Oxidation of sulphur dioxide into sulphur trioxide in the presence of oxides of nitrogen.

(3) Hydrolysis of sugar catalysed by H^+ ions.

(4) Decomposition of ozone in presence of nitrogen monoxide.

65 Amongst the given options which of the following molecules / ion acts as a Lewis acid?

(1) OH^- (2) NH_3

(3) H_2O (4) BF_3

66 Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : In equation $\Delta_r G = -nFE_{cell}$, value of $\Delta_r G$ depends on n.

Reasons R : E_{cell} is an intensive property and $\Delta_r G$ is an extensive property.

In the light of the above statements, choose the **correct** answer from the options given below :

(1) **A** is false but **R** is true.

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

(3) Both **A** and **R** are true and **R** is **NOT** the correct explanation of **A**.

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

67 The element expected to form largest ion to achieve the nearest noble gas configuration is :

(1) Na (2) O

(3) F (4) N

68 A compound is formed by two elements A and B. The element B forms cubic close packed structure and atoms of A occupy 1/3 of tetrahedral voids. If the formula of the compound is A_xB_y, then the value of $x + y$ is in option

(1) 2 (2) 5

(3) 4 (4) 3

69 Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : Helium is used to dilute oxygen in diving apparatus.

Reasons R : Helium has high solubility in O_2.

In the light of the above statements, choose the **correct** answer from the options given below :

(1) **A** is false but **R** is true.

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

(3) Both **A** and **R** are true and **R** is **NOT** the correct explanation of **A**.

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

70 Which of the following statements are **NOT** correct?

A. Hydrogen is used to reduce heavy metal oxides to metals.

B. Heavy water is used to study reaction mechanism.

C. Hydrogen is used to make saturated fats from oils.

D. The H-H bond dissociation enthalpy is lowest as compared to a single bond between two atoms of any element.

E. Hydrogen reduces oxides of metals that are more active than iron.

Choose the **most appropriate** answer from the options given below :

(1) A, B, C only

(2) B, C, D, E only

(3) B, D only

(4) D, E only

71 Which one of the following statements is **correct**?

(1) Mg plays roles in neuromuscular function and interneuronal transmission.

(2) The daily requirement of Mg and Ca in the human body is estimated to be 0.2 - 0.3 g.

(3) All enzymes that utilise ATP in phosphate transfer require Ca as the cofactor.

(4) The bone in human body is an inert and unchanging substance.

72 For a certain reaction, the rate = $k[A]^2[B]$, when the initial concentration of A is tripled keeping concentration of B constant, the initial rate would

(1) increase by a factor of three.

(2) decrease by a factor of nine.

(3) increase by a factor of six.

(4) increase by a factor of nine.

73 Amongst the following, the total number of species NOT having eight electrons around central atom in its outer most shell, is

$NH_3, AlCl_3, BeCl_2, CCl_4, PCl_5$:

(1) 1 (2) 3

(3) 2 (4) 4

74 In Lassaigne's extract of an organic compound, both nitrogen and sulphur are present, which gives blood red colour with Fe^{3+} due to the formation of -

(1) $\left[Fe(SCN)\right]^{2+}$

(2) $Fe_4\left[Fe(CN)_6\right]_3 \cdot x H_2O$

(3) NaSCN

(4) $\left[Fe(CN)_5 NOS\right]^{4-}$

75 The **correct** order of energies of molecular orbitals of N_2 molecule, is :

(1) $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \left(\pi 2p_x = \pi 2p_y\right) < \left(\pi^* 2p_x = \pi^* 2p_y\right) < \sigma 2p_z < \sigma^* 2p_z$

(2) $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \left(\pi 2p_x = \pi 2p_y\right) < \sigma 2p_z < \left(\pi^* 2p_x = \pi^* 2p_y\right) < \sigma^* 2p_z$

(3) $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \sigma 2p_z < \left(\pi 2p_x = \pi 2p_y\right) < \left(\pi^* 2p_x = \pi^* 2p_y\right) < \sigma^* 2p_z$

(4) $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \sigma 2p_z < \sigma^* 2p_z < \left(\pi 2p_x = \pi 2p_y\right) < \left(\pi^* 2p_x = \pi^* 2p_y\right)$

76 Homoleptic complex from the following complexes is :

(1) Triamminetriaquachromium (III) chloride

(2) Potassium trioxalatoaluminate (III)

(3) Diamminechloridonitrito - N - platinum (II)

(4) Pentaamminecarbonatocobalt (III) chloride

77 Intermolecular forces are forces of attraction and repulsion between interacting particles that will include :

A. dipole - dipole forces.

B. dipole - induced dipole forces.

C. hydrogen bonding.

D. covalent bonding.

E. dispersion forces.

Choose the **most appropriate** answer from the options given below :

(1) A, C, D, E are correct.

(2) B, C, D, E are correct.

(3) A, B, C, D are correct.

(4) A, B, C, E are correct.

78 Select the **correct** statements from the following :

A. Atoms of all elements are composed of two fundamental particles.

B. The mass of the electron is 9.10939×10^{-31} kg.

C. All the isotopes of a given element show same chemical properties.

D. Protons and electrons are collectively known as nucleons.

E. Dalton's atomic theory, regarded the atom as an ultimate particle of matter.

Choose the **correct** answer from the options given below :

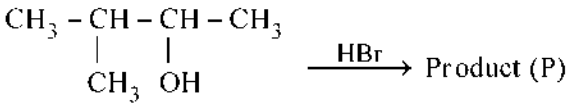
(1) B, C and E only

(2) A, B and C only

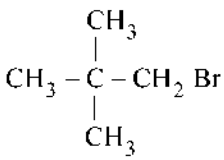
(3) C, D and E only

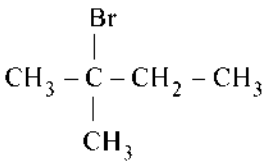
(4) A and E only

79 Consider the following reaction and identify the product (P).

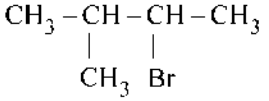


3 – Methylbutan – 2 – ol

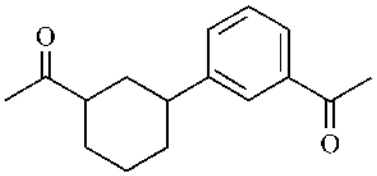
(1) 

(2) 

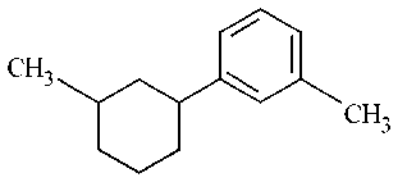
(3) $CH_3CH = CH - CH_3$

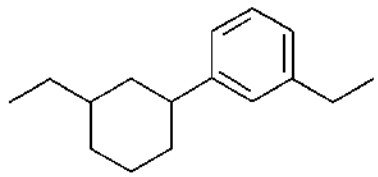
(4) 

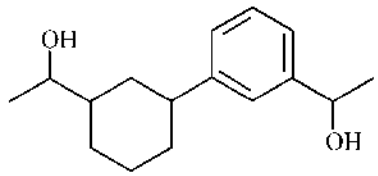
80 Identify product (A) in the following reaction:

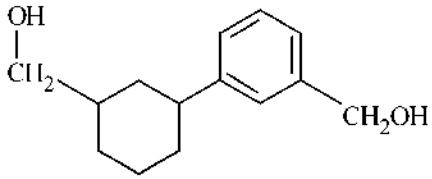


$$\xrightarrow[\text{conc. HCl}]{\text{Zn–Hg}} (A) + 2H_2O$$

(1) 

(2) 

(3) 

(4) 

81 Taking stability as the factor, which one of the following represents **correct** relationship?

(1) $TlI > TlI_3$ (2) $TlCl_3 > TlCl$

(3) $InI_3 > InI$ (4) $AlCl > AlCl_3$

82 Given below are two statements :

Statement I : A unit formed by the attachment of a base to 1' position of sugar is known as nucleoside

Statement II : When nucleoside is linked to phosphorous acid at 5'-position of sugar moiety, we get nucleotide.

In the light of the above statements, choose the **correct** answer from the options given below :

(1) Statement **I** is false but Statement **II** is true.

(2) Both Statement **I** and Statement **II** are true.

(3) Both Statement **I** and Statement **II** are false.

(4) Statement **I** is true but Statement **II** is false.

83 Weight (g) of two moles of the organic compound, which is obtained by heating sodium ethanoate with sodium hydroxide in presence of calcium oxide is :

(1) 18 (2) 16

(3) 32 (4) 30

84 The relation between n_m, (n_m = the number of permissible values of magnetic quantum number (m)) for a given value of azimuthal quantum number (l), is

(1) $n_m = l + 2$ (2) $l = \frac{n_m - 1}{2}$

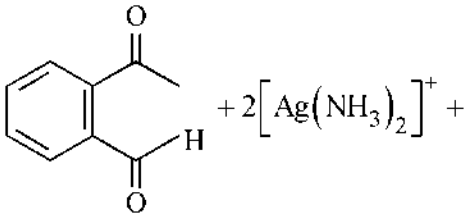
(3) $l = 2n_m + 1$ (4) $n_m = 2l^2 + 1$

85 The number of σ bonds, π bonds and lone pair of electrons in pyridine, respectively are:

(1) 12, 2, 1 (2) 11, 2, 0

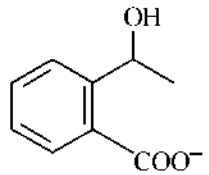
(3) 12, 3, 0 (4) 11, 3, 1

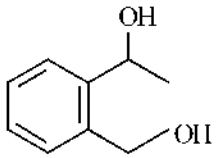
86 Identify the major product obtained in the following reaction :

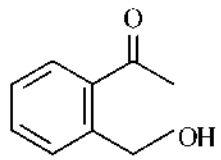


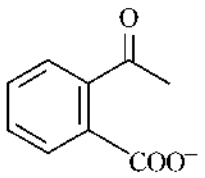
$+ 2\left[Ag(NH_3)_2\right]^+ +$

$3\ ^-OH \xrightarrow{\Delta}$ major product

(1) 

(2) 

(3) 

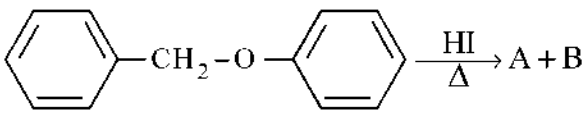
(4) 

87 Pumice stone is an example of -

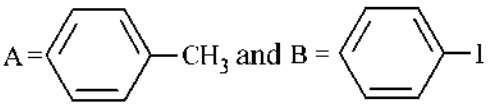
(1) foam (2) sol

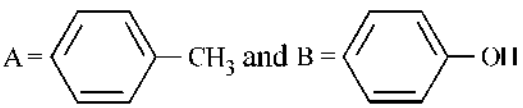
(3) gel (4) solid sol

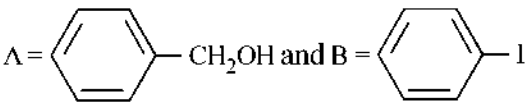
88 Consider the following reaction :

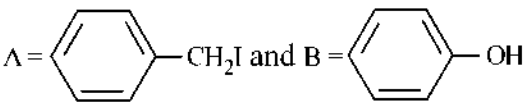


Identify products A and B.

(1) 

(2) 

(3) 

(4) 

89 The reaction that does **NOT** take place in a blast furnace between 900 K to 1500 K temperature range during extraction of iron is :

(1) $CaO + SiO_2 \rightarrow CaSiO_3$

(2) $Fe_2O_3 + CO \rightarrow 2FeO + CO_2$

(3) $FeO + CO \rightarrow Fe + CO_2$

(4) $C + CO_2 \rightarrow 2CO$

90 Which of the following statements are **INCORRECT**?

A. All the transition metals except scandium form MO oxides which are ionic.

B. The highest oxidation number corresponding to the group number in transition metal oxides is attained in Sc_2O_3 to Mn_2O_7.

C. Basic character increases from V_2O_3 to V_2O_4 to V_2O_5.

D. V_2O_4 dissolves in acids to give VO_4^{3-} salts.

E. CrO is basic but Cr_2O_3 is amphoteric.

Choose the **correct** answer from the options given below :

(1) B and C only

(2) A and E only

(3) B and D only

(4) C and D only

91 Which complex compound is most stable?

(1) $\left[Co(NH_3)_6\right]_2(SO_4)_3$

(2) $\left[Co(NH_3)_4(H_2O)Br\right](NO_3)_2$

(3) $\left[Co(NH_3)_3(NO_3)_3\right]$

(4) $\left[CoCl_2(en)_2\right]NO_3$

92 What fraction of one edge centred octahedral void lies in one unit cell of fcc?

(1) $\frac{1}{12}$ (2) $\frac{1}{2}$

(3) $\frac{1}{3}$ (4) $\frac{1}{4}$

93 Match **List - I** with **List - II** :

List - I (Oxoacids of Sulphur)	**List - II (Bonds)**
A. Peroxodisulphuric acid	I. Two S-OH, Four S=O, One S-O-S
B. Sulphuric acid	II. Two S-OH, One S=O
C. Pyrosulphuric acid	III. Two S-OH, Four S=O, One S-O-O-S
D. Sulphurous acid	IV. Two S-OH, Two S=O

Choose the **correct** answer from the options given below :

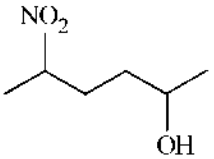
(1) A-III, B-IV, C-II, D-I

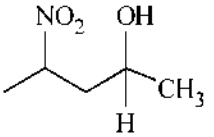
(2) A-I, B-III, C-II, D-IV

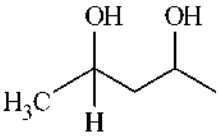
(3) A-III, B-IV, C-I, D-II

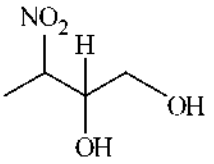
(4) A-I, B-III, C-IV, D-II

94 Which amongst the following will be most readily dehydrated under acidic conditions ?

(1) 

(2) 

(3) 

(4) 

95 The equilibrium concentrations of the species in the reaction $A + B \rightleftharpoons C + D$ are 2, 3, 10 and 6 mol L^{-1}, respectively at 300 K. ΔG° for the reaction is (R = 2 cal / mol K)

(1) – 13.73 cal (2) 1372.60 cal

(3) – 137.26 cal (4) – 1381.80 cal

96 Given below are two statements :

Statement I : The nutrient deficient water bodies lead to eutrophication.

Statement II : Eutrophication leads to decrease in the level of oxygen in the water bodies.

In the light of the above statements, choose the **correct** answer from the options given below :

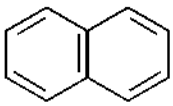
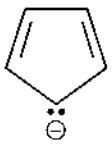
(1) **Statement I** is incorrect but **Statement II** is true.

(2) Both **Statement I** and **Statement II** are true.

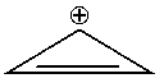
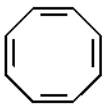
(3) Both **Statement I** and **Statement II** are false.

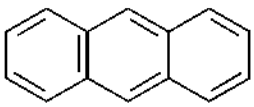
(4) **Statement I** is correct but **Statement II** is false.

97 Consider the following compounds/species:

i.  ii. 

iii.  iv. 

v.  vi. 

vii. 

The number of compounds/species which obey Huckel's rule is _____.

(1) 5 (2) 4

(3) 6 (4) 2

98 Which amongst the following options is the **correct** relation between change in enthalpy and change in internal energy?

(1) $\Delta H + \Delta U = \Delta nR$

(2) $\Delta H = \Delta U - \Delta n_g RT$

(3) $\Delta H = \Delta U + \Delta n_g RT$

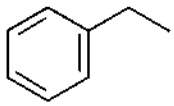
(4) $\Delta H - \Delta U = -\Delta nRT$

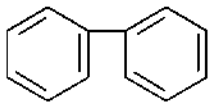
99 Identify the final product [D] obtained in the following sequence of reactions.

$$CH_3CHO \xrightarrow[ii)\ H_3O^+]{i)\ LiAlH_4} [A] \xrightarrow[\Delta]{H_2SO_4} [B]$$

$$\xrightarrow{HBr} [C] \xrightarrow[Na/dry\ ether]{} [D]$$ (with Br on the benzene ring)

(1) $HC \equiv C^{\ominus}\ Na^+$

(2) 

(3) 

(4) C_4H_{10}

100 On balancing the given redox reaction,

$$a\ Cr_2O_7^{2-} + b\ SO_3^{2-}(aq) + c\ H^+(aq) \rightarrow$$

$$2a\ Cr^{3+}(aq) + b\ SO_4^{2-}(aq) + \frac{c}{2} H_2O(\ell)$$

the coefficients a, b and c are found to be, respectively -

(1) 8, 1, 3 (2) 1, 3, 8

(3) 3, 8, 1 (4) 1, 8, 3

Botany : Section-A (Q. No. 101 to 135)

101 Movement and accumulation of ions across a membrane against their concentration gradient can be explained by
(1) Active Transport
(2) Osmosis
(3) Facilitated Diffusion
(4) Passive Transport

102 Among 'The Evil Quartet', which one is considered the most important cause driving extinction of species?
(1) Co-extinctions
(2) Habitat loss and fragmentation
(3) Over exploitation for economic gain
(4) Alien species invasions

103 Expressed Sequence Tags (ESTs) refers to
(1) Certain important expressed genes.
(2) All genes that are expressed as RNA.
(3) All genes that are expressed as proteins.
(4) All genes whether expressed or unexpressed.

104 The phenomenon of pleiotropism refers to
(1) more than two genes affecting a single character.
(2) presence of several alleles of a single gene controlling a single crossover.
(3) presence of two alleles, each of the two genes controlling a single trait.
(4) a single gene affecting multiple phenotypic expression.

105 In tissue culture experiments, leaf mesophyll cells are put in a culture medium to form callus. This phenomenon may be called as -
(1) Senescence
(2) Differentiation
(3) Dedifferentiation
(4) Development

106 Given below are two statements :
Statement I : Endarch and exarch are the terms often used for describing the position of secondary xylem in the plant body.
Statement II : Exarch condition is the most common feature of the root system.
In the light of the above statements, choose the **correct** answer from the options given below :
(1) **Statement I** is incorrect but **Statement II** is true.
(2) Both **Statement I** and **Statement II** are true.
(3) Both **Statement I** and **Statement II** are false.
(4) **Statement I** is correct but **Statement II** is false.

107 Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R** :
Assertion A : The first stage of gametophyte in the life cycle of moss is protonema stage.
Reason R : Protonema develops directly from spores produced in capsule.
In the light of the above statements, choose the **most appropriate** answer from the options given below :
(1) **A** is not correct but **R** is correct.
(2) Both **A** and **R** are correct and **R** is the correct explanation of **A**.
(3) Both **A** and **R** are correct but **R** is NOT the correct explanation of **A**.
(4) **A** is correct but **R** is not correct.

108 Which of the following stages of meiosis involves division of centromere?
(1) Telophase (2) Metaphase I
(3) Metaphase II (4) Anaphase II

109 Upon exposure to UV radiation, DNA stained with ethidium bromide will show
(1) Bright orange colour
(2) Bright red colour
(3) Bright blue colour
(4) Bright yellow colour

110 The process of appearance of recombination nodules occurs at which sub stage of prophase I in meiosis?
(1) Diakinesis (2) Zygotene
(3) Pachytene (4) Diplotene

111 Cellulose does not form blue colour with Iodine because
(1) It breakes down when iodine reacts with it.
(2) It is a disaccharide.
(3) It is a helical molecule.
(4) It does not contain complex helices and hence cannot hold iodine molecules.

112 Family Fabaceae differs from Solanaceae and Liliaceae. With respect to the stamens, pick out the characteristics specific to family Fabaceae but not found in Solanaceae or Liliaceae.
(1) Epiphyllous and Dithecous anthers
(2) Diadelphous and Dithecous anthers
(3) Polyadelphous and epipetalous stamens
(4) Monoadelphous and Monothecous anthers

113 The thickness of ozone in a column of air in the atmosphere is measured in terms of :
(1) Kilobase (2) Dobson units
(3) Decibels (4) Decameter

114 Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R** :
Assertion A : ATP is used at two steps in glycolysis.
Reason R : First ATP is used in converting glucose into glucose-6-phosphate and second ATP is used in conversion of fructose-6-phosphate into fructose-1-6-diphosphate.
In the light of the above statements, choose the **correct** answer from the options given below :
(1) **A** is false but **R** is true.
(2) Both **A** and **R** are true and **R** is the correct explanation of **A**.
(3) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**.
(4) **A** is true but **R** is false.

115 How many ATP and $NADPH_2$ are required for the synthesis of one molecule of Glucose during Calvin cycle?
(1) 18 ATP and 16 $NADPH_2$
(2) 12 ATP and 12 $NADPH_2$
(3) 18 ATP and 12 $NADPH_2$
(4) 12 ATP and 16 $NADPH_2$

116 During the purification process for recombinant DNA technology, addition of chilled ethanol precipitates out
(1) Polysaccharides (2) RNA
(3) DNA (4) Histones

117 Spraying of which of the following phytohormone on juvenile conifers helps in hastening the maturity period, that leads to early seed production?
(1) Abscisic Acid
(2) Indole-3-butyric Acid
(3) Gibberellic Acid
(4) Zeatin

118 In the equation

$\boxed{GPP - R = NPP}$

GPP is Gross Primary Productivity
NPP is Net Primary Productivity
R here is _____.
(1) Reproductive allocation
(2) Photosynthetically active radiation
(3) Respiratory quotient
(4) Respiratory loss

119 Axile placentation is observed in
(1) China rose, Petunia and Lemon
(2) Mustard, Cucumber and Primrose
(3) China rose, Beans and Lupin
(4) Tomato, Dianthus and Pea

120 Unequivocal proof that DNA is the genetic material was first proposed by
(1) Wilkins and Franklin
(2) Frederick Griffith
(3) Alfred Hershey and Martha Chase
(4) Avery, Macleoid and McCarthy

121 What is the function of tassels in the corn cob?
(1) To protect seeds
(2) To attract insects
(3) To trap pollen grains
(4) To disperse pollen grains

122 Which micronutrient is required for splitting of water molecule during photosynthesis?
(1) copper (2) manganese
(3) molybdenum (4) magnesium

123 Given below are two statements :
Statement I : The forces generated by transpiration can lift a xylem-sized column of water over 130 meters height.
Statement II : Transpiration cools leaf surfaces sometimes 10 to 15 degrees, by evaporative cooling.
In the light of the above statements, choose the **most appropriate** answer from the options given below :
(1) **Statement I** is incorrect but **Statement II** is correct.
(2) Both **Statement I** and **Statement II** are correct.
(3) Both **Statement I** and **Statement II** are incorrect.
(4) **Statement I** is correct but **Statement II** is incorrect.

124 Among eukaryotes, replication of DNA takes place in -
(1) G_2 phase (2) M phase
(3) S phase (4) G_1 phase

125 In gene gun method used to introduce alien DNA into host cells, microparticles of _____ metal are used.
(1) Silver
(2) Copper
(3) Zinc
(4) Tungsten or gold

126 The reaction centre in PS II has an absorption maxima at
(1) 780 nm (2) 680 nm
(3) 700 nm (4) 660 nm

127 Frequency of recombination between gene pairs on same chromosome as a measure of the distance between genes to map their position on chromosome, was used for the first time by
(1) Henking
(2) Thomas Hunt Morgan
(3) Sutton and Boveri
(4) Alfred Sturtevant

128 The historic Convention on Biological Diversity, 'The Earth Summit' was held in Rio de Janeiro in the year :
(1) 2002 (2) 1985
(3) 1992 (4) 1986

129 Identify the **correct** statements :
A. Detrivores perform fragmentation.
B. The humus is further degraded by some microbes during mineralization.
C. Water soluble inorganic nutrients go down into the soil and get precipitated by a process called leaching.
D. The detritus food chain begins with living organisms.
E. Earthworms break down detritus into smaller particles by a process called catabolism.
Choose the **correct** answer from the options given below :
(1) D, E, A only (2) A, B, C only
(3) B, C, D only (4) C, D, E only

130 Identify the pair of heterosporous pteridophytes among the following :
(1) *Equisetum* and *Salvinia*
(2) *Lycopodium* and *Selaginella*
(3) *Selaginella* and *Salvinia*
(4) *Psilotum* and *Salvinia*

131 In angiosperm, the haploid, diploid and triploid structures of a fertilized embryo sac sequentially are :
(1) Synergids, antipodals and Polar nuclei
(2) Synergids, Primary endosperm nucleus and zygote
(3) Antipodals, synergids, and primary endosperm nucleus
(4) Synergids, Zygote and Primary endosperm nucleus

132 What is the role of RNA polymerase III in the process of transcription in Eukaryotes?
(1) Transcription of only snRNAs
(2) Transcription of rRNAs (28S, 18S and 5.8S)
(3) Transcription of tRNA, 5 srRNA and snRNA
(4) Transcription of precursor of mRNA

133 Which hormone promotes internode/petiole elongation in deep water rice?
(1) 2, 4-D (2) GA_3
(3) Kinetin (4) Ethylene

134 Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R** :
Assertion A : Late wood has fewer xylary elements with narrow vessels.
Reason R : Cambium is less active in winters.
In the light of the above statements, choose the **correct** answer from the options given below :
(1) **A** is false but **R** is true.
(2) Both **A** and **R** are true and R is the correct explanation of **A**.
(3) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**.
(4) **A** is true but **R** is false.

135 Large, colourful, fragrant flowers with nectar are seen in :
(1) wind pollinated plants
(2) insect pollinated plants
(3) bird pollinated plants
(4) bat pollinated plants

136 Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R** :
Assertion A : A flower is defined as modified shoot wherein the shoot apical meristem changes to floral meristem.
Reason R : Internode of the shoot gets condensed to produce different floral appendages laterally at successive nodes instead of leaves.
In the light of the above statements, choose the **correct** answer from the options given below :
(1) **A** is false but **R** is true.
(2) Both **A** and **R** are true and R is the correct explanation of **A**.
(3) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**.
(4) **A** is true but **R** is false.

137 Which of the following combinations is required for chemiosmosis?
(1) proton pump, electron gradient, NADP synthase
(2) membrane, proton pump, proton gradient, ATP synthase
(3) membrane, proton pump, proton gradient, NADP synthase
(4) proton pump, electron gradient, ATP synthase

138 How many different proteins does the ribosome consist of?
(1) 20 (2) 80
(3) 60 (4) 40

139 Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R** :
Assertion A : In gymnosperms the pollen grains are released from the microsporangium and carried by air currents.
Reason R : Air currents carry the pollen grains to the mouth of the archegonia where the male gametes are discharged and pollen tube is not formed.
In the light of the above statements, choose the **correct** answer from the options given below :
(1) **A** is false but **R** is true.
(2) Both **A** and **R** are true and **R** is the correct explanation of **A**.
(3) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**.
(4) **A** is true but **R** is false.

140 Match **List I** with **List II** :

	List I		**List II**
A.	Cohesion	I.	More attraction in liquid phase
B.	Adhesion	II.	Mutual attraction among water molecules
C.	Surface tension	III.	Water loss in liquid phase
D.	Guttation	IV.	Attraction towards polar surfaces

Choose the **correct** answer from the options given below :

(1) A-II, B-I, C-IV, D-III
(2) A-II, B-IV, C-I, D-III
(3) A-IV, B-III, C-II, D-I
(4) A-III, B-I, C-IV, D-II

141 Which one of the following statements is **NOT** correct?

(1) The amount of some toxic substances of industrial waste water increases in the organisms at successive trophic levels.
(2) The micro-organisms involved in biodegradation of organic matter in a sewage polluted water body consume a lot of oxygen causing the death of aquatic organisms.
(3) Algal blooms caused by excess of organic matter in water improve water quality and promote fisheries.
(4) Water hyacinth grows abundantly in eutrophic water bodies and leads to an imbalance in the ecosystem dynamics of the water body.

142 Which of the following statements are correct about Klinefelter's Syndrome?

A. This disorder was first described by Langdon Down (1866).
B. Such an individual has overall masculine development. However, the feminine development is also expressed.
C. The affected individual is short statured.
D. Physical, psychomotor and mental development is retarded.
E. Such individuals are sterile.

Choose the **correct** answer from the options given below :

(1) A and E only (2) A and B only
(3) C and D only (4) B and E only

143 Given below are two statements :

Statement I : Gause's 'Competitive Exclusion Principle' states that two closely related species competing for the same resources cannot co-exist indefinitely and competitively inferior one will be eliminated eventually.

Statement II : In general, carnivores are more adversely affected by competition than herbivores.

In the light of the above statements, choose the **correct** answer from the options given below :

(1) **Statement I** is incorrect but **Statement II** is true.
(2) Both **Statement I** and **Statement II** are true.
(3) Both **Statement I** and **Statement II** are false.
(4) **Statement I** is correct but **Statement II** is false.

144 Match **List I** with **List II** :

	List I		**List II**
A.	M Phase	I.	Proteins are synthesized
B.	G_2 Phase	II.	Inactive phase
C.	Quiescent stage	III.	Interval between mitosis and initiation of DNA replication
D.	G_1 Phase	IV.	Equational division

Choose the correct answer from the options given below :

(1) A-II, B-IV, C-I, D-III
(2) A-III, B-II, C-IV, D-I
(3) A-IV, B-II, C-I, D-III
(4) A-IV, B-I, C-II, D-III

145 Identify the **correct** statements :

A. Lenticels are the lens-shaped openings permitting the exchange of gases.

B. Bark formed early in the season is called hard bark.

C. Bark is a technical term that refers to all tissues exterior to vascular cambium.

D. Bark refers to periderm and secondary phloem.

E. Phellogen is single-layered in thickness.

Choose the correct answer from the options given below :

(1) B and C only

(2) B, C and E only

(3) A and D only

(4) A, B and D only

146 Main steps in the formation of Recombinant DNA are given below. Arrange these steps in a correct sequence.

A. Insertion of recombinant DNA into the host cell.

B. Cutting of DNA at specific location by restriction enzyme.

C. Isolation of desired DNA fragment.

D. Amplification of gene of interest using PCR.

Choose the correct answer from the options given below :

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

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

147 Match **List I** with **List II** :

List I (Interaction)	**List II (Species A and B)**
A. Mutualism	I. +(A), O(B)
B. Commensalism	II. −(A), O(B)
C. Amensalism	III. +(A), −(B)
D. Parasitism	IV. +(A), +(B)

Choose the **correct** answer from the options given below :

(1) A-III, B-I, C-IV, D-II

(2) A-IV, B-II, C-I, D-III

(3) A-IV, B-I, C-II, D-III

(4) A-IV, B-III, C-I, D-II

148 Melonate inhibits the growth of pathogenic bacteria by inhibiting the activity of

(1) Dinitrogenase

(2) Succinic dehydrogenase

(3) Amylase

(4) Lipase

149 Match **List I** with **List II** :

List I	**List II**
A. Iron	I. Synthesis of auxin
B. Zinc	II. Component of nitrate reductase
C. Boron	III. Activator of catalase
D. Molybdenum	IV. Cell elongation and differentiation

Choose the correct answer from the options given below :

(1) A-II, B-IV, C-I, D-III

(2) A-III, B-II, C-I, D-IV

(3) A-II, B-III, C-IV, D-I

(4) A-III, B-I, C-IV, D-II

150 Match **List I** with **List II** :

List I	**List II**
A. Oxidative decarboxylation	I. Citrate synthase
B. Glycolysis	II. Pyruvate dehydrogenase
C. Oxidative phosphorylation	III. Electron transport system
D. Tricarboxylic acid cycle	IV. EMP pathway

Choose the correct answer from the options given below :

(1) A-II, B-IV, C-III, D-I

(2) A-III, B-IV, C-II, D-I

(3) A-II, B-IV, C-I, D-III

(4) A-III, B-I, C-II, D-IV

151 Given below are statements: one is labelled as **Assertion A** and the other is labelled as **Reason R.**

Assertion A: Nephrons are of two types: Cortical & Juxta medullary, based on their relative position in cortex and medulla.

Reason R: Juxta medullary nephrons have short loop of Henle whereas, cortical nephrons have longer loop of Henle.

In the light of the above statements, choose the **correct** answer from the options given below:

(1) **A** is false but **R** is true.
(2) Both **A** and **R** are true and **R** is the correct explanation of **A**.
(3) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**.
(4) **A** is true but **R** is false.

152 Match **List I** with **List II** with respect to human eye.

List I		**List II**
A. Fovea	I.	Visible coloured portion of eye that regulates diameter of pupil.
B. Iris	II.	External layer of eye formed of dense connective tissue.
C. Blind spot	III.	Point of greatest visual acuity or resolution.
D. Sclera	IV.	Point where optic nerve leaves the eyeball and photoreceptor cells are absent.

Choose the **correct** answer from the options given below:

(1) A-II, B-I, C-III, D-IV
(2) A-III, B-I, C-IV, D-II
(3) A-IV, B-III, C-II, D-I
(4) A-I, B-IV, C-III, D-II

153 Which of the following functions is carried out by cytoskeleton in a cell?

(1) Transportation
(2) Nuclear division
(3) Protein synthesis
(4) Motility

154 Given below are two statements:

Statement I: Ligaments are dense irregular tissue.

Statement II: Cartilage is dense regular tissue.

In the light of the above statements, choose the **correct** answer from the options given below:

(1) **Statement I** is false but **Statement II** is true.
(2) Both **Statement I** and **Statement II** are true.
(3) Both **Statement I** and **Statement II** are false.
(4) **Statement I** is true but **Statement II** is false.

155 Match **List I** with **List II**.

List I		**List II**
A. Heroin	I.	Effect on cardiovascular system
B. Marijuana	II.	Slow down body function
C. Cocaine	III.	Painkiller
D. Morphine	IV.	Interfere with transport of dopamine

Choose the **correct** answer from the options given below:

(1) A-III, B-IV, C-I, D-II
(2) A-II, B-I, C-IV, D-III
(3) A-I, B-II, C-III, D-IV
(4) A-IV, B-III, C-II, D-I

156 Which of the following is not a cloning vector?

(1) Probe (2) BAC
(3) YAC (4) pBR322

157 Which of the following are NOT considered as the part of endomembrane system?

A. Mitochondria B. Endoplasmic Reticulum
C. Chloroplasts D. Golgi complex
E. Peroxisomes

Choose the **most appropriate** answer from the options given below:

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

158 Which of the following statements are correct regarding female reproductive cycle?

A. In non-primate mammals cyclical changes during reproduction are called oestrus cycle.

B. First menstrual cycle begins at puberty and is called menopause.

C. Lack of menstruation may be indicative of pregnancy.

D. Cyclic menstruation extends between menarche and menopause.

Choose the **most appropriate** answer from the options given below:

(1) A, C and D only

(2) A and D only

(3) A and B only

(4) A, B and C only

159 Which one of the following techniques does not serve the purpose of early diagnosis of a disease for its early treatment?

(1) Enzyme Linked Immuno-Sorbent Assay (ELISA) technique

(2) Recombinant DNA Technology

(3) Serum and Urine analysis

(4) Polymerase Chain Reaction (PCR) technique

160 Match **List I** with **List II**.

List I		**List II**
A. Ringworm	I.	*Haemophilus influenzae*
B. Filariasis	II.	*Trichophyton*
C. Malaria	III.	*Wuchereria bancrofti*
D. Pneumonia	IV.	*Plasmodium vivax*

Choose the **correct** answer from the options given below:

(1) A-III, B-II, C-IV, D-I

(2) A-II, B-III, C-IV, D-I

(3) A-II, B-III, C-I, D-IV

(4) A-III, B-II, C-I, D-IV

161 Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R.**

Assertion A: Amniocentesis for sex determination is one of the strategies of Reproductive and Child Health Care Programme.

Reason R: Ban on amniocentesis checks increasing menace of female foeticide.

In the light of the above statements, choose the **correct** answer from the options given below:

(1) **A** is false but **R** is true.

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

(3) Both **A** and **R** are true and **R** is NOT the correct explanation of **A**.

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

162 Given below are two statements:

Statement I: RNA mutates at a faster rate.

Statement II: Viruses having RNA genome and shorter life span mutate and evolve faster.

In the light of the above statements, choose the **correct** answer from the options given below:

(1) **Statement I** false but **Statement II** is true.

(2) Both **Statement I** and **Statement II** are true.

(3) Both **Statement I** and **Statement II** are false.

(4) **Statement I** is true but **Statement II** is false.

163 Given below are two statements:

Statement I: In prokaryotes, the positively charged DNA is held with some negatively charged proteins in a region called nucleoid.

Statement II: In eukaryotes, the negatively charged DNA is wrapped around the positively charged histone octamer to form nucleosome.

In the light of the above statements, choose the **correct** answer from the options given below:

(1) **Statement I** incorrect but **Statement II** is true.

(2) Both **Statement I** and **Statement II** are true.

(3) Both **Statement I** and **Statement II** are false.

(4) **Statement I** is correct but **Statement II** is false.

164 Match **List I** with **List II**.

	List I		List II
A.	*Taenia*	I.	Nephridia
B.	*Paramoecium*	II.	Contractile vacuole
C.	*Periplaneta*	III.	Flame cells
D.	*Pheretima*	IV.	Urecose gland

Choose the **correct** answer from the options give below:

(1) A-II, B-I, C-IV, D-III
(2) A-I, B-II, C-III, D-IV
(3) A-I, B-II, C-IV, D-III
(4) A-III, B-II, C-IV, D-I

165 Match **List I** with **List II**.

	List I		List II
A.	Gene 'a'	I.	β-galactosidase
B.	Gene 'y'	II.	Transacetylase
C.	Gene 'i'	III.	Permease
D.	Gene 'z'	IV.	Repressor protein

Choose the **correct** answer from the options given below:

(1) A-III, B-I, C-IV, D-II
(2) A-II, B-I, C-IV, D-III
(3) A-II, B-III, C-IV, D-I
(4) A-III, B-IV, C-I, D-II

166 Match **List I** with **List II**.

	List I		List II
A.	Vasectomy	I.	Oral method
B.	Coitus interruptus	II.	Barrier method
C.	Cervical caps	III.	Surgical method
D.	Saheli	IV.	Natural method

Choose the **correct** answer from the options given below:

(1) A-IV, B-II, C-I, D-III
(2) A-III, B-I, C-IV, D-II
(3) A-III, B-IV, C-II, D-I
(4) A-II, B-III, C-I, D-IV

167 Broad palm with single palm crease is visible in a person suffering from-

(1) Thalassemia
(2) Down's syndrome
(3) Turner's syndrome
(4) Klinefelter's syndrome

168 Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R.**

Assertion A: Endometrium is necessary for implantation of blastocyst.

Reason R: In the absence of fertilization, the corpus luteum degenerates that causes disintegration of endometrium.

In the light of the above statements, choose the **correct** answer from the options given below:

(1) **A** is false but **R** is true.
(2) Both **A** and **R** are true and **R** is the correct explanation of **A**.
(3) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**.
(4) **A** is true but **R** is false.

169 Vital capacity of lung is _____.

(1) IRV + ERV + TV
(2) IRV + ERV
(3) IRV + ERV + TV + RV
(4) IRV + ERV + TV – RV

170 Given below are two statements:

Statement I: A protein is imagined as a line, the left end represented by first amino acid (C-terminal) and the right end represented by last amino acid (N-terminal)

Statement II: Adult human haemoglobin, consists of 4 subunits (two subunits of α type and two subunits of β type.)

In the light of the above statements, choose the **correct** answer from the options given below:

(1) **Statement I** is false but **Statement II** is true.
(2) Both **Statement I** and **Statement II** are true.
(3) Both **Statement I** and **Statement II** are false.
(4) **Statement I** is true but **Statement II** is false.

171 Which one of the following common sexually transmitted diseases is completely curable when detected early and treated properly?

(1) HIV Infection (2) Genital herpes

(3) Gonorrhoea (4) Hepatitis-B

172 Given below are two statements:

Statement I: Vas deferens receives a duct from seminal vesicle and opens into urethra as the ejaculatory duct.

Statement II: The cavity of the cervix is called cervical canal which along with vagina forms birth canal.

In the light of the above statements, choose the **correct** answer from the options given below:

(1) **Statement I** incorrect but **Statement II** is true.

(2) Both **Statement I** and **Statement II** are true.

(3) Both **Statement I** and **Statement II** are false.

(4) **Statement I** is correct but **Statement II** is false.

173 Match **List I** with **List II.**

	List I		**List II**
A.	P - wave	I.	Beginning of systole
B.	Q - wave	II.	Repolarisation of ventricles
C.	QRS complex	III.	Depolarisation of atria
D.	T - wave	IV.	Depolarisation of ventricles

Choose the **correct** answer from the options given below:

(1) A-I, B-II, C-III, D-IV

(2) A-III, B-I, C-IV, D-II

(3) A-IV, B-III, C-II, D-I

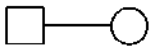
(4) A-II, B-IV, C-I, D-III

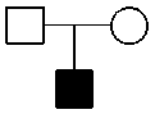
174 Radial symmetry is NOT found in adults of phylum _____.

(1) Echinodermata (2) Ctenophora

(3) Hemichordata (4) Coelenterata

175 Which one of the following symbols represents mating between relatives in human pedigree analysis?

(1)  (2) 

(3)  (4) 

176 Select the correct group/set of Australian Marsupials exhibiting adaptive radiation.

(1) Lemur, Anteater, Wolf

(2) Tasmanian wolf, Bobcat, Marsupial mole

(3) Numbat, Spotted cuscus, Flying phalanger

(4) Mole, Flying squirrel, Tasmanian tiger cat

177 Match **List I** with **List II.**

	List I (Interacting species)		**List II (Name of Interaction)**
A.	A Leopard and a Lion in a forest/ grassland	I.	Competition
B.	A Cuckoo laying egg in a Crow's nest	II.	Brood parasitism
C.	Fungi and root of a higher plant in Mycorrtizae	III.	Mutualism
D.	A cattle egret and a Cattle in a field	IV.	Commensalism

Choose the **correct** answer from the options given below:

(1) A-II, B-III, C-I, D-IV

(2) A-I, B-II, C-III, D-IV

(3) A-I, B-II, C-IV, D-III

(4) A-III, B-IV, C-I, D-II

178 Match **List I** with **List II**.

List I (Cells)	**List II (Secretion)**
A. Peptic cells	I. Mucus
B. Goblet cells	II. Bile juice
C. Oxyntic cells	III. Proenzyme pepsinogen
D. Hepatic cells	IV. HCl and intrinsic factor for absorption of vitamin B_{12}

Choose the **correct** answer from the options given below:

(1) A-II, B-IV, C-I, D-III

(2) A-IV, B-III, C-II, D-I

(3) A-II, B-I, C-III, D-IV

(4) A-III, B-I, C-IV, D-II

179 Match **List I** with **List II**.

List I	**List II**
A. CCK	I. Kidney
B. GIP	II. Heart
C. ANF	III. Gastric gland
D. ADH	IV. Pancreas

Choose the **correct** answer from the options given below:

(1) A-IV, B-II, C-III, D-I

(2) A-IV, B-III, C-II, D-I

(3) A-III, B-II, C-IV, D-I

(4) A-II, B-IV, C-I, D-III

180 Once the undigested and unabsorbed substances enter the caecum, their backflow is prevented by-

(1) Pyloric sphincter

(2) Sphincter of Oddi

(3) Ileo - caecal valve

(4) Gastro - oesophageal sphincter

181 Match **List I** with **List II**.

List I (Type of Joint)	**List II (Found between)**
A. Cartilaginous Joint	I. Between flat skull bones
B. Ball and Socket Joint	II. Between adjacent vertebrae in vertebral column
C. Fibrous Joint	III. Between carpal and metacarpal of thumb
D. Saddle Joint	IV. Between Humerus and Pectoral girdle

Choose the **correct** answer from the options given below:

(1) A-II, B-IV, C-III, D-I

(2) A-III, B-I, C-II, D-IV

(3) A-II, B-IV, C-I, D-III

(4) A-I, B-IV, C-III, D-II

182 Which of the following statements is correct?

(1) Algal Bloom decreases fish mortality

(2) Eutrophication refers to increase in domestic sewage and waste water in lakes.

(3) Biomagnification refers to increase in concentration of the toxicant at successive trophic levels.

(4) Presence of large amount of nutrients in water restricts 'Algal Bloom'

183 Given below are two statements:
Statement I: Electrostatic precipitator is most widely used in thermal power plant.
Statement II: Electrostatic precipitator in thermal power plant removes ionising radiations
In the light of the above statements, choose the ***most appropriate*** answer from the options given below:
(1) **Statement I** incorrect but **Statement II** is correct.
(2) Both **Statement I** and **Statement II** are correct.
(3) Both **Statement I** and **Statement II** are incorrect.
(4) **Statement I** is correct but **Statement II** is incorrect.

184 In which blood corpuscles, the HIV undergoes replication and produces progeny viruses?
(1) Eosinophils (2) T_H cells
(3) B-lymphocytes (4) Basophils

185 Given below are two statements:
Statement I: Low temperature preserves the enzyme in a temporarily inactive state whereas high temperature destroys enzymatic activity because proteins are denatured by heat.
Statement II: When the inhibitor closely resembles the substrate in its molecular structure and inhibits the activity of the enzyme, it is known as competitive inhibitor.
In the light of the above statements, choose the **correct** answer from the options given below:
(1) **Statement I** is false but **Statement II** is true.
(2) Both **Statement I** and **Statement II** are true.
(3) Both **Statement I** and **Statement II** are false.
(4) **Statement I** is true but **Statement II** is false.

186 Select the correct statements with reference to chordates.
A. Presence of a mid-dorsal, solid and double nerve cord.
B. Presence of closed circulatory system.
C. Presence of paired pharyngeal gillslits.
D. Presence of dorsal heart
E. Triploblastic pseudocoelomate animals.
Choose the **correct** answer from the options given below:
(1) C, D and E only
(2) A, C and D only
(3) B and C only
(4) B, D and E only

187 Which of the following statements are correct regarding skeletal muscle?
A. Muscle bundles are held together by collagenous connective tissue layer called fascicle.
B. Sarcoplasmic reticulum of muscle fibre is a store house of calcium ions.
C. Striated appearance of skeletal muscle fibre is due to distribution pattern of actin and myosin proteins.
D. M line is considered as functional unit of contraction called sarcomere.
Choose the ***most appropriate*** answer from the options given below:
(1) C and D only
(2) A, B and C only
(3) B and C only
(4) A, C and D only

188 Which one of the following is the sequence on corresponding coding strand, if the sequence on mRNA formed is as follows
5' AUCGAUCGAUCGAUCGAUCG AUCG AUCG 3'?
(1) 3' ATCGATCGATCGATCGATCG ATCGATCG 5'
(2) 5' UAGCUAGCUAGCUAGCUA GCUAGC UAGC 3'
(3) 3' UAGCUAGCUAGCUAGCUA GCUAGCUAGC 5'
(4) 5' ATCGATCGATCGATCGATCG ATCGATCG 3'

189 Given below are two statements:

Statement I: During G_0 phase of cell cycle, the cell is metabolically inactive.

Statement II: The centrosome undergoes duplication during S phase of interphase.

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

(1) **Statement I** is incorrect but **Statement II** is correct.

(2) Both **Statement I** and **Statement II** are correct.

(3) Both **Statement I** and **Statement II** are incorrect.

(4) **Statement I** is correct but **Statement II** is incorrect.

190 Which of the following are NOT under the control of thyroid hormone?

A. Maintenance of water and electrolyte balance

B. Regulation of basal metabolic rate

C. Normal rhythm of sleep-wake cycle

D. Development of immune system

E. Support the process of R.B.Cs formation

Choose the **correct** answer from the options given below:

(1) D and E only (2) A and D only

(3) B and C only (4) C and D only

191 In cockroach, excretion is brought about by-

A. Phallic gland B. Urecose gland

C. Nephrocytes D. Fat body

E. Collaterial glands

Choose the **correct** answer from the options given below:

(1) B and D only

(2) A and E only

(3) A, B and E only

(4) B, C and D only

192 Match **List I** with **List II**.

List I	**List II**
A. Mast cells	I. Ciliated epithelium
B. Inner surface of bronchiole	II. Areolar connective tissue
C. Blood	III. Cuboidal epithelium
D. Tubular parts of nephron	IV. specialised connective tissue

Choose the **correct** answer from the options give below:

(1) A-III, B-IV, C-II, D-I

(2) A-I, B-II, C-IV, D-III

(3) A-II, B-III, C-I, D-IV

(4) A-II, B-I, C-IV, D-III

193 Which of the following is characteristic feature of cockroach regarding sexual dimorphism ?

(1) Presence of anal cerci

(2) Dark brown body colour and anal cerci

(3) Presence of anal styles

(4) Presence of sclerites

194 Select the correct statements.

A. Tetrad formation is seen during Leptotene.

B. During Anaphase, the centromeres split and chromatids separate.

C. Terminalization takes place during Pachytene.

D. Nucleolus, Golgi complex and ER are reformed during Telophase.

E. Crossing over takes place between sister chromatids of homologous chromosome.

Choose the **correct** answer from the options given below:

(1) B and E only

(2) A and C only

(3) B and D only

(4) A, C and E only

195 Which one of the following is NOT an advantage of inbreeding?

(1) It decreases the productivity of inbred population, after continuous inbreeding.
(2) It decreases homozygosity.
(3) It exposes harmful recessive genes that are eliminated by selection.
(4) Elimination of less desirable genes and accumulation of superior genes takes place due to it.

196 The unique mammalian characteristics are:

(1) pinna, monocondylic skull and mammary glands
(2) hairs, tympanic membrane and mammary glands
(3) hairs, pinna and mammary glands
(4) hairs, pinna and indirect development

197 The parts of human brain that helps in regulation of sexual behaviour, expression of excitement, pleasure, rage, fear etc. are :

(1) Corpus callosum and thalamus
(2) Limbic system & hypothalamus
(3) Corpora quadrigemina & hippocampus
(4) Brain stem & epithalamus

198 Match **List I** with **List II**.

List I	**List II**
A. Logistic growth	I. Unlimited resource availability condition
B. Exponential growth	II. Limited resource availability condition
C. Expanding age pyramid	III. The percent individuals of pre-reproductive age is largest followed by reproductive and post reproductive age groups
D. Stable age pyramid	IV. The percent individuals of pre-reproductives and reproductive age group are same

Choose the **correct** answer from the options given below:

(1) A-II, B-IV, C-III, D-I
(2) A-II, B-I, C-III, D-IV
(3) A-II, B-III, C-I, D-IV
(4) A-II, B-IV, C-I, D-III

199 Which of the following statements are correct ?

A. Basophils are most abundant cells of the total WBCs
B. Basophils secrete histamine, serotonin and heparin
C. Basophils are involved in inflammatory response
D. Basophils have kidney shaped nucleus
E. Basophils are agranulocytes

Choose the **correct** answer from the options given below:

(1) A and B only
(2) D and E only
(3) C and E only
(4) B and C only

200 Which of the following statements are correct?

A. An excessive loss of body fluid from the body switches off osmoreceptors.
B. ADH facilitates water reabsorption to prevent diuresis.
C. ANF causes vasodilation.
D. ADH causes increase in blood pressure.
E. ADH is responsible for decrease in GFR.

Choose the **correct** answer from the options given below:

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

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK

Test Booklet Code

← Test Booklet No. **ENGLISH**

H1

ADI

This Booklet contains **32** pages, including Rough Page.

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 CODE for this Booklet is H1. Make sure that the CODE printed on the Original Copy of the Answer Sheet is the same as that on this Test Booklet.** In case of discrepancy, the candidate should immediately report the matter to the Invigilator for replacement of both the Test Booklet and the Answer Sheet.
8. 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 Roll No. anywhere else except in the specified space in the Test Booklet/Answer Sheet.
9. Use of white fluid for correction is **NOT** permissible on the Answer Sheet.
10. Each candidate must show on-demand his/her Admit Card to the Invigilator.
11. No candidate, without special permission of the centre Superintendent or Invigilator, would leave his/her seat.
12. 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.**
13. Use of Electronic/Manual Calculator is prohibited.
14. 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.
15. **No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.**
16. The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.
17. 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): _____

Roll Number : In figures _____

: In words _____

Centre of Examination (in Capitals): _____

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

Facsimile signature stamp of Centre Superintendent

Physics : Section-A (Q. No. 1 to 35)

1 The ratio of radius of gyration of a solid sphere of mass M and radius R about its own axis to the radius of gyration of the thin hollow sphere of same mass and radius about its axis is :

(1) 2 : 5 (2) 5 : 2

(3) 3 : 5 (4) 5 : 3

2 The magnetic energy stored in an inductor of inductance 4 μH carrying a current of 2 A is :

(1) 8 mJ (2) 8 μJ

(3) 4 μJ (4) 4 mJ

3 A full wave rectifier circuit consists of two p-n junction diodes, a centre-tapped transformer, capacitor and a load resistance. Which of these components remove the ac ripple from the rectified output?

(1) Capacitor

(2) Load resistance

(3) A centre-tapped transformer

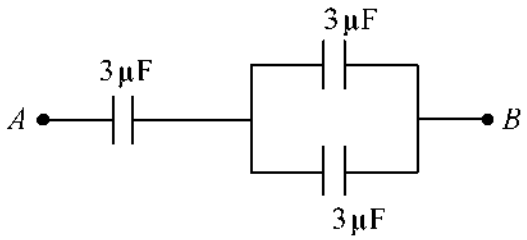
(4) p-n junction diodes

4 An electric dipole is placed at an angle of 30° with an electric field of intensity $2\times10^5\,N\,C^{-1}$. It experiences a torque equal to 4 N m. Calculate the magnitude of charge on the dipole, if the dipole length is 2 cm.

(1) 4 mC (2) 2 mC

(3) 8 mC (4) 6 mC

5 The equivalent capacitance of the system shown in the following circuit is :



(1) 6 μF (2) 9 μF

(3) 2 μF (4) 3 μF

6 In hydrogen spectrum, the shortest wavelength in the Balmer series is λ. The shortest wavelength in the Bracket series is :

(1) 9λ (2) 16λ

(3) 2λ (4) 4λ

7 Resistance of a carbon resistor determined from colour codes is $(22000\pm5\%)\,\Omega$. The colour of third band must be :

(1) Orange (2) Yellow

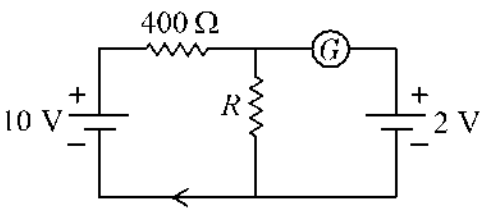
(3) Red (4) Green

8 Two bodies of mass m and $9m$ are placed at a distance R. The gravitational potential on the line joining the bodies where the gravitational field equals zero, will be (G = gravitational constant) :

(1) $-\frac{16\,Gm}{R}$ (2) $-\frac{20\,Gm}{R}$

(3) $-\frac{8\,Gm}{R}$ (4) $-\frac{12\,Gm}{R}$

9 If the galvanometer G does not show any deflection in the circuit shown, the value of R is given by :



(1) 100 Ω (2) 400 Ω

(3) 200 Ω (4) 50 Ω

10 For Young's double slit experiment, two statements are given below:

Statement I : If screen is moved away from the plane of slits, angular separation of the fringes remains constant.

Statement II : If the monochromatic source is replaced by another monochromatic source of larger wavelength, the angular separation of fringes decreases.

In the light of the above statements, choose the *correct* answer from the options given below:

(1) **Statement I** is true but **Statement II** is false.

(2) **Statement I** is false but **Statement II** is true.

(3) Both **Statement I** and **Statement II** are true.

(4) Both **Statement I** and **Statement II** are false.

11 The venturi-meter works on :

(1) The principle of parallel axes

(2) The principle of perpendicular axes

(3) Huygen's principle

(4) Bernoulli's principle

12 Let a wire be suspended from the ceiling (rigid support) and stretched by a weight W attached at its free end. The longitudinal stress at any point of cross-sectional area A of the wire is :

(1) $W/2A$ (2) Zero

(3) $2W/A$ (4) W/A

13 The angular acceleration of a body, moving along the circumference of a circle, is :

(1) along the tangent to its position

(2) along the axis of rotation

(3) along the radius, away from centre

(4) along the radius towards the centre

14 The temperature of a gas is –50° C. To what temperature the gas should be heated so that the rms speed is increased by 3 times?

(1) 3097 K (2) 223 K

(3) 669° C (4) 3295° C

15 The work functions of Caesium (Cs), Potassium (K) and Sodium (Na) are 2.14 eV, 2.30 eV and 2.75 eV respectively. If incident electromagnetic radiation has an incident energy of 2.20 eV, which of these photosensitive surfaces may emit photoelectrons?

(1) K only

(2) Na only

(3) Cs only

(4) Both Na and K

16 An ac source is connected to a capacitor C. Due to decrease in its operating frequency :

(1) displacement current decreases.

(2) capacitive reactance remains constant

(3) capacitive reactance decreases.

(4) displacement current increases.

17 Light travels a distance x in time t_1 in air and $10x$ in time t_2 in another denser medium. What is the critical angle for this medium?

(1) $\sin^{-1}\left(\frac{t_1}{10\,t_2}\right)$ (2) $\sin^{-1}\left(\frac{10\,t_1}{t_2}\right)$

(3) $\sin^{-1}\left(\frac{t_2}{t_1}\right)$ (4) $\sin^{-1}\left(\frac{10\,t_2}{t_1}\right)$

18 The net magnetic flux through any closed surface is :

(1) Infinity (2) Negative

(3) Zero (4) Positive

19 A 12 V, 60 W lamp is connected to the secondary of a step down transformer, whose primary is connected to ac mains of 220 V. Assuming the transformer to be ideal, what is the current in the primary winding?

(1) 3.7 A (2) 0.37 A

(3) 0.27 A (4) 2.7 A

20 A metal wire has mass (0.4 ± 0.002) g, radius (0.3 ± 0.001) mm and length (5 ± 0.02) cm. The maximum possible percentage error in the measurement of density will nearly be:

(1) 1.6% (2) 1.4%

(3) 1.2% (4) 1.3%

21 Given below are two statements:

Statement I : Photovoltaic devices can convert optical radiation into electricity.

Statement II : Zener diode is designed to operate under reverse bias in breakdown region.

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

(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.

22 A bullet is fired from a gun at the speed of 280 m s^{-1} in the direction 30° above the horizontal. The maximum height attained by the bullet is $\left(g = 9.8 \text{ m s}^{-2}, \sin 30° = 0.5\right)$:

(1) 1000 m (2) 3000 m

(3) 2800 m (4) 2000 m

23 A Carnot engine has an efficiency of 50% when its source is at a temperature 327° C. The temperature of the sink is :

(1) 100° C (2) 200° C

(3) 27° C (4) 15° C

24 The amount of energy required to form a soap bubble of radius 2 cm from a soap solution is nearly : (surface tension of soap solution = 0.03 N m^{-1})

(1) 3.01×10^{-4}J (2) 50.1×10^{-4}J

(3) 30.16×10^{-4}J (4) 5.06×10^{-4}J

25 The minimum wavelength of X-rays produced by an electron accelerated through a potential difference of V volts is proportional to:

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

(3) $\sqrt{V}$ (4) $\frac{1}{V}$

26 In a series LCR circuit, the inductance L is 10 mH, capacitance C is 1 μF and resistance R is 100 Ω. The frequency at which resonance occurs is :

(1) 1.59 rad/s (2) 1.59 kHz

(3) 15.9 rad/s (4) 15.9 kHz

27 The potential energy of a long spring when stretched by 2 cm is U. If the spring is stretched by 8 cm, potential energy stored in it will be :

(1) 8U (2) 16U

(3) 2U (4) 4U

28 The half life of a radioactive substance is 20 minutes. In how much time, the activity of substance drops to $\left(\frac{1}{16}\right)^{th}$ of its initial value?

(1) 60 minutes (2) 80 minutes

(3) 20 minutes (4) 40 minutes

29 If $\oint_S \vec{E} \cdot \vec{dS} = 0$ over a surface, then :

(1) all the charges must necessarily be inside the surface.

(2) the electric field inside the surface is necessarily uniform.

(3) the number of flux lines entering the surface must be equal to the number of flux lines leaving it.

(4) the magnitude of electric field on the surface is constant.

30 The ratio of frequencies of fundamental harmonic produced by an open pipe to that of closed pipe having the same length is :

(1) 1 : 3 (2) 3 : 1

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

31 The errors in the measurement which arise due to unpredictable fluctuations in temperature and voltage supply are :

(1) Least count errors

(2) Random errors

(3) Instrumental errors

(4) Personal errors

32 In a plane electromagnetic wave travelling in free space, the electric field component oscillates sinusoidally at a frequency of 2.0×10^{10} Hz and amplitude $48\ V\,m^{-1}$. Then the amplitude of oscillating magnetic field is : (Speed of light in free space = 3×10^8 m s^{-1})

(1) 1.6×10^{-7} T (2) 1.6×10^{-6} T

(3) 1.6×10^{-9} T (4) 1.6×10^{-8} T

33 A football player is moving southward and suddenly turns eastward with the same speed to avoid an opponent. The force that acts on the player while turning is :

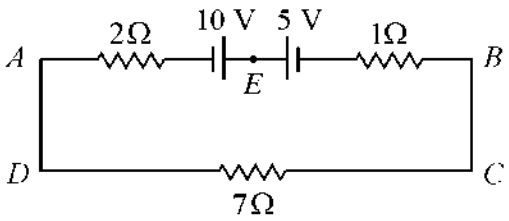
(1) along north-east

(2) along south-west

(3) along eastward

(4) along northward

34 The magnitude and direction of the current in the following circuit is



(1) $\frac{5}{9}$ A from A to B through E

(2) 1.5 A from B to A through E

(3) 0.2 A from B to A through E

(4) 0.5 A from A to B through E

35 A vehicle travels half the distance with speed ϑ and the remaining distance with speed 2ϑ. Its average speed is:

(1) $\frac{4\vartheta}{3}$ (2) $\frac{3\vartheta}{4}$

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

Physics : Section-B (Q. No. 36 to 50)

36 The radius of inner most orbit of hydrogen atom is 5.3×10^{-11} m. What is the radius of third allowed orbit of hydrogen atom?

(1) 1.59 Å (2) 4.77 Å

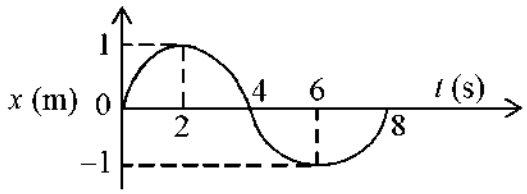
(3) 0.53 Å (4) 1.06 Å

37 10 resistors, each of resistance R are connected in series to a battery of emf E and negligible internal resistance. Then those are connected in parallel to the same battery, the current is increased n times. The value of n is :

(1) 1 (2) 1000

(3) 10 (4) 100

38 The x-t graph of a particle performing simple harmonic motion is shown in the figure. The acceleration of the particle at $t = 2$ s is :



(1) $\frac{\pi^2}{16}$ m s^{-2} (2) $-\frac{\pi^2}{16}$ m s^{-2}

(3) $\frac{\pi^2}{8}$ m s^{-2} (4) $-\frac{\pi^2}{8}$ m s^{-2}

39 Two thin lenses are of same focal lengths (f), but one is convex and the other one is concave. When they are placed in contact with each other, the equivalent focal length of the combination will be :

(1) $f/2$ (2) Infinite

(3) Zero (4) $f/4$

40 A satellite is orbiting just above the surface of the earth with period T. If d is the density of the earth and G is the universal constant of gravitation, the quantity $\frac{3\pi}{Gd}$ represents :

(1) T^3 (2) $\sqrt{T}$

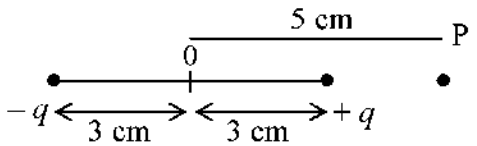
(3) T (4) T^2

41 Calculate the maximum acceleration of a moving car so that a body lying on the floor of the car remains stationary. The coefficient of static friction between the body and the floor is 0.15 ($g = 10$ m s^{-2}).

(1) 1.5 m s^{-2} (2) 50 m s^{-2}

(3) 1.2 m s^{-2} (4) 150 m s^{-2}

42 An electric dipole is placed as shown in the figure.

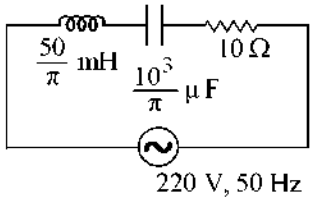


The electric potential (in 10^2 V) at point P due to the dipole is (ϵ_0 = permittivity of free space and $\frac{1}{4\pi\epsilon_0} = K$):

(1) $\left(\frac{8}{5}\right)$qK (2) $\left(\frac{8}{3}\right)$qK

(3) $\left(\frac{3}{8}\right)$qK (4) $\left(\frac{5}{8}\right)$qK

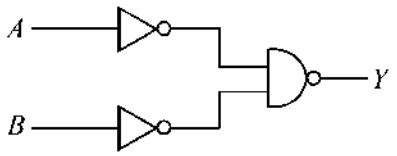
43 The net impedance of circuit (as shown in figure) will be :



(1) $5\sqrt{5}\ \Omega$ (2) $25\ \Omega$

(3) $10\sqrt{2}\ \Omega$ (4) $15\ \Omega$

44 For the following logic circuit, the truth table is:



(1)

A	B	Y
0	0	1
0	1	0
1	0	1
1	1	0

(2)

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

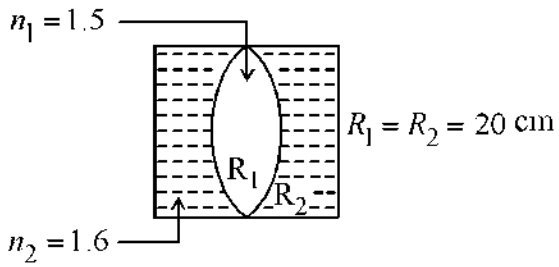
(3)

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

(4)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

45 In the figure shown here, what is the equivalent focal length of the combination of lenses (Assume that all layers are thin)?



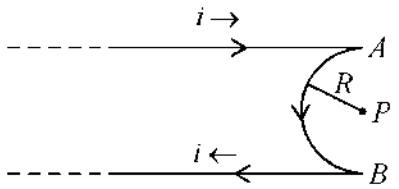
(1) -100 cm (2) -50 cm
(3) 40 cm (4) -40 cm

46 A bullet from a gun is fired on a rectangular wooden block with velocity u. When bullet travels 24 cm through the block along its length horizontally, velocity of bullet becomes $\frac{u}{3}$. Then it further penetrates into the block in the same direction before coming to rest exactly at the other end of the block. The total length of the block is :
(1) 28 cm (2) 30 cm
(3) 27 cm (4) 24 cm

47 The resistance of platinum wire at 0°C is 2Ω and 6.8Ω at 80°C. The temperature coefficient of resistance of the wire is :
(1) 3×10^{-2} °C^{-1} (2) 3×10^{-1} °C^{-1}
(3) 3×10^{-4} °C^{-1} (4) 3×10^{-3} °C^{-1}

48 A horizontal bridge is built across a river. A student standing on the bridge throws a small ball vertically upwards with a velocity $4\ \text{m s}^{-1}$. The ball strikes the water surface after 4 s. The height of bridge above water surface is (Take $g = 10\ \text{m s}^{-2}$) :
(1) 64 m (2) 68 m
(3) 56 m (4) 60 m

49 A very long conducting wire is bent in a semi-circular shape from A to B as shown in figure. The magnetic field at point P for steady current configuration is given by :



(1) $\frac{\mu_0 i}{4R}\left[1-\frac{2}{\pi}\right]$ pointed away from page

(2) $\frac{\mu_0 i}{4R}\left[1-\frac{2}{\pi}\right]$ pointed into the page

(3) $\frac{\mu_0 i}{4R}$ pointed into the page

(4) $\frac{\mu_0 i}{4R}$ pointed away from the page

50 A wire carrying a current I along the positive x-axis has length L. It is kept in a magnetic field $\vec{B} = (2\hat{i} + 3\hat{j} - 4\hat{k})$ T. The magnitude of the magnetic force acting on the wire is :
(1) $5\,IL$ (2) $\sqrt{3}\,IL$
(3) $3\,IL$ (4) $\sqrt{5}\,IL$

51 Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : A reaction can have zero activation energy.

Reasons R : The minimum extra amount of energy absorbed by reactant molecules so that their energy becomes equal to threshold value, is called activation energy.

In the light of the above statements, choose the **correct** answer from the options given below :

(1) **A** is true but **R** is false.
(2) **A** is false but **R** is true.
(3) Both **A** and **R** are true and **R** is the correct explanation of **A**.
(4) Both **A** and **R** are true and **R** is **NOT** the correct explanation of **A**.

52 The **correct** order of energies of molecular orbitals of N_2 molecule, is :

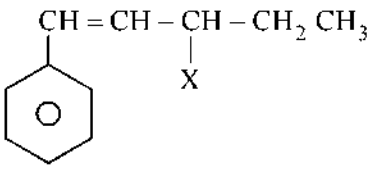
(1) $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \sigma 2p_z < \sigma^* 2p_z < \left(\pi 2p_x = \pi 2p_y\right) < \left(\pi^* 2p_x = \pi^* 2p_y\right)$

(2) $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \left(\pi 2p_x = \pi 2p_y\right) < \left(\pi^* 2p_x = \pi^* 2p_y\right) < \sigma 2p_z < \sigma^* 2p_z$

(3) $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \left(\pi 2p_x = \pi 2p_y\right) < \sigma 2p_z < \left(\pi^* 2p_x = \pi^* 2p_y\right) < \sigma^* 2p_z$

(4) $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \sigma 2p_z < \left(\pi 2p_x = \pi 2p_y\right) < \left(\pi^* 2p_x = \pi^* 2p_y\right) < \sigma^* 2p_z$

53 The given compound



is an example of _____.

(1) allylic halide
(2) vinylic halide
(3) benzylic halide
(4) aryl halide

54 Homoleptic complex from the following complexes is :

(1) Pentaamminecarbonatocobalt (III) chloride
(2) Triamminetriaquachromium (III) chloride
(3) Potassium trioxalatoaluminate (III)
(4) Diamminechloridonitrito - N - platinum (II)

55 The **right** option for the mass of CO_2 produced by heating 20 g of 20% pure limestone is (Atomic mass of Ca = 40)

$\left[CaCO_3 \xrightarrow{1200\ K} CaO + CO_2\right]$

(1) 2.64 g (2) 1.32 g
(3) 1.12 g (4) 1.76 g

56 The relation between n_m, (n_m = the number of permissible values of magnetic quantum number (m)) for a given value of azimuthal quantum number (l), is

(1) $n_m = 2l^2 + 1$ (2) $n_m = l + 2$

(3) $l = \frac{n_m - 1}{2}$ (4) $l = 2n_m + 1$

57 Select the **correct** statements from the following :

A. Atoms of all elements are composed of two fundamental particles.
B. The mass of the electron is 9.10939×10^{-31} kg.
C. All the isotopes of a given element show same chemical properties.
D. Protons and electrons are collectively known as nucleons.
E. Dalton's atomic theory, regarded the atom as an ultimate particle of matter.

Choose the **correct** answer from the options given below :

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

58 Which one is an example of heterogenous catalysis?

(1) Decomposition of ozone in presence of nitrogen monoxide.

(2) Combination between dinitrogen and dihydrogen to form ammonia in the presence of finely divided iron.

(3) Oxidation of sulphur dioxide into sulphur trioxide in the presence of oxides of nitrogen.

(4) Hydrolysis of sugar catalysed by H^+ ions.

59 Weight (g) of two moles of the organic compound, which is obtained by heating sodium ethanoate with sodium hydroxide in presence of calcium oxide is :

(1) 30 (2) 18

(3) 16 (4) 32

60 The number of σ bonds, π bonds and lone pair of electrons in pyridine, respectively are:

(1) 11, 3, 1 (2) 12, 2, 1

(3) 11, 2, 0 (4) 12, 3, 0

61 Which amongst the following molecules on polymerization produces neoprene?

(1) $H_2C = CH - C \equiv CH$

(2) $H_2C = \underset{\displaystyle CH_3}{\underset{|}{C}} - CH = CH_2$

(3) $H_2C = CH - CH = CH_2$

(4) $H_2C = \underset{\displaystyle Cl}{\underset{|}{C}} - CH = CH_2$

62 The stability of Cu^{2+} is more than Cu^+ salts in aqueous solution due to -

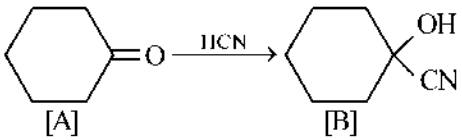
(1) hydration energy.

(2) second ionisation enthalpy.

(3) first ionisation enthalpy.

(4) enthalpy of atomization.

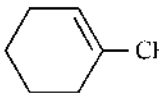
63 Complete the following reaction :

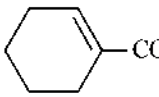


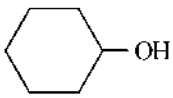
[A] [B]

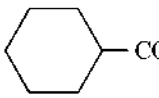
$$\xrightarrow[\Delta]{\text{conc. } H_2SO_4} [C]$$

[C] is _____.

(1) 

(2) 

(3) 

(4) 

64 Which of the following reactions will NOT give primary amine as the product?

(1) $CH_3NC \xrightarrow[(ii)\ H_3O\oplus]{(i)\ LiAlH_4}$ Product

(2) $CH_3CONH_2 \xrightarrow[(ii)\ H_3O\oplus]{(i)\ LiAlH_4}$ Product

(3) $CH_3\ CONH_2 \xrightarrow{Br_2\ /\ KOH}$ Product

(4) $CH_3CN \xrightarrow[(ii)\ H_3O\oplus]{(i)\ LiAlH_4}$ Product

65 Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : Helium is used to dilute oxygen in diving apparatus.

Reasons R : Helium has high solubility in O_2.

In the light of the above statements, choose the **correct** answer from the options given below :

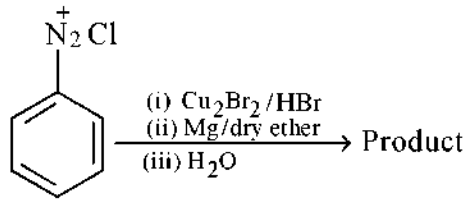
(1) **A** is true but **R** is false.

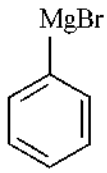
(2) **A** is false but **R** is true.

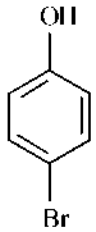
(3) Both **A** and **R** are true and **R** is the correct explanation of **A**.

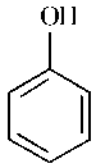
(4) Both **A** and **R** are true and **R** is **NOT** the correct explanation of **A**.

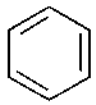
66 Identify the product in the following reaction:



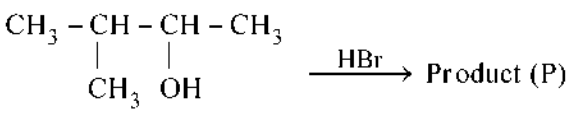
(1) 

(2) 

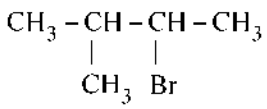
(3) 

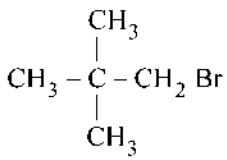
(4) 

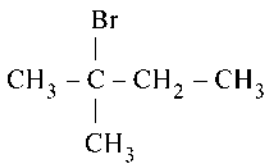
67 Consider the following reaction and identify the product (P).



3 – Methylbutan – 2 – ol

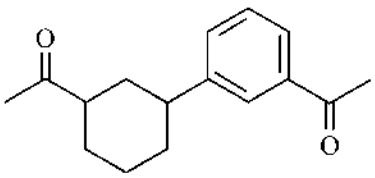
(1) 

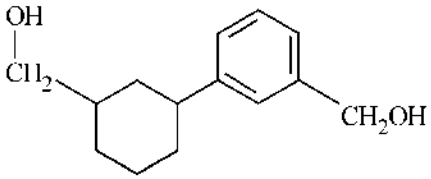
(2) 

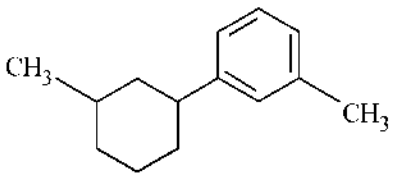
(3) 

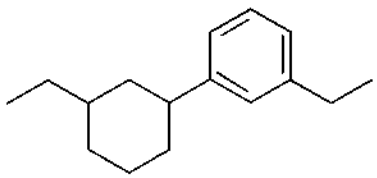
(4) $CH_3CH=CH-CH_3$

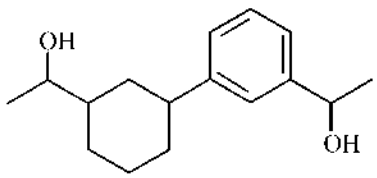
68 Identify product (A) in the following reaction:



(1) 

(2) 

(3) 

(4) 

69 Taking stability as the factor, which one of the following represents **correct** relationship?

(1) $AlCl > AlCl_3$

(2) $TlI > TlI_3$

(3) $TlCl_3 > TlCl$

(4) $InI_3 > InI$

70 The conductivity of centimolar solution of KCl at 25°C is 0.0210 ohm^{-1} cm^{-1} and the resistance of the cell containing the solution at 25°C is 60 ohm. The value of cell constant is -

(1) 1.26 cm^{-1} (2) 3.34 cm^{-1}

(3) 1.34 cm^{-1} (4) 3.28 cm^{-1}

71 Which one of the following statements is **correct**?

(1) The bone in human body is an inert and unchanging substance.

(2) Mg plays roles in neuromuscular function and interneuronal transmission.

(3) The daily requirement of Mg and Ca in the human body is estimated to be 0.2 - 0.3 g.

(4) All enzymes that utilise ATP in phosphate transfer require Ca as the cofactor.

72 Match **List - I** with **List - II** :

	List - I		**List - II**
A.	Coke	I.	Carbon atoms are sp^3 hybridised.
B.	Diamond	II.	Used as a dry lubricant
C.	Fullerene	III.	Used as a reducing agent
D.	Graphite	IV.	Cage like molecules

Choose the **correct** answer from the options given below :

(1) A-III, B-I, C-IV, D-II

(2) A-III, B-IV, C-I, D-II

(3) A-II, B-IV, C-I, D-III

(4) A-IV, B-I, C-II, D-III

73 Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : Metallic sodium dissolves in liquid ammonia giving a deep blue solution, which is paramagnetic.

Reasons R : The deep blue solution is due to the formation of amide.

In the light of the above statements, choose the **correct** answer from the options given below :

(1) **A** is true but **R** is false.

(2) **A** is false but **R** is true.

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

(4) Both **A** and **R** are true but **R** is **NOT** the correct explanation of **A**.

74 Which of the following statements are **NOT** correct?

A. Hydrogen is used to reduce heavy metal oxides to metals.

B. Heavy water is used to study reaction mechanism.

C. Hydrogen is used to make saturated fats from oils.

D. The H-H bond dissociation enthalpy is lowest as compared to a single bond between two atoms of any element.

E. Hydrogen reduces oxides of metals that are more active than iron.

Choose the **most appropriate** answer from the options given below :

(1) D, E only

(2) A, B, C only

(3) B, C, D, E only

(4) B, D only

75 The element expected to form largest ion to achieve the nearest noble gas configuration is :

(1) N (2) Na

(3) O (4) F

76 In Lassaigne's extract of an organic compound, both nitrogen and sulphur are present, which gives blood red colour with Fe^{3+} due to the formation of -

(1) $\left[Fe(CN)_5 NOS\right]^{4-}$

(2) $\left[Fe(SCN)\right]^{2+}$

(3) $Fe_4\left[Fe(CN)_6\right]_3 \cdot x H_2O$

(4) NaSCN

77 Intermolecular forces are forces of attraction and repulsion between interacting particles that will include :

A. dipole - dipole forces.
B. dipole - induced dipole forces.
C. hydrogen bonding.
D. covalent bonding.
E. dispersion forces.

Choose the **most appropriate** answer from the options given below :

(1) A, B, C, E are correct.
(2) A, C, D, E are correct.
(3) B, C, D, E are correct.
(4) A, B, C, D are correct.

78 Amongst the following, the total number of species NOT having eight electrons around central atom in its outer most shell, is

$NH_3, AlCl_3, BeCl_2, CCl_4, PCl_5$:

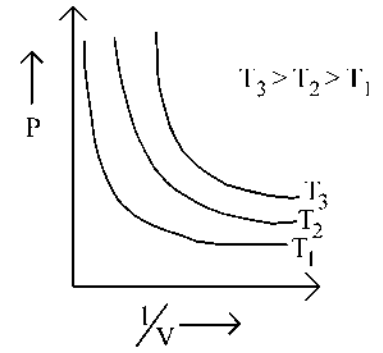
(1) 4 (2) 1
(3) 3 (4) 2

79 A compound is formed by two elements A and B. The element B forms cubic close packed structure and atoms of A occupy 1/3 of tetrahedral voids. If the formula of the compound is A_xB_y, then the value of $x + y$ is in option

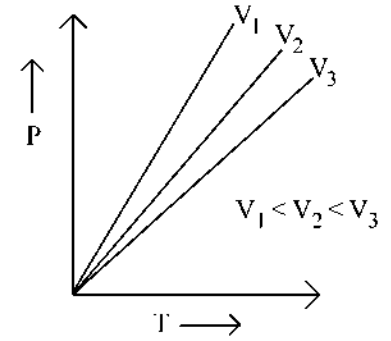
(1) 3 (2) 2
(3) 5 (4) 4

80 Which amongst the following options is **correct** graphical representation of Boyle's Law?

(1)



(2)



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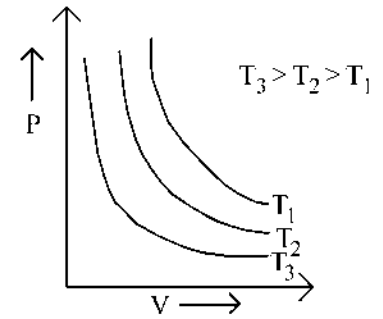

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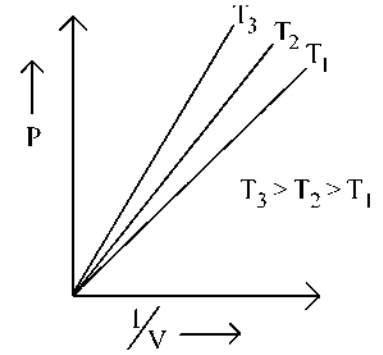


81 Some tranquilizers are listed below. Which one from the following belongs to barbiturates?

(1) Valium

(2) Veronal

(3) Chlordiazepoxide

(4) Meprobamate

82 Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : In equation $\Delta_r G = -nFE_{cell}$, value of $\Delta_r G$ depends on n.

Reasons R : E_{cell} is an intensive property and $\Delta_r G$ is an extensive property.

In the light of the above statements, choose the **correct** answer from the options given below :

(1) **A** is true but **R** is false.

(2) **A** is false but **R** is true.

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

(4) Both **A** and **R** are true and **R** is **NOT** the correct explanation of **A**.

83 Given below are two statements :

Statement I : A unit formed by the attachment of a base to 1' position of sugar is known as nucleoside

Statement II : When nucleoside is linked to phosphorous acid at 5'-position of sugar moiety, we get nucleotide.

In the light of the above statements, choose the **correct** answer from the options given below :

(1) Statement **I** is true but Statement **II** is false.

(2) Statement **I** is false but Statement **II** is true.

(3) Both Statement **I** and Statement **II** are true.

(4) Both Statement **I** and Statement **II** are false.

84 For a certain reaction, the rate = $k[A]^2[B]$, when the initial concentration of A is tripled keeping concentration of B constant, the initial rate would

(1) increase by a factor of nine.

(2) increase by a factor of three.

(3) decrease by a factor of nine.

(4) increase by a factor of six.

85 Amongst the given options which of the following molecules / ion acts as a Lewis acid?

(1) BF_3 (2) OH^-

(3) NH_3 (4) H_2O

86 Which of the following statements are **INCORRECT**?

A. All the transition metals except scandium form MO oxides which are ionic.

B. The highest oxidation number corresponding to the group number in transition metal oxides is attained in Sc_2O_3 to Mn_2O_7.

C. Basic character increases from V_2O_3 to V_2O_4 to V_2O_5.

D. V_2O_4 dissolves in acids to give VO_4^{3-} salts.

E. CrO is basic but Cr_2O_3 is amphoteric.

Choose the **correct** answer from the options given below :

(1) C and D only

(2) B and C only

(3) A and E only

(4) B and D only

87 What fraction of one edge centred octahedral void lies in one unit cell of fcc?

(1) $\frac{1}{4}$ (2) $\frac{1}{12}$

(3) $\frac{1}{2}$ (4) $\frac{1}{3}$

88 Match **List - I** with **List - II** :

List - I (Oxoacids of Sulphur)	**List - II (Bonds)**
A. Peroxodisulphuric acid	I. Two S-OH, Four S=O, One S-O-S
B. Sulphuric acid	II. Two S-OH, One S=O
C. Pyrosulphuric acid	III. Two S-OH, Four S=O, One S-O-O-S
D. Sulphurous acid	IV. Two S-OH, Two S=O

Choose the **correct** answer from the options given below :

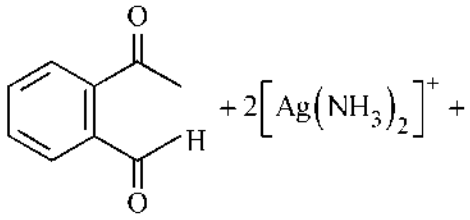
(1) A-I, B-III, C-IV, D-II

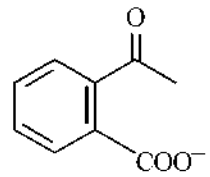
(2) A-III, B-IV, C-II, D-I

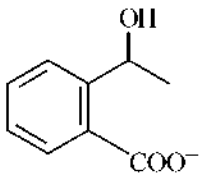
(3) A-I, B-III, C-II, D-IV

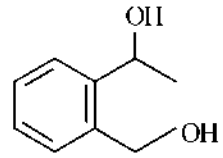
(4) A-III, B-IV, C-I, D-II

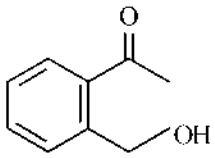
89 Identify the major product obtained in the following reaction :



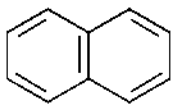
(1) 

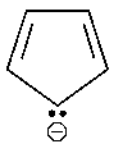
(2) 

(3) 

(4) 

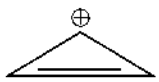
90 Consider the following compounds/species:

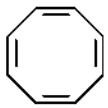
i. 

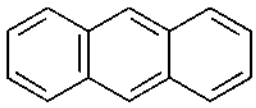
ii. 

iii. 

iv. 

v. 

vi. 

vii. 

The number of compounds/species which obey Huckel's rule is _____.

(1) 2 (2) 5

(3) 4 (4) 6

91 Which amongst the following options is the **correct** relation between change in enthalpy and change in internal energy?

(1) $\Delta H - \Delta U = -\Delta nRT$

(2) $\Delta H + \Delta U = \Delta nR$

(3) $\Delta H = \Delta U - \Delta n_g RT$

(4) $\Delta H = \Delta U + \Delta n_g RT$

92 Given below are two statements :

Statement I : The nutrient deficient water bodies lead to eutrophication.

Statement II : Eutrophication leads to decrease in the level of oxygen in the water bodies.

In the light of the above statements, choose the **correct** answer from the options given below :

(1) **Statement I** is correct but **Statement II** is false.

(2) **Statement I** is incorrect but **Statement II** is true.

(3) Both **Statement I** and **Statement II** are true.

(4) Both **Statement I** and **Statement II** are false.

93 Pumice stone is an example of -

(1) solid sol (2) foam

(3) sol (4) gel

94 Which complex compound is most stable?

(1) $\left[CoCl_2(en)_2\right]NO_3$

(2) $\left[Co(NH_3)_6\right]_2(SO_4)_3$

(3) $\left[Co(NH_3)_4(H_2O)Br\right](NO_3)_2$

(4) $\left[Co(NH_3)_3(NO_3)_3\right]$

95 The reaction that does **NOT** take place in a blast furnace between 900 K to 1500 K temperature range during extraction of iron is :

(1) $C + CO_2 \rightarrow 2CO$

(2) $CaO + SiO_2 \rightarrow CaSiO_3$

(3) $Fe_2O_3 + CO \rightarrow 2FeO + CO_2$

(4) $FeO + CO \rightarrow Fe + CO_2$

96 The equilibrium concentrations of the species in the reaction $A + B \rightleftharpoons C + D$ are 2, 3, 10 and 6 mol L^{-1}, respectively at 300 K. ΔG° for the reaction is (R = 2 cal / mol K)

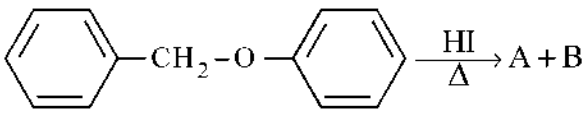
(1) – 1381.80 cal

(2) – 13.73 cal

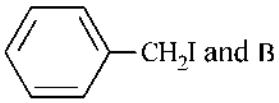
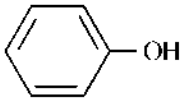
(3) 1372.60 cal

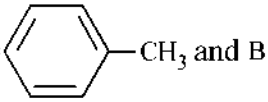
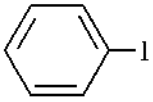
(4) – 137.26 cal

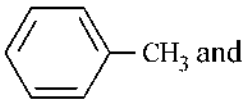
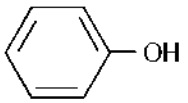
97 Consider the following reaction :

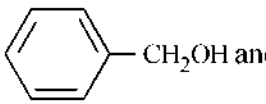
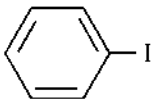


Identify products A and B.

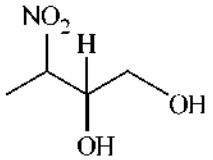
(1) A =  and B = 

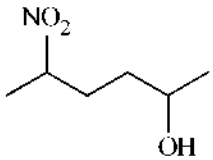
(2) A =  and B = 

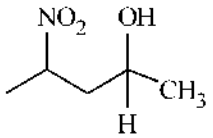
(3) A =  and B = 

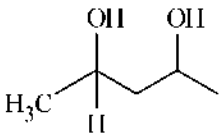
(4) A =  and B = 

98 Which amongst the following will be most readily dehydrated under acidic conditions ?

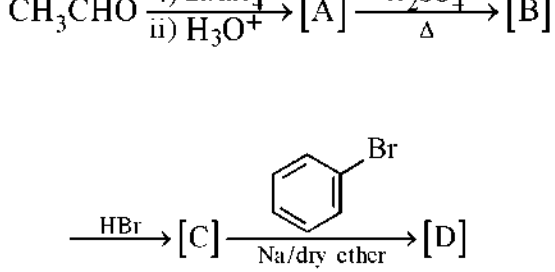
(1) 

(2) 

(3) 

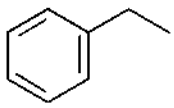
(4) 

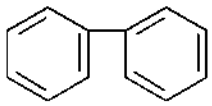
99 Identify the final product [D] obtained in the following sequence of reactions.



(1) C_4H_{10}

(2) $HC \equiv C^{\ominus}\ Na^{+}$

(3) 

(4) 

100 On balancing the given redox reaction,

$$a\ Cr_2O_7^{2-} + b\ SO_3^{2-}(aq) + c\ H^{+}(aq) \rightarrow$$

$$2a\ Cr^{3+}(aq) + b\ SO_4^{2-}(aq) + \frac{c}{2} H_2O(\ell)$$

the coefficients a, b and c are found to be, respectively -

(1) 1, 8, 3 (2) 8, 1, 3

(3) 1, 3, 8 (4) 3, 8, 1

Botany : Section-A (Q. No. 101 to 135)

101 Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R** :
Assertion A : Late wood has fewer xylary elements with narrow vessels.
Reason R : Cambium is less active in winters.
In the light of the above statements, choose the **correct** answer from the options given below :
(1) **A** is true but **R** is false.
(2) **A** is false but **R** is true.
(3) Both **A** and **R** are true and R is the correct explanation of **A**.
(4) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**.

102 The historic Convention on Biological Diversity, 'The Earth Summit' was held in Rio de Janeiro in the year :
(1) 1986 (2) 2002
(3) 1985 (4) 1992

103 In the equation

$$GPP - R = NPP$$

GPP is Gross Primary Productivity
NPP is Net Primary Productivity
R here is _____.
(1) Respiratory loss
(2) Reproductive allocation
(3) Photosynthetically active radiation
(4) Respiratory quotient

104 What is the function of tassels in the corn cob?
(1) To disperse pollen grains
(2) To protect seeds
(3) To attract insects
(4) To trap pollen grains

105 What is the role of RNA polymerase III in the process of transcription in Eukaryotes?
(1) Transcription of precursor of mRNA
(2) Transcription of only snRNAs
(3) Transcription of rRNAs (28S, 18S and 5.8S)
(4) Transcription of tRNA, 5 srRNA and snRNA

106 Upon exposure to UV radiation, DNA stained with ethidium bromide will show
(1) Bright yellow colour
(2) Bright orange colour
(3) Bright red colour
(4) Bright blue colour

107 The thickness of ozone in a column of air in the atmosphere is measured in terms of :
(1) Decameter (2) Kilobase
(3) Dobson units (4) Decibels

108 The phenomenon of pleiotropism refers to
(1) a single gene affecting multiple phenotypic expression.
(2) more than two genes affecting a single character.
(3) presence of several alleles of a single gene controlling a single crossover.
(4) presence of two alleles, each of the two genes controlling a single trait.

109 Spraying of which of the following phytohormone on juvenile conifers helps in hastening the maturity period, that leads to early seed production?
(1) Zeatin
(2) Abscisic Acid
(3) Indole-3-butyric Acid
(4) Gibberellic Acid

110 Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R** :
Assertion A : The first stage of gametophyte in the life cycle of moss is protonema stage.
Reason R : Protonema develops directly from spores produced in capsule.
In the light of the above statements, choose the **most appropriate** answer from the options given below :
(1) **A** is correct but **R** is not correct.
(2) **A** is not correct but **R** is correct.
(3) Both **A** and **R** are correct and **R** is the correct explanation of **A**.
(4) Both **A** and **R** are correct but **R** is NOT the correct explanation of **A**.

111 During the purification process for recombinant DNA technology, addition of chilled ethanol precipitates out
(1) Histones (2) Polysaccharides
(3) RNA (4) DNA

112 The reaction centre in PS II has an absorption maxima at
(1) 660 nm (2) 780 nm
(3) 680 nm (4) 700 nm

113 Family Fabaceae differs from Solanaceae and Liliaceae. With respect to the stamens, pick out the characteristics specific to family Fabaceae but not found in Solanaceae or Liliaceae.
(1) Monoadelphous and Monothecous anthers
(2) Epiphyllous and Dithecous anthers
(3) Diadelphous and Dithecous anthers
(4) Polyadelphous and epipetalous stamens

114 Which micronutrient is required for splitting of water molecule during photosynthesis?
(1) magnesium (2) copper
(3) manganese (4) molybdenum

115 Among 'The Evil Quartet', which one is considered the most important cause driving extinction of species?
(1) Alien species invasions
(2) Co-extinctions
(3) Habitat loss and fragmentation
(4) Over exploitation for economic gain

116 Movement and accumulation of ions across a membrane against their concentration gradient can be explained by
(1) Passive Transport
(2) Active Transport
(3) Osmosis
(4) Facilitated Diffusion

117 In tissue culture experiments, leaf mesophyll cells are put in a culture medium to form callus. This phenomenon may be called as -
(1) Development
(2) Senescence
(3) Differentiation
(4) Dedifferentiation

118 The process of appearance of recombination nodules occurs at which sub stage of prophase I in meiosis?
(1) Diplotene (2) Diakinesis
(3) Zygotene (4) Pachytene

119 Given below are two statements :
Statement I : The forces generated by transpiration can lift a xylem-sized column of water over 130 meters height.
Statement II : Transpiration cools leaf surfaces sometimes 10 to 15 degrees, by evaporative cooling.
In the light of the above statements, choose the **most appropriate** answer from the options given below :
(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.

120 Axile placentation is observed in
(1) Tomato, Dianthus and Pea
(2) China rose, Petunia and Lemon
(3) Mustard, Cucumber and Primrose
(4) China rose, Beans and Lupin

121 Which of the following stages of meiosis involves division of centromere?
(1) Anaphase II (2) Telophase
(3) Metaphase I (4) Metaphase II

122 Frequency of recombination between gene pairs on same chromosome as a measure of the distance between genes to map their position on chromosome, was used for the first time by
(1) Alfred Sturtevant
(2) Henking
(3) Thomas Hunt Morgan
(4) Sutton and Boveri

123 Cellulose does not form blue colour with Iodine because

(1) It does not contain complex helices and hence cannot hold iodine molecules.

(2) It breakes down when iodine reacts with it.

(3) It is a disaccharide.

(4) It is a helical molecule.

124 In gene gun method used to introduce alien DNA into host cells, microparticles of _____ metal are used.

(1) Tungsten or gold

(2) Silver

(3) Copper

(4) Zinc

125 Identify the pair of heterosporous pteridophytes among the following :

(1) *Psilotum* and *Salvinia*

(2) *Equisetum* and *Salvinia*

(3) *Lycopodium* and *Selaginella*

(4) *Selaginella* and *Salvinia*

126 Unequivocal proof that DNA is the genetic material was first proposed by

(1) Avery, Macleoid and McCarthy

(2) Wilkins and Franklin

(3) Frederick Griffith

(4) Alfred Hershey and Martha Chase

127 How many ATP and $NADPH_2$ are required for the synthesis of one molecule of Glucose during Calvin cycle?

(1) 12 ATP and 16 $NADPH_2$

(2) 18 ATP and 16 $NADPH_2$

(3) 12 ATP and 12 $NADPH_2$

(4) 18 ATP and 12 $NADPH_2$

128 Identify the **correct** statements :

A. Detrivores perform fragmentation.

B. The humus is further degraded by some microbes during mineralization.

C. Water soluble inorganic nutrients go down into the soil and get precipitated by a process called leaching.

D. The detritus food chain begins with living organisms.

E. Earthworms break down detritus into smaller particles by a process called catabolism.

Choose the **correct** answer from the options given below :

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

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

129 In angiosperm, the haploid, diploid and triploid structures of a fertilized embryo sac sequentially are :

(1) Synergids, Zygote and Primary endosperm nucleus

(2) Synergids, antipodals and Polar nuclei

(3) Synergids, Primary endosperm nucleus and zygote

(4) Antipodals, synergids, and primary endosperm nucleus

130 Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : ATP is used at two steps in glycolysis.

Reason R : First ATP is used in converting glucose into glucose-6-phosphate and second ATP is used in conversion of fructose-6-phosphate into fructose-1-6-diphosphate.

In the light of the above statements, choose the **correct** answer from the options given below :

(1) **A** is true but **R** is false.

(2) **A** is false but **R** is true.

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

(4) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**.

131 Expressed Sequence Tags (ESTs) refers to
(1) All genes whether expressed or unexpressed.
(2) Certain important expressed genes.
(3) All genes that are expressed as RNA.
(4) All genes that are expressed as proteins.

132 Among eukaryotes, replication of DNA takes place in -
(1) G_1 phase (2) G_2 phase
(3) M phase (4) S phase

133 Given below are two statements :
Statement I : Endarch and exarch are the terms often used for describing the position of secondary xylem in the plant body.
Statement II : Exarch condition is the most common feature of the root system.
In the light of the above statements, choose the **correct** answer from the options given below :
(1) **Statement I** is correct but **Statement II** is false.
(2) **Statement I** is incorrect but **Statement II** is true.
(3) Both **Statement I** and **Statement II** are true.
(4) Both **Statement I** and **Statement II** are false.

134 Large, colourful, fragrant flowers with nectar are seen in :
(1) bat pollinated plants
(2) wind pollinated plants
(3) insect pollinated plants
(4) bird pollinated plants

135 Which hormone promotes internode/petiole elongation in deep water rice?
(1) Ethylene (2) 2, 4-D
(3) GA_3 (4) Kinetin

136 Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R** :
Assertion A : A flower is defined as modified shoot wherein the shoot apical meristem changes to floral meristem.
Reason R : Internode of the shoot gets condensed to produce different floral appendages laterally at successive nodes instead of leaves.
In the light of the above statements, choose the **correct** answer from the options given below :
(1) **A** is true but **R** is false.
(2) **A** is false but **R** is true.
(3) Both **A** and **R** are true and R is the correct explanation of **A**.
(4) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**.

137 Match **List I** with **List II** :

	List I		**List II**
A.	M Phase	I.	Proteins are synthesized
B.	G_2 Phase	II.	Inactive phase
C.	Quiescent stage	III.	Interval between mitosis and initiation of DNA replication
D.	G_1 Phase	IV.	Equational division

Choose the correct answer from the options given below :
(1) A-IV, B-I, C-II, D-III
(2) A-II, B-IV, C-I, D-III
(3) A-III, B-II, C-IV, D-I
(4) A-IV, B-II, C-I, D-III

138 How many different proteins does the ribosome consist of?
(1) 40 (2) 20
(3) 80 (4) 60

139 Which one of the following statements is **NOT** correct?

(1) Water hyacinth grows abundantly in eutrophic water bodies and leads to an imbalance in the ecosystem dynamics of the water body.

(2) The amount of some toxic substances of industrial waste water increases in the organisms at successive trophic levels.

(3) The micro-organisms involved in biodegradation of organic matter in a sewage polluted water body consume a lot of oxygen causing the death of aquatic organisms.

(4) Algal blooms caused by excess of organic matter in water improve water quality and promote fisheries.

140 Which of the following combinations is required for chemiosmosis?

(1) proton pump, electron gradient, ATP synthase

(2) proton pump, electron gradient, NADP synthase

(3) membrane, proton pump, proton gradient, ATP synthase

(4) membrane, proton pump, proton gradient, NADP synthase

141 Match **List I** with **List II** :

	List I		**List II**
A.	Cohesion	I.	More attraction in liquid phase
B.	Adhesion	II.	Mutual attraction among water molecules
C.	Surface tension	III.	Water loss in liquid phase
D.	Guttation	IV.	Attraction towards polar surfaces

Choose the **correct** answer from the options given below :

(1) A-III, B-I, C-IV, D-II

(2) A-II, B-I, C-IV, D-III

(3) A-II, B-IV, C-I, D-III

(4) A-IV, B-III, C-II, D-I

142 Match **List I** with **List II** :

	List I		**List II**
A.	Iron	I.	Synthesis of auxin
B.	Zinc	II.	Component of nitrate reductase
C.	Boron	III.	Activator of catalase
D.	Molybdenum	IV.	Cell elongation and differentiation

Choose the correct answer from the options given below :

(1) A-III, B-I, C-IV, D-II

(2) A-II, B-IV, C-I, D-III

(3) A-III, B-II, C-I, D-IV

(4) A-II, B-III, C-IV, D-I

143 Given below are two statements :

Statement I : Gause's 'Competitive Exclusion Principle' states that two closely related species competing for the same resources cannot co-exist indefinitely and competitively inferior one will be eliminated eventually.

Statement II : In general, carnivores are more adversely affected by competition than herbivores.

In the light of the above statements, choose the **correct** answer from the options given below :

(1) **Statement I** is correct but **Statement II** is false.

(2) **Statement I** is incorrect but **Statement II** is true.

(3) Both **Statement I** and **Statement II** are true.

(4) Both **Statement I** and **Statement II** are false.

144 Melonate inhibits the growth of pathogenic bacteria by inhibiting the activity of

(1) Lipase

(2) Dinitrogenase

(3) Succinic dehydrogenase

(4) Amylase

145 Identify the **correct** statements :
A. Lenticels are the lens-shaped openings permitting the exchange of gases.
B. Bark formed early in the season is called hard bark.
C. Bark is a technical term that refers to all tissues exterior to vascular cambium.
D. Bark refers to periderm and secondary phloem.
E. Phellogen is single-layered in thickness.
Choose the correct answer from the options given below :
(1) A, B and D only
(2) B and C only
(3) B, C and E only
(4) A and D only

146 Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R** :
Assertion A : In gymnosperms the pollen grains are released from the microsporangium and carried by air currents.
Reason R : Air currents carry the pollen grains to the mouth of the archegonia where the male gametes are discharged and pollen tube is not formed.
In the light of the above statements, choose the **correct** answer from the options given below :
(1) **A** is true but **R** is false.
(2) **A** is false but **R** is true.
(3) Both **A** and **R** are true and **R** is the correct explanation of **A**.
(4) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**.

147 Which of the following statements are correct about Klinefelter's Syndrome?
A. This disorder was first described by Langdon Down (1866).
B. Such an individual has overall masculine development. However, the feminine development is also expressed.
C. The affected individual is short statured.
D. Physical, psychomotor and mental development is retarded.
E. Such individuals are sterile.
Choose the **correct** answer from the options given below :
(1) B and E only (2) A and E only
(3) A and B only (4) C and D only

148 Main steps in the formation of Recombinant DNA are given below. Arrange these steps in a correct sequence.
A. Insertion of recombinant DNA into the host cell.
B. Cutting of DNA at specific location by restriction enzyme.
C. Isolation of desired DNA fragment.
D. Amplification of gene of interest using PCR.
Choose the correct answer from the options given below :
(1) C, B, D, A (2) B, D, A, C
(3) B, C, D, A (4) C, A, B, D

149 Match **List I** with **List II** :

List I	**List II**
A. Oxidative decarboxylation	I. Citrate synthase
B. Glycolysis	II. Pyruvate dehydrogenase
C. Oxidative phosphorylation	III. Electron transport system
D. Tricarboxylic acid cycle	IV. EMP pathway

Choose the correct answer from the options given below :
(1) A-III, B-I, C-II, D-IV
(2) A-II, B-IV, C-III, D-I
(3) A-III, B-IV, C-II, D-I
(4) A-II, B-IV, C-I, D-III

150 Match **List I** with **List II** :

List I (Interaction)	**List II (Species A and B)**
A. Mutualism	I. +(A), O(B)
B. Commensalism	II. −(A), O(B)
C. Amensalism	III. +(A), −(B)
D. Parasitism	IV. +(A), +(B)

Choose the **correct** answer from the options given below :
(1) A-IV, B-III, C-I, D-II
(2) A-III, B-I, C-IV, D-II
(3) A-IV, B-II, C-I, D-III
(4) A-IV, B-I, C-II, D-III

151 Broad palm with single palm crease is visible in a person suffering from-
(1) Klinefelter's syndrome
(2) Thalassemia
(3) Down's syndrome
(4) Turner's syndrome

152 Given below are two statements:
Statement I: A protein is imagined as a line, the left end represented by first amino acid (C-terminal) and the right end represented by last amino acid (N-terminal)
Statement II: Adult human haemoglobin, consists of 4 subunits (two subunits of α type and two subunits of β type.)
In the light of the above statements, choose the **correct** answer from the options given below:
(1) **Statement I** is true but **Statement II** is false.
(2) **Statement I** is false but **Statement II** is true.
(3) Both **Statement I** and **Statement II** are true.
(4) Both **Statement I** and **Statement II** are false.

153 Given below are statements: one is labelled as **Assertion A** and the other is labelled as **Reason R.**
Assertion A: Nephrons are of two types: Cortical & Juxta medullary, based on their relative position in cortex and medulla.
Reason R: Juxta medullary nephrons have short loop of Henle whereas, cortical nephrons have longer loop of Henle.
In the light of the above statements, choose the **correct** answer from the options given below:
(1) **A** is true but **R** is false.
(2) **A** is false but **R** is true.
(3) Both **A** and **R** are true and **R** is the correct explanation of **A.**
(4) Both **A** and **R** are true but **R** is NOT the correct explanation of **A.**

154 Match **List I** with **List II.**

List I		**List II**
A. Heroin	I.	Effect on cardiovascular system
B. Marijuana	II.	Slow down body function
C. Cocaine	III.	Painkiller
D. Morphine	IV.	Interfere with transport of dopamine

Choose the **correct** answer from the options given below:
(1) A-IV, B-III, C-II, D-I
(2) A-III, B-IV, C-I, D-II
(3) A-II, B-I, C-IV, D-III
(4) A-I, B-II, C-III, D-IV

155 Vital capacity of lung is _____.
(1) IRV + ERV + TV – RV
(2) IRV + ERV + TV
(3) IRV + ERV
(4) IRV + ERV + TV + RV

156 Match **List I** with **List II.**

List I		**List II**
A. P - wave	I.	Beginning of systole
B. Q - wave	II.	Repolarisation of ventricles
C. QRS complex	III.	Depolarisation of atria
D. T - wave	IV.	Depolarisation of ventricles

Choose the **correct** answer from the options given below:
(1) A-II, B-IV, C-I, D-III
(2) A-I, B-II, C-III, D-IV
(3) A-III, B-I, C-IV, D-II
(4) A-IV, B-III, C-II, D-I

157 Match **List I** with **List II**.

List I (Cells)		**List II (Secretion)**
A. Peptic cells	I.	Mucus
B. Goblet cells	II.	Bile juice
C. Oxyntic cells	III.	Proenzyme pepsinogen
D. Hepatic cells	IV.	HCl and intrinsic factor for absorption of vitamin B_{12}

Choose the **correct** answer from the options given below:

(1) A-III, B-I, C-IV, D-II
(2) A-II, B-IV, C-I, D-III
(3) A-IV, B-III, C-II, D-I
(4) A-II, B-I, C-III, D-IV

158 Match **List I** with **List II**.

List I		**List II**
A. Vasectomy	I.	Oral method
B. Coitus interruptus	II.	Barrier method
C. Cervical caps	III.	Surgical method
D. Saheli	IV.	Natural method

Choose the **correct** answer from the options given below:

(1) A-II, B-III, C-I, D-IV
(2) A-IV, B-II, C-I, D-III
(3) A-III, B-I, C-IV, D-II
(4) A-III, B-IV, C-II, D-I

159 Which one of the following common sexually transmitted diseases is completely curable when detected early and treated properly?

(1) Hepatitis-B (2) HIV Infection
(3) Genital herpes (4) Gonorrhoea

160 Match **List I** with **List II**.

List I		**List II**
A. Ringworm	I.	*Haemophilus influenzae*
B. Filariasis	II.	*Trichophyton*
C. Malaria	III.	*Wuchereria bancrofti*
D. Pneumonia	IV.	*Plasmodium vivax*

Choose the **correct** answer from the options given below:

(1) A-III, B-II, C-I, D-IV
(2) A-III, B-II, C-IV, D-I
(3) A-II, B-III, C-IV, D-I
(4) A-II, B-III, C-I, D-IV

161 Which of the following are NOT considered as the part of endomembrane system?

A. Mitochondria B. Endoplasmic Reticulum
C. Chloroplasts D. Golgi complex
E. Peroxisomes

Choose the **most appropriate** answer from the options given below:

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

162 Which of the following is not a cloning vector?

(1) pBR322 (2) Probe
(3) BAC (4) YAC

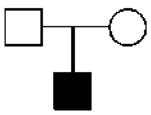
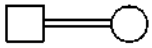
163 Match **List I** with **List II**.

List I (Interacting species)		**List II (Name of Interaction)**
A. A Leopard and a Lion in a forest/ grassland	I.	Competition
B. A Cuckoo laying egg in a Crow's nest	II.	Brood parasitism
C. Fungi and root of a higher plant in Mycorrtizae	III.	Mutualism
D. A cattle egret and a Cattle in a field	IV.	Commensalism

Choose the **correct** answer from the options given below:

(1) A-III, B-IV, C-I, D-II
(2) A-II, B-III, C-I, D-IV
(3) A-I, B-II, C-III, D-IV
(4) A-I, B-II, C-IV, D-III

164 Which one of the following symbols represents mating between relatives in human pedigree analysis?

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

165 Match **List I** with **List II**.

	List I		List II
A.	*Taenia*	I.	Nephridia
B.	*Paramoecium*	II.	Contractile vacuole
C.	*Periplaneta*	III.	Flame cells
D.	*Pheretima*	IV.	Urecose gland

Choose the **correct** answer from the options give below:

(1) A-III, B-II, C-IV, D-I
(2) A-II, B-I, C-IV, D-III
(3) A-I, B-II, C-III, D-IV
(4) A-I, B-II, C-IV, D-III

166 Once the undigested and unabsorbed substances enter the caecum, their backflow is prevented by-

(1) Gastro - oesophageal sphincter
(2) Pyloric sphincter
(3) Sphincter of Oddi
(4) Ileo - caecal valve

167 Match **List I** with **List II**.

	List I		List II
A.	Gene 'a'	I.	β-galactosidase
B.	Gene 'y'	II.	Transacetylase
C.	Gene 'i'	III.	Permease
D.	Gene 'z'	IV.	Repressor protein

Choose the **correct** answer from the options given below:

(1) A-III, B-IV, C-I, D-II
(2) A-III, B-I, C-IV, D-II
(3) A-II, B-I, C-IV, D-III
(4) A-II, B-III, C-IV, D-I

168 Which one of the following techniques does not serve the purpose of early diagnosis of a disease for its early treatment?

(1) Polymerase Chain Reaction (PCR) technique
(2) Enzyme Linked Immuno-Sorbent Assay (ELISA) technique
(3) Recombinant DNA Technology
(4) Serum and Urine analysis

169 Given below are two statements:

Statement I: Low temperature preserves the enzyme in a temporarily inactive state whereas high temperature destroys enzymatic activity because proteins are denatured by heat.

Statement II: When the inhibitor closely resembles the substrate in its molecular structure and inhibits the activity of the enzyme, it is known as competitive inhibitor.

In the light of the above statements, choose the **correct** answer from the options given below:

(1) **Statement I** is true but **Statement II** is false.
(2) **Statement I** is false but **Statement II** is true.
(3) Both **Statement I** and **Statement II** are true.
(4) Both **Statement I** and **Statement II** are false.

170 Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R.**

Assertion A: Endometrium is necessary for implantation of blastocyst.

Reason R: In the absence of fertilization, the corpus luteum degenerates that causes disintegration of endometrium.

In the light of the above statements, choose the **correct** answer from the options given below:

(1) **A** is true but **R** is false.
(2) **A** is false but **R** is true.
(3) Both **A** and **R** are true and **R** is the correct explanation of **A**.
(4) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**.

171 Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R.**

Assertion A: Amniocentesis for sex determination is one of the strategies of Reproductive and Child Health Care Programme.

Reason R: Ban on amniocentesis checks increasing menace of female foeticide.

In the light of the above statements, choose the **correct** answer from the options given below:

(1) **A** is true but **R** is false.
(2) **A** is false but **R** is true.
(3) Both **A** and **R** are true and **R** is the correct explanation of **A**.
(4) Both **A** and **R** are true and **R** is NOT the correct explanation of **A**.

172 Which of the following statements is correct?

(1) Presence of large amount of nutrients in water restricts 'Algal Bloom'
(2) Algal Bloom decreases fish mortality
(3) Eutrophication refers to increase in domestic sewage and waste water in lakes.
(4) Biomagnification refers to increase in concentration of the toxicant at successive trophic levels.

173 Which of the following statements are correct regarding female reproductive cycle?

A. In non-primate mammals cyclical changes during reproduction are called oestrus cycle.
B. First menstrual cycle begins at puberty and is called menopause.
C. Lack of menstruation may be indicative of pregnancy.
D. Cyclic menstruation extends between menarche and menopause.

Choose the **most appropriate** answer from the options given below:

(1) A, B and C only
(2) A, C and D only
(3) A and D only
(4) A and B only

174 Match **List I** with **List II.**

List I		**List II**	
A.	CCK	I.	Kidney
B.	GIP	II.	Heart
C.	ANF	III.	Gastric gland
D.	ADH	IV.	Pancreas

Choose the **correct** answer from the options given below:

(1) A-II, B-IV, C-I, D-III
(2) A-IV, B-II, C-III, D-I
(3) A-IV, B-III, C-II, D-I
(4) A-III, B-II, C-IV, D-I

175 Given below are two statements:

Statement I: In prokaryotes, the positively charged DNA is held with some negatively charged proteins in a region called nucleoid.

Statement II: In eukaryotes, the negatively charged DNA is wrapped around the positively charged histone octamer to form nucleosome.

In the light of the above statements, choose the **correct** answer from the options given below:

(1) **Statement I** is correct but **Statement II** is false.
(2) **Statement I** incorrect but **Statement II** is true.
(3) Both **Statement I** and **Statement II** are true.
(4) Both **Statement I** and **Statement II** are false.

176 Match **List I** with **List II.**

List I (Type of Joint)		**List II (Found between)**	
A.	Cartilaginous Joint	I.	Between flat skull bones
B.	Ball and Socket Joint	II.	Between adjacent vertebrae in vertebral column
C.	Fibrous Joint	III.	Between carpal and metacarpal of thumb
D.	Saddle Joint	IV.	Between Humerus and Pectoral girdle

Choose the **correct** answer from the options given below:

(1) A-I, B-IV, C-III, D-II
(2) A-II, B-IV, C-III, D-I
(3) A-III, B-I, C-II, D-IV
(4) A-II, B-IV, C-I, D-III

177 Given below are two statements:

Statement I: Ligaments are dense irregular tissue.

Statement II: Cartilage is dense regular tissue.

In the light of the above statements, choose the **correct** answer from the options given below:

(1) **Statement I** is true but **Statement II** is false.

(2) **Statement I** is false but **Statement II** is true.

(3) Both **Statement I** and **Statement II** are true.

(4) Both **Statement I** and **Statement II** are false.

178 In which blood corpuscles, the HIV undergoes replication and produces progeny viruses?

(1) Basophils (2) Eosinophils

(3) T_H cells (4) B-lymphocytes

179 Radial symmetry is NOT found in adults of phylum _____.

(1) Coelenterata (2) Echinodermata

(3) Ctenophora (4) Hemichordata

180 Which of the following functions is carried out by cytoskeleton in a cell?

(1) Motility

(2) Transportation

(3) Nuclear division

(4) Protein synthesis

181 Given below are two statements:

Statement I: Vas deferens receives a duct from seminal vesicle and opens into urethra as the ejaculatory duct.

Statement II: The cavity of the cervix is called cervical canal which along with vagina forms birth canal.

In the light of the above statements, choose the **correct** answer from the options given below:

(1) **Statement I** is correct but **Statement II** is false.

(2) **Statement I** incorrect but **Statement II** is true.

(3) Both **Statement I** and **Statement II** are true.

(4) Both **Statement I** and **Statement II** are false.

182 Select the correct group/set of Australian Marsupials exhibiting adaptive radiation.

(1) Mole, Flying squirrel, Tasmanian tiger cat

(2) Lemur, Anteater, Wolf

(3) Tasmanian wolf, Bobcat, Marsupial mole

(4) Numbat, Spotted cuscus, Flying phalanger

183 Given below are two statements:

Statement I: Electrostatic precipitator is most widely used in thermal power plant.

Statement II: Electrostatic precipitator in thermal power plant removes ionising radiations

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

(1) **Statement I** is correct but **Statement II** is incorrect.

(2) **Statement I** incorrect but **Statement II** is correct.

(3) Both **Statement I** and **Statement II** are correct.

(4) Both **Statement I** and **Statement II** are incorrect.

184 Given below are two statements:

Statement I: RNA mutates at a faster rate.

Statement II: Viruses having RNA genome and shorter life span mutate and evolve faster.

In the light of the above statements, choose the **correct** answer from the options given below:

(1) **Statement I** is true but **Statement II** is false.

(2) **Statement I** false but **Statement II** is true.

(3) Both **Statement I** and **Statement II** are true.

(4) Both **Statement I** and **Statement II** are false.

185 Match **List I** with **List II** with respect to human eye.

List I		**List II**
A. Fovea	I.	Visible coloured portion of eye that regulates diameter of pupil.
B. Iris	II.	External layer of eye formed of dense connective tissue.
C. Blind spot	III.	Point of greatest visual acuity or resolution.
D. Sclera	IV.	Point where optic nerve leaves the eyeball and photoreceptor cells are absent.

Choose the **correct** answer from the options given below:

(1) A-I, B-IV, C-III, D-II

(2) A-II, B-I, C-III, D-IV

(3) A-III, B-I, C-IV, D-II

(4) A-IV, B-III, C-II, D-I

186 Select the correct statements.

A. Tetrad formation is seen during Leptotene.

B. During Anaphase, the centromeres split and chromatids separate.

C. Terminalization takes place during Pachytene.

D. Nucleolus, Golgi complex and ER are reformed during Telophase.

E. Crossing over takes place between sister chromatids of homologous chromosome.

Choose the **correct** answer from the options given below:

(1) A, C and E only

(2) B and E only

(3) A and C only

(4) B and D only

187 Select the correct statements with reference to chordates.

A. Presence of a mid-dorsal, solid and double nerve cord.

B. Presence of closed circulatory system.

C. Presence of paired pharyngeal gillslits.

D. Presence of dorsal heart

E. Triploblastic pseudocoelomate animals.

Choose the **correct** answer from the options given below:

(1) B, D and E only

(2) C, D and E only

(3) A, C and D only

(4) B and C only

188 In cockroach, excretion is brought about by-

A. Phallic gland B. Urecose gland

C. Nephrocytes D. Fat body

E. Collaterial glands

Choose the **correct** answer from the options given below:

(1) B, C and D only

(2) B and D only

(3) A and E only

(4) A, B and E only

189 Match **List I** with **List II**.

List I	List II
A. Mast cells	I. Ciliated epithelium
B. Inner surface of bronchiole	II. Areolar connective tissue
C. Blood	III. Cuboidal epithelium
D. Tubular parts of nephron	IV. specialised connective tissue

Choose the **correct** answer from the options give below:

(1) A-II, B-I, C-IV, D-III
(2) A-III, B-IV, C-II, D-I
(3) A-I, B-II, C-IV, D-III
(4) A-II, B-III, C-I, D-IV

190 Given below are two statements:

Statement I: During G_0 phase of cell cycle, the cell is metabolically inactive.

Statement II: The centrosome undergoes duplication during S phase of interphase.

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

(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.

191 Which one of the following is NOT an advantage of inbreeding?

(1) Elimination of less desirable genes and accumulation of superior genes takes place due to it.
(2) It decreases the productivity of inbred population, after continuous inbreeding.
(3) It decreases homozygosity.
(4) It exposes harmful recessive genes that are eliminated by selection.

192 Which of the following is characteristic feature of cockroach regarding sexual dimorphism ?

(1) Presence of sclerites
(2) Presence of anal cerci
(3) Dark brown body colour and anal cerci
(4) Presence of anal styles

193 The parts of human brain that helps in regulation of sexual behaviour, expression of excitement, pleasure, rage, fear etc. are :

(1) Brain stem & epithalamus
(2) Corpus callosum and thalamus
(3) Limbic system & hypothalamus
(4) Corpora quadrigemina & hippocampus

194 Which of the following statements are correct ?

A. Basophils are most abundant cells of the total WBCs
B. Basophils secrete histamine, serotonin and heparin
C. Basophils are involved in inflammatory response
D. Basophils have kidney shaped nucleus
E. Basophils are agranulocytes

Choose the **correct** answer from the options given below:

(1) B and C only (2) A and B only
(3) D and E only (4) C and E only

195 Which one of the following is the sequence on corresponding coding strand, if the sequence on mRNA formed is as follows
5' AUCGAUCGAUCGAUCGAUCG AUCG AUCG 3'?

(1) 5' ATCGATCGATCGATCGATCG ATCGATCG 3'
(2) 3' ATCGATCGATCGATCGATCG ATCGATCG 5'
(3) 5' UAGCUAGCUAGCUAGCUA GCUAGC UAGC 3'
(4) 3' UAGCUAGCUAGCUAGCUA GCUAGCUAGC 5'

196 Match **List I** with **List II**.

List I	**List II**
A. Logistic growth	I. Unlimited resource availability condition
B. Exponential growth	II. Limited resource availability condition
C. Expanding age pyramid	III. The percent individuals of pre-reproductive age is largest followed by reproductive and post reproductive age groups
D. Stable age pyramid	IV. The percent individuals of pre-reproductives and reproductive age group are same

Choose the **correct** answer from the options given below:

(1) A-II, B-IV, C-I, D-III

(2) A-II, B-IV, C-III, D-I

(3) A-II, B-I, C-III, D-IV

(4) A-II, B-III, C-I, D-IV

197 Which of the following are NOT under the control of thyroid hormone?

A. Maintenance of water and electrolyte balance

B. Regulation of basal metabolic rate

C. Normal rhythm of sleep-wake cycle

D. Development of immune system

E. Support the process of R.B.Cs formation

Choose the **correct** answer from the options given below:

(1) C and D only

(2) D and E only

(3) A and D only

(4) B and C only

198 Which of the following statements are correct?

A. An excessive loss of body fluid from the body switches off osmoreceptors.

B. ADH facilitates water reabsorption to prevent diuresis.

C. ANF causes vasodilation.

D. ADH causes increase in blood pressure.

E. ADH is responsible for decrease in GFR.

Choose the **correct** answer from the options given below:

(1) A, B and E only

(2) C, D and E only

(3) A and B only

(4) B, C and D only

199 Which of the following statements are correct regarding skeletal muscle?

A. Muscle bundles are held together by collagenous connective tissue layer called fascicle.

B. Sarcoplasmic reticulum of muscle fibre is a store house of calcium ions.

C. Striated appearance of skeletal muscle fibre is due to distribution pattern of actin and myosin proteins.

D. M line is considered as functional unit of contraction called sarcomere.

Choose the ***most appropriate*** answer from the options given below:

(1) A, C and D only

(2) C and D only

(3) A, B and C only

(4) B and C only

200 The unique mammalian characteristics are:

(1) hairs, pinna and indirect development

(2) pinna, monocondylic skull and mammary glands

(3) hairs, tympanic membrane and mammary glands

(4) hairs, pinna and mammary glands

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