23/04/2024

CODE-A

Aakash
Medical | IIT-JEE | Foundations

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AIM – 720

(*Advanced* INTENSIVE *Mastery for* 720)

MM : 720 **CST – 13** **Time : 3 Hrs. 20 Mins.**

Complete Syllabus of NEET

Instructions :

(i) There are two sections in each subject, i.e. Section-A & Section-B. You have to attempt all 35 questions from Section-A & only 10 questions from Section-B out of 15.

(ii) Each question carries 4 marks. For every wrong response 1 mark shall be deducted from the total score. Unanswered / unattempted questions will be given no marks.

(iii) Use blue/black ballpoint pen only to darken the appropriate circle.

(iv) Mark should be dark and completely fill the circle.

(v) Dark only one circle for each entry.

(vi) Dark the circle in the space provided only.

(vii) Rough work must not be done on the Answer sheet and do not use white-fluid or any other rubbing material on the Answer sheet.

PHYSICS

SECTION-A

1. A cube of aluminium of side 0.1 m is subjected to a shearing force of 100 N. The top face of the cube is displaced through 0.02 cm with respect to the bottom face. The shearing strain would be

   (1) 0.02 (2) 0.1

   (3) 0.005 (4) 0.002

2. The radius of the orbit of a satellite is r and its kinetic energy is K. If the radius of the orbit is tripled, then the new kinetic energy will be

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

   (3) $4K$ (4) Data insufficient

3. If a force is applied on a rigid body, then the distance between any two points on the rigid body

   (1) Increases (2) Decreases

   (3) Remains constant (4) Either (1) or (2)

4. Two particles, each of mass m and speed v, travel in opposite directions along parallel lines separated by a distance d. Then, choose the correct statement.

   (1) Angular momentum of the system about a point depends on choice of position of point

   (2) Angular momentum of the system is zero

   (3) Angular momentum of the system about any point in space is constant

   (4) Angular momentum of the system keeps on increasing

5. Which of the following statements is incorrect regarding convection process of heat transfer?
   (1) It is a mode of heat transfer in which bulk motion of matter takes place
   (2) It is possible in fluids as well as solids
   (3) It can be natural or forced
   (4) It is responsible for land breeze and sea breeze

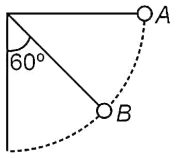
6. Work done in blowing a soap bubble of radius r having surface tension T is
   (1) $\pi r^2 T$ (2) $8\pi r^2 T$
   (3) $4\pi r^2 T$ (4) $12\pi r^2 T$

7. A monoatomic ideal gas $\left(\frac{C_p}{C_v} = \gamma\right)$ is taken through a process in which the pressure and the volume vary as $P = KV^a$, where K = constant. Find the value of a for which the molar specific heat capacity in the process is zero.
   (1) $\frac{-8}{3}$ (2) $\frac{-1}{2}$
   (3) $\frac{-5}{3}$ (4) $\frac{-2}{5}$

8. During an experiment, an ideal gas is found to obey an additional law VP^2 = constant. The gas is initially at temperature T and volume $2V$. What will be the temperature of the gas when it expands to a volume $4V$?
   (1) $2\sqrt{2}T$ (2) $\sqrt{2}T$
   (3) $3\sqrt{2}T$ (4) $2T$

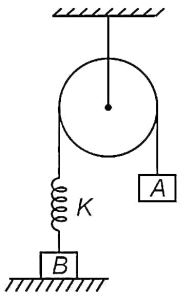
9. A physical quantity Q depends on other physical quantities A, B and C as $Q = \frac{A^2\sqrt{C}}{B}$. If error in the measurement of A, B and C are 1%, 2% and 3% respectively then possible error in the calculation of Q can be
   (1) 3.8% (2) 1.5%
   (3) 5.5% (4) All of the above

10. A simple pendulum is released from A as shown in the figure. If m and l represents the mass of the bob and the length of string of the pendulum respectively, then tension in the string at position B is



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

11. In the diagram given below, the block A is released from rest when the spring is at its natural length. For the block B of mass 10 kg to leave contact with the ground at some time, the minimum mass of A must be



   (1) 20 kg (2) 10 kg
   (3) 7.5 kg (4) 5 kg

12. In the core of a transformer, the ferromagnetic alloy is made into thin laminated sheets. This reduces
   (1) Hysteresis loss
   (2) Eddy current loss
   (3) Neither hysteresis loss nor eddy current loss
   (4) Both hysteresis loss and eddy current loss

13. If the frequency of source emf in an AC circuit is f, then power supplied by the source varies with a frequency
   (1) f (2) $2f$
   (3) $f/2$ (4) Zero

Space for Rough Work

14. The critical angle of a medium with respect to air is 37°. Then refractive index of that medium will be

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

(3) 4 (4) $\frac{5}{4}$

15. The minimum magnifying power of an astronomical telescope is Y, if the focal length of its eyepiece lens is halved, then the minimum magnifying power will become

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

(3) $2Y$ (4) $4Y$

16. An electromagnetic wave in vacuum has the electric and magnetic field as $\vec{E}$ and $\vec{B}$ respectively, which are always perpendicular to each other. The direction of wave propagation is given by $\vec{X}$, then

(1) $\vec{X}$ is in the direction of $\vec{B}\times\vec{E}$

(2) $\vec{X}$ is in the direction of $\vec{E}\times\vec{B}$

(3) $\vec{X}$ is in the direction of $\vec{B}$

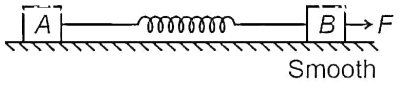
(4) $\vec{X}$ is in the direction of $\vec{E}$

17. The angle of incidence at which reflected light is totally polarized for reflection from air to glass of refractive index μ is

(1) $\sin^{-1}(\mu)$ (2) $\sin^{-1}\left(\frac{1}{\mu}\right)$

(3) $\tan^{-1}(\mu)$ (4) $\tan^{-1}\left(\frac{1}{\mu}\right)$

18. Two identical blocks A and B, each of mass 'm' are interconnected by a spring of stiffness K and force F is exerted on block B as shown. If at an instant elongation in spring is x, then magnitude of acceleration of block B relative to block A at that instant is



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

(3) $\frac{F-Kx}{m}$ (4) $\frac{F-2Kx}{m}$

19. Velocity of A and B are $\vec{V}_A=(3\hat{i}+2\hat{j})\text{m s}^{-1}$ and $\vec{V}_B=(2\hat{i}+\hat{j})\text{m s}^{-1}$. Velocity of B as observed by A is

(1) $(\hat{i}+2\hat{j})\text{ m s}^{-1}$

(2) $(-\hat{i}-\hat{j})\text{ m s}^{-1}$

(3) $(\hat{i}+\hat{j})\text{ m s}^{-1}$

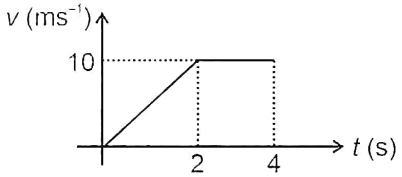
(4) $(\hat{i}+4\hat{j})\text{ m s}^{-1}$

20. A ball is thrown upward from ground with a velocity of 120 m/s. The time taken by ball to reach the ground will be (Assume air resistance to be negligible)

(1) 10 s (2) 24 s

(3) 14 s (4) 20 s

21. The speed of a car increases uniformly from zero to 10 m s^{-1} in 2 s and then it remains constant.



The distance travelled by the car in 4 s is

(1) 10 m (2) 20 m

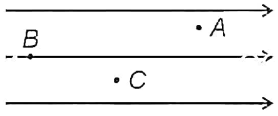
(3) Zero (4) 30 m

22. Internal energy of a given sample of an ideal gas depends on its

(1) Volume (2) Pressure

(3) Temperature (4) All of these

23. A, B and C are three points in a uniform electric field. The electric potential is



(1) Minimum at C

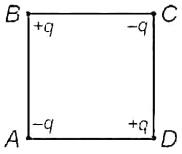
(2) Same at all the three points A, B and C

(3) Minimum at A

(4) Minimum at B

Space for Rough Work

24. Four charges are arranged at the corners of a square *ABCD*, as shown. The force on a negative charge kept at the centre of the square will be



(1) Along diagonal *AC*
(2) Along diagonal *BD*
(3) Perpendicular to side *AB*
(4) Zero

25. **Statement A :** Using the phenomenon of echo velocity of sound can be determined.

Statement B: Using the phenomenon of echo depth of ocean can not be determined.

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

(1) Both statement (A) and statement (B) are correct
(2) Both statement (A) and statement (B) are incorrect
(3) Statement (A) is correct and statement (B) is incorrect
(4) Statement (A) is incorrect and statement (B) is correct

26. The displacement equation of a particle in SHM is $y = 10\sin(2\pi t + \frac{\pi}{3})$ m. The initial velocity of the particle will be

(1) 20π m/s (2) 10π m/s
(3) $10\sqrt{3}\pi$ m/s (4) Zero

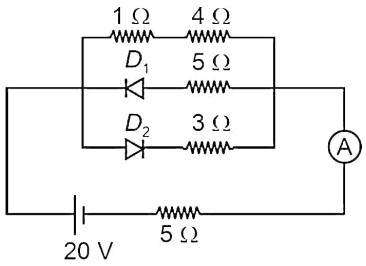
27. Light of frequency 1.2 times the threshold frequency is incident on a photosensitive material. What will be the photoelectric current if the frequency is halved and intensity is tripled?

(1) Remains same (2) Doubled
(3) Four times (4) Zero

28. A radioactive element $^{240}_{90}X$ emits 3 α-particles, two β^- particles and four β^+ particles then mass number and atomic number of product nucleus is

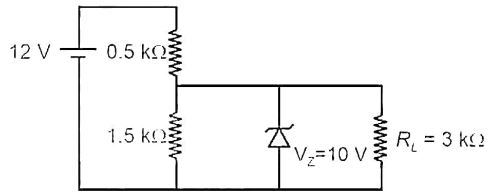
(1) 230, 82 (2) 228, 84
(3) 228, 86 (4) 228, 82

29. In the circuit, diode D_1 is ideal and D_2 has resistance 2 Ω in forward biasing. The reading of ammeter is



(1) 3 A (2) $\frac{4}{3}$ A
(3) $\frac{5}{3}$ A (4) $\frac{8}{3}$ A

30. In the circuit shown below, the current through Zener diode is

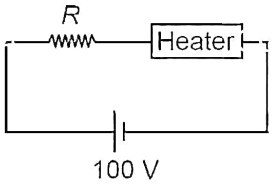


(1) 2 mA (2) 4 mA
(3) 6.66 mA (4) Zero

31. A cylindrical wire has a resistance of 81 Ω, it is melted and recasted into the same shape such that its area of cross-section become 3 times. The new resistance of the wire is

(1) 9 Ω (2) 81 Ω
(3) 729 Ω (4) 6 Ω

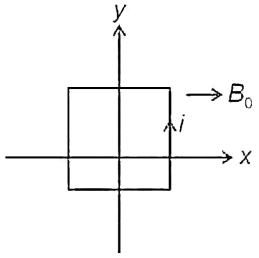
32. A heater rated for 1000 W at 100 V is used in the circuit having a 100 V supply as shown in the figure. If the heater operates at a power of 810 W, then the value of *R* is



(1) 2.3 Ω (2) 5.1 Ω
(3) 3.7 Ω (4) 1.1 Ω

Space for Rough Work

33. A current carrying square loop of side a is placed in a uniform magnetic field B_0, and loop as well as field lie in x-y plane as shown. If the loop carries a current i in the direction shown, then the torque acting on it will be



(1) $ia^2B_0\hat{i}$ (2) $ia^2B_0(-\hat{j})$

(3) $ia^2B_0\hat{i}$ (4) $ia^2B_0(-\hat{i})$

34. In the Ampere circuital law, which is given by $\oint \vec{B}.\vec{dl} = \mu_0 I_{enclosed}$, the magnetic field $\left(\vec{B}\right)$ is due to current elements lying

(1) Outside the loop only

(2) Inside the loop only

(3) Inside as well as outside the loop

(4) None of these

35. If I, H and χ represent intensity of magnetisation, magnetising field intensity and magnetic susceptibility, then the correct relation between them is

(1) $\chi = IH$ (2) $I = \chi H$

(3) $H = \chi I$ (4) $\chi^2 = IH$

SECTION-B

36. Among the following equations, which equation can't be correct dimensionally? (Symbols have their usual meaning)

(1) $s = ut + \frac{1}{2}at^2$

(2) $v^2 = u^2 + as$

(3) $F = \frac{mv^2}{r} + \frac{mv}{t}$

(4) $\frac{1}{2}mv^2 + \frac{F.d}{t} = 3ma.d$

37. In a series LCR circuit, the value of L is 0.4 H, the value of R is 50 Ω and C is 40 μF. The quality factor of the circuit is

(1) 2 (2) 4

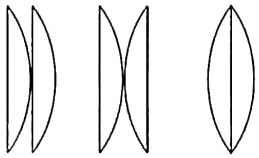
(3) 1 (4) 0.5

38. A coil of area 0.01 m^2 is kept inside a magnetic field which is normal to its plane. The magnetic field changes from 4 T to 2 T in 1 millisecond. If the resistance of the coil is 10 Ω, then amount of average power consumed by the coil is

(1) 10 W (2) 20 W

(3) 40 W (4) Zero

39. Given figures show the arrangements of two lenses, the radii of curvature of all the curved surfaces are same. The ratio of the equivalent focal length of combination A, B and C is



(1) 1 : 1 : 2 (2) 1 : –1 : 1

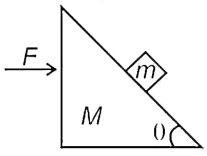
(3) –1 : 1 : 1 (4) 1 : 1 : 1

40. A thin mica sheet of thickness 2 μm and refractive index (μ = 2) is introduced in the path of the upper slit. The wavelength of the wave used is 4000 Å. The central bright maximum will shift

(1) 5 fringes upward (2) 4 fringes upward

(3) 5 fringes downward (4) 4 fringes downward

41. A block of mass m is in equilibrium relative to a smooth wedge of mass M which is pushed by a horizontal force F. The magnitude of pseudo force acting on mass m w.r.t. wedge is (Assume all the surfaces to be smooth)



(1) $\frac{M \times F}{M + m}$ (2) $\frac{m \times F}{M + m}$

(3) $\frac{mF}{M - m}$ (4) $\frac{MF}{M - m}$

Space for Rough Work

42. A charge q is placed on the line joining two charges Q and $4Q$. The system of three charges will be in equilibrium if q is equal to

(1) $\frac{-4Q}{9}$ (2) $\frac{4Q}{9}$

(3) $\frac{-9Q}{4}$ (4) $\frac{9Q}{4}$

43. A parallel plate air capacitor has capacity C, distance of separation between plates is d and potential difference V is applied between the plates. Force of attraction between the plates of the parallel plate air capacitor is

(1) $\frac{CV^2}{d}$ (2) $\frac{C^2V^2}{2d^2}$

(3) $\frac{C^2V^2}{2d}$ (4) $\frac{CV^2}{2d}$

44. Given the value of Rydberg constant is $10^7\ m^{-1}$, the wave number of the last line of the Paschen series in hydrogen spectrum will be

(1) $9 \times 10^{-7}\ m^{-1}$ (2) $1.11 \times 10^7\ m^{-1}$

(3) $1.11 \times 10^8\ m^{-1}$ (4) $1.11 \times 10^6\ m^{-1}$

45. A p-n junction photodiode is fabricated from a semiconductor with a band gap of 3.2 eV. It can detect a signal of wavelength

(1) 4000 Å (2) 3000 nm

(3) 4200 Å (4) 3000 Å

46. An asteroid of mass m is approaching Earth, initially at a distance $5R_E$ from the centre of Earth with speed v_i. It hits Earth with a speed v_f (R_E and M_E are radius and mass of Earth), then

(1) $v_f^2 = v_i^2 + \frac{2Gm}{R_E}\left(1+\frac{1}{5}\right)$

(2) $v_f^2 = v_i^2 + \frac{2GM_E}{R_E}\left(1+\frac{1}{5}\right)$

(3) $v_f^2 = v_i^2 + \frac{2GM_E}{R_E}\left(1-\frac{1}{5}\right)$

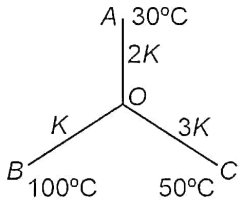
(4) $v_f^2 = v_i^2 + \frac{2Gm}{R_E}\left(1-\frac{1}{5}\right)$

47. A 3 m long ladder of mass 20 kg leans on a frictionless wall. Its feet rests on the floor 1 m from the wall. The normal forces of the wall and the floor will be nearly

(1) 35 N and 200 N (2) 30 N and 180 N

(3) 25 N and 200 N (4) 45 N and 160 N

48. The figure shows three rods of same dimensions but different thermal conductivities. The system is in steady state of conduction then the temperature of the junction O is



(1) $\frac{50}{4}$ °C (2) $\frac{40}{3}$ °C

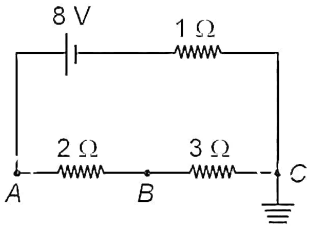
(3) $\frac{210}{3}$ °C (4) $\frac{155}{3}$ °C

49. Two rain drops with mass ratio 3 : 4 are falling down. If terminal velocity of smaller drop is v, then the terminal velocity of bigger drop is

(1) $\left(\frac{2}{3}\right)^{1/3} v$ (2) $\sqrt{3}v$

(3) $\left(\frac{4}{3}\right)^{2/3} v$ (4) v

50. In the given figure, point C is earthed. The potential of point A is



(1) $\frac{10}{3}$ V (2) 8 V

(3) $\frac{20}{3}$ V (4) 9 V

Space for Rough Work

CHEMISTRY

SECTION-A

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

Assertion (A) : Molar conductivity increases with decrease in concentration.

Reason (R) : On dilution the total volume of solution containing one mole of electrolyte decreases.

In the light of above statements choose the correct option

(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

52. Which of the following is an incorrect match?

(1) Cl_2O_7 : Acidic oxide

(2) Al_2O_3 : Amphoteric oxide

(3) Na_2O : Basic oxide

(4) NO : Acidic oxide

53. Given below are two statements.

Statement I: Covalency of Al in $[AlCl(H_2O)_5]^{2+}$ and of B in $[BF_4]^-$ is 6 and 4 respectively.

Statement II: Carbon displays greater ability to form $p\pi-p\pi$ multiple bonds to itself in its group.

In the light of above statements choose the correct option.

(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

54. Consider the reaction

$2NOBr(g) \rightleftharpoons 2NO(g) + Br_2(g)$

If partial pressure of NO is $\frac{2}{5}$ of total pressure (P) at equilibrium then K_p for the reaction is

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

(3) $\frac{P}{5}$ (4) $\frac{2P}{5}$

55. Select the correct statement for the following equilibrium.

$$A(s) + \frac{1}{2}B_2(g) \rightleftharpoons AB(s)$$

(1) On removing $B_2(g)$, reaction goes in forward direction

(2) On removing A(s), reaction goes in backward direction

(3) On removing AB(s), equilibrium remains unchanged

(4) On increasing pressure, reaction goes in backward direction

56. Consider the following statements

(a) The half cell reaction taking place at the anode of Daniell cell is $Zn \rightarrow Zn^{2+} + 2e^-$

(b) Salt bridge provides an electric contact between the two solutions without allowing them to mix with each other

(c) By convention, a negative $E^{\ominus}$ value means that the redox couple is weaker reducing agent than the H^+/H_2 couple

Choose the incorrect statement(s).

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

(3) (a) only (4) (c) only

Space for Rough Work

57. Match the column-I of the species with an underlined element with column-II containing oxidation state.

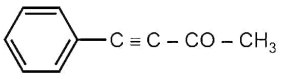
	Column-I (Species)		Column-II (Oxidation state)
a.	$\underline{Mn}O_4^-$	(i)	+3
b.	$\underline{Cr}O_5$	(ii)	+5
c.	$\underline{Cl}O_2^-$	(iii)	+6
d.	$H\underline{N}O_3$	(iv)	+7

Choose the correct option.

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

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

58. The total number of sp^2 hybridised carbon and π bonds respectively in the given compound are



(1) 6 and 7 (2) 8 and 7

(3) 7 and 6 (4) 7 and 5

59. Match the following columns and choose the correct option.

	Column-I		Column-II
a.	$[Fe(SCN)]^{2+}$	(i)	Black
b.	AgI	(ii)	Blood red
c.	$Na_4[Fe(CN)_5NOS]$	(iii)	Yellow
d.	Ag_2S	(iv)	Violet

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

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

60. Which of the given order of group 14 elements is incorrect with respect to the property indicated against it?

(1) Sn > Ge > Si > C (Covalent Radii)

(2) C > Si > Ge > Sn (First ionisation enthalpy)

(3) C > Si > Ge ≈ Sn (Electronegativity)

(4) C > Si > Ge > Sn (Melting point)

61. Consider the following statements:

Statement (I): Aromatic amines are weaker bases than ammonia due to electron donating nature of the aryl group.

Statement (II) : Tertiary amines do not have intermolecular hydrogen bonding due to absence of hydrogen atom for hydrogen bond formation.

Choose the correct option.

(1) Both Statement I and Statement II are false

(2) Statement I is true but Statement II is false

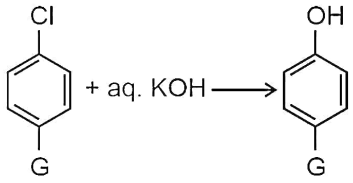
(3) Statement I is false but Statement II is true

(4) Both Statement I and Statement II are true

62. Which among the following alkane cannot be prepared by Wurtz reaction?

(1) C_4H_{10} (2) C_6H_{14}

(3) C_2H_6 (4) CH_4

63. 

For which of the following group G, above reaction will be the slowest?

(1) $-NO_2$ (2) $-CH_3$

(3) –H (4) –OH

64. The pair of metal ions that can give a spin only magnetic moment of 4.8 BM for the complex $[M(H_2O)_6]Cl_2$ is (where M is the central metal atom)

(1) Cr^{2+}, Mn^{2+} (2) V^{2+}, Fe^{3+}

(3) Cr^{2+}, Fe^{2+} (4) Co^{2+}, Mn^{2+}

65. Consider the following statements.

(I) 1 g of N_2 and 1 g of H_2 contain same number of atoms.

(II) Mass percentage of oxygen in H_2O molecule is 88.89%.

(III) Molality is temperature independent concentration term.

Correct statements among the following are

(1) (I) and (II) only (2) (II) and (III) only

(3) (I) and (III) only (4) (I), (II) and (III)

Space for Rough Work

66. An organic compound containing C, H and Cl gave following analysis, C = 24.27%, H = 4.07%, Cl = 71.65%. Its empirical formula would be
(1) CH_2Cl_2 (2) $CHCl_2$
(3) CHCl (4) CH_2Cl

67. In the Kjeldahl's method for estimation of nitrogen present in a soil sample, ammonia evolved from 1.23 g of sample neutralized 20 mL of 1 M H_2SO_4. The percentage of nitrogen in the soil is
(1) 37.33 (2) 40.33
(3) 35.33 (4) 45.52

68. Which among the following will be reduced by $NaBH_4$?
(1) CH_3COOH (2) CH_3CONH_2
(3) $CH_3COOC_2H_5$ (4) CH_3COCl

69. Activation energy of a reaction for which rate constant at 300 K is K s^{-1} and at 310 K is 2K s^{-1} will be nearly
(1) 106.84 kJ (2) 53.59 kJ
(3) 26.71 kJ (4) 70.4 kJ

70. Mohr's salt is
(1) $FeSO_4 \cdot (NH_4)_2SO_4 \cdot 6H_2O$
(2) $Fe_2(SO_4)_3 \cdot (NH_4)_2SO_4 \cdot 24H_2O$
(3) $FeSO_4 \cdot (NH_4)_2SO_4 \cdot 24H_2O$
(4) $FeSO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$

71. Given below are two statements one is labelled as assertion (A) and the other is labelled as reason (R).

Assertion (A): Preparation of acetanilide from aniline is done in presence of strong base.

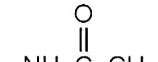
Reason (R): Bases stronger than amines can remove HCl formed to shift equilibrium forward.

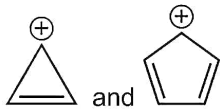
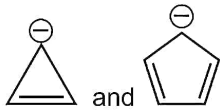
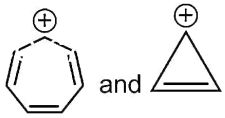
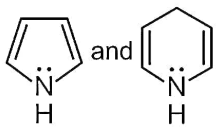
In the light of the above statements, choose the **correct** answer from the options given below.
(1) Both **(A)** and **(R)** are true but **(R)** is **NOT** the correct explanation of **(A)**
(2) **(A)** is true but **(R)** is false
(3) **(A)** is false but **(R)** is true
(4) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**

72. Phenol and cyclohexanol can be chemically distinguished by
(1) Na (2) $NaHCO_3$
(3) Br_2/Water (4) HCl

73. Consider the following statements.
(a) In DNA molecule adenine forms hydrogen bonds with thymine.
(b) DNA is the chemical basis of heredity
(c) DNA contains adenine, guanine, cytosine and uracil

The correct statements are
(1) (a) and (b) only
(2) (b) and (c) only
(3) (a), (b) and (c)
(4) (a) and (c) only

74. Which among the following is meta-directing group when attached with benzene?
(1)  (2) –CN
(3) $-CH_3$ (4) $-OCH_3$

75. The pair of aromatic species among the following is
(1) 
(2) 
(3) 
(4) 

Space for Rough Work

76. Consider the following reaction sequence

$$CH_3-CH=CH_2 \xrightarrow{H_3O^+} A\ (Major) \xrightarrow{CrO_3} B\ (Major)$$

Incorrect statement about B is

(1) It gives aldol condensation reaction

(2) It gives coloured precipitate on reaction with 2, 4-DNP

(3) It gives positive Iodoform test

(4) It gives silver mirror test on reaction with Tollens' reagent

77. What is mole fraction of solute in 1.00 m aqueous solution?

(1) 0.0354 (2) 0.0177

(3) 0.177 (4) 1.770

78. Osmotic pressure of solution containing 0.6 g urea and 3.42 g sugar in 100 ml water at 27°C is

(1) 492 atm (2) 4.92 atm

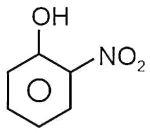
(3) 0.492 atm (4) 49.2 atm

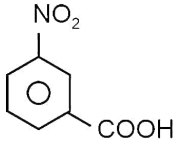
79. In an octahedral structure, the pair of *d*-orbitals involved in sp^3d^2 hybridisation is

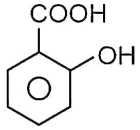
(1) $d_{x^2-y^2}$, d_{z^2} (2) d_{xz}, $d_{x^2-y^2}$

(3) d_{z^2}, d_{xz} (4) d_{xy}, d_{yz}

80. Intramolecular H-bonding is shown by

(i) 

(ii) 

(iii) 

Choose the correct option.

(1) Only (i) (2) Both (ii) and (iii)

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

81. The de Broglie wavelength of the electron in the second orbit of Li^{2+} ion is (Given Bohr radius, a_0 = 52.9 pm)

(1) 105.8 π pm

(2) 70.5 π pm

(3) 52.9 π pm

(4) 35.3 π pm

82. Given below are two statements:

Statement I: At elevated temperatures (~1000 K), S_2 is the dominant allotropic form.

Statement II: S_2 and O_2 have different magnetic behaviours.

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

83. Which of the following has -P-O-P- linkage?

(1) $H_4P_2O_5$

(2) $H_4P_2O_6$

(3) $H_4P_2O_7$

(4) Both (1) and (3)

84. Identify the correct statement from the following.

(1) Heat is an intensive property

(2) Work done is positive during expansion of a gas

(3) Internal energy decreases during adiabatic expansion of a gas

(4) ΔG is zero for isothermal expansion

Space for Rough Work

85. Given below are two statements one is labelled as assertion (A) and the other is labelled as reason (R).

Assertion (A): Zn^{2+} is paramagnetic ion.

Reason (R): Zn^{2+} contains no unpaired electrons.

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

(1) **(A)** is correct but **(R)** is incorrect

(2) **(A)** is incorrect but **(R)** is correct

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

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

SECTION-B

86. If the largest wavelength of Lyman series of H atom is x, then the wavelength of the second line of Balmer series of H atom will be

(1) $\frac{5x}{36}$ (2) 4x

(3) $\frac{9x}{5}$ (4) x

87. Consider the following statements regarding interhalogen compounds.

(a) The interhalogen compounds are covalent molecules and are diamagnetic in nature.

(b) ClF is a volatile solid at 298 K.

(c) X–X' bond in interhalogens is stronger than F–F bond.

The correct statements are

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

(3) (a) and (c) only (4) (b) and (c) only

88. Calculate the amount of heat evolved when 500 cm^3 of 0.5 M H_2SO_4 is mixed with 500 cm^3 of 0.2 M NaOH solution.

(1) 57.1 kJ (2) 4 × 5.71 kJ

(3) 2 × 57.1 kJ (4) 5.71 kJ

89. The electronic configuration of Gd (Atomic number = 64) and Tb (Atomic number = 65) are

(1) $[Xe]4f^6 6s^2$ and $[Xe]4f^7 6s^2$

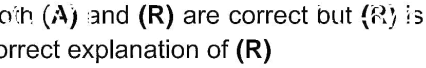
(2) $[Xe]4f^{10} 6s^2$ and $[Xe]4f^{11} 6s^2$

(3) $[Xe]4f^7 5d^1 6s^2$ and $[Xe]4f^9 6s^2$

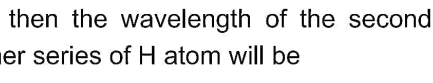
(4) $[Xe]4f^9 6s^2$ and $[Xe]4f^{10} 6s^2$

90. In the following sequence of reaction, the major product C is

$$CH_3CH_2I \xrightarrow{NaCN} A \xrightarrow[\text{Partial hydrolysis}]{OH^- / H_2O} B \xrightarrow{Br_2/NaOH} \underset{\text{(Major)}}{C}$$

(1) 

(2) $CH_3 - CH_2 - CH_2 - NH_2$

(3) 

(4) $CH_3CH_2NH_2$

91. Which among the following match is incorrect?

	Coordination compound	IUPAC name
(1)	$[CoCl_2(en)_2]Cl$	Dichloridobis(ethane-1, 2-diamine)cobalt(III) chloride
(2)	$[Ni(CO)_4]$	Tetracarbonylnickel(0)
(3)	$Hg[Co(SCN)_4]$	Mercury (I) tetrathiocyanatocobalt (III)
(4)	$K_3[Cr(C_2O_4)_3]$	Potassium trioxalatochromate(III)

92. 8 g NaOH is mixed with 7.3 g HCl to prepare 5 litre aqueous solution. The resulting solution will have pH equal to [Assume T = 298 K]

(1) 3 (2) 5

(3) 7 (4) 9

Space for Rough Work

93. The product obtained at anode and cathode when aqueous solution of NaCl is electrolysed using Pt electrodes respectively are

(1) H_2, O_2 (2) Cl_2, Na

(3) O_2, H_2 (4) Cl_2, H_2

94. Given below are two statements.

Statement I: K_{a_2} of maleic acid is less than K_{a_2} of fumaric acid.

Statement II: Fumaric acid exhibit intramolecular hydrogen bonding after removal of first hydrogen.

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

(1) Both the statements I and II are correct

(2) Both the statements I and II are incorrect

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

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

95. If half-life of zero order reaction is 20 min then $t_{75\%}$ for same reaction will be

(1) 30 min (2) 40 min

(3) 35 min (4) 25 min

96. Hybridisation of C in $^{\ominus}CH_3$ and $\dot{C}H_3$ is

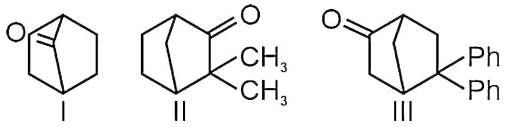
(1) sp^3 and sp^2 respectively

(2) sp^3 and sp^3 respectively

(3) sp^2 and sp^2 respectively

(4) sp and sp^2 respectively

97. Which of the given molecules will not exhibit tautomerism?



I II III

(1) I and III only

(2) I only

(3) I and II only

(4) I, II and III

98. Correct order of boiling point of the given compounds is

CH_3CH_2OH (i) $CH_3CH_2CH_3$ (ii) CH_3-O-CH_3 (iii)

(1) (i) > (iii) > (ii)

(2) (iii) > (i) > (ii)

(3) (ii) > (iii) > (i)

(4) (i) > (ii) > (iii)

99. The most acidic compound among the following is

(1) 

(2) 

(3) 

(4) 

100. Consider the following statements.

(a) Cellulose is composed of α-D-glucose units.

(b) Glycogen is called animal starch and its structure is similar to amylopectin.

(c) Cellulose is a predominant constituent of cell wall of plant cells.

The correct statements are

(1) (a) and (b) only

(2) (b) and (c) only

(3) (a), (b) and (c)

(4) (a) and (c) only

Space for Rough Work

93. The product obtained at anode and cathode when aqueous solution of NaCl is electrolysed using Pt electrodes respectively are

(1) H_2, O_2 (2) Cl_2, Na

(3) O_2, H_2 (4) Cl_2, H_2

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Statement I: K_{a_2} of maleic acid is less than K_{a_2} of fumaric acid.

Statement II: Fumaric acid exhibit intramolecular hydrogen bonding after removal of first hydrogen.

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

(1) Both the statements I and II are correct

(2) Both the statements I and II are incorrect

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

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

95. If half-life of zero order reaction is 20 min then $t_{75\%}$ for same reaction will be

(1) 30 min (2) 40 min

(3) 35 min (4) 25 min

96. Hybridisation of C in $^{\ominus}CH_3$ and CH_3 is

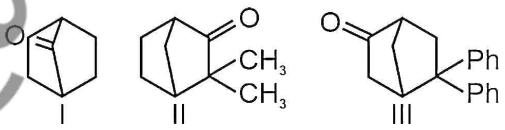
(1) sp^3 and sp^2 respectively

(2) sp^3 and sp^3 respectively

(3) sp^2 and sp^2 respectively

(4) sp and sp^2 respectively

97. Which of the given molecules will not exhibit tautomerism?



I II III

(1) I and III only

(2) I only

(3) I and II only

(4) I, II and III

98. Correct order of boiling point of the given compounds is

CH_3CH_2OH (i) $CH_3CH_2CH_3$ (ii) CH_3-O-CH_3 (iii)

(1) (i) > (iii) > (ii)

(2) (iii) > (i) > (ii)

(3) (ii) > (iii) > (i)

(4) (i) > (ii) > (iii)

99. The most acidic compound among the following is

(1) 

(2) 

(3) 

(4) 

100. Consider the following statements.

(a) Cellulose is composed of α-D-glucose units.

(b) Glycogen is called animal starch and its structure is similar to amylopectin.

(c) Cellulose is a predominant constituent of cell wall of plant cells.

The correct statements are

(1) (a) and (b) only

(2) (b) and (c) only

(3) (a), (b) and (c)

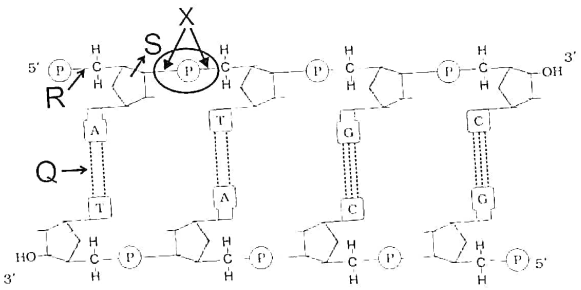
(4) (a) and (c) only

Space for Rough Work

BOTANY

SECTION-A

101. Which of the following option is true w.r.t the given structure?



(1) Q confers the stability to the helical structure

(2) X is formed in individual nucleotides

(3) R forms the attachment between OH of 3′C to phosphate group

(4) S is a homocyclic ring of a carbon atoms

102. Which of the following is **not** the application of DNA fingerprinting?

(1) Determination of population and genetic diversity

(2) Identification of molecular structure of DNA

(3) Paternity-maternity disputes

(4) Criminal identification and forensics

103. Read the following statements and select the **correct** option.

Statement A: RNA functions as adapter, structural and in some cases as a catalytic molecule.

Statement B: The DNA in nucleoid is organised in large loops held by proteins.

(1) Only statement A is correct

(2) Only statement B is correct

(3) Both the statements A and B are correct

(4) Both the statements A and B are incorrect

104. RNA polymerase

(1) Uses nucleotide triphosphates as substrate

(2) Works in template independent manner

(3) Is capable to facilitate the opening of the helix during transcription

(4) Binds to the operator region to initiate transcription

105. Which of the following statement is **incorrect** w.r.t. photochemical phase of photosynthesis?

(1) It includes formation of high energy chemical intermediates

(2) Antennae in photosystem has all the pigments except one molecule of chlorophyll *b*

(3) Reaction centre of PS II has absorption maxima at 680 nm

(4) The cyclic flow of electrons results only in the synthesis of ATP

106. Which of the following organisms was used by Calvin to propose that the first CO_2 fixation product was a 3-carbon organic acid?

(1) Algae (2) Angiosperms

(3) Bryophytes (4) Gymnosperms

107. Rough endoplasmic reticulum is involved in

(1) Lipid synthesis

(2) Steroidal hormone synthesis

(3) Protein synthesis and secretion

(4) Photosynthesis

108. Read the given assertion (A) and reason (R) and select the **correct** option.

Assertion (A): Concentration of ions and other materials is significantly higher in vacuole than in the cytoplasm.

Reason (R): In plants, the tonoplast facilitates the transport of a number of ions and other materials against concentration gradients into the vacuole.

(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 statement but (R) is false

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

Space for Rough Work

109. Which of the following organelle digests the old organelles that are no longer useful to the cells?
(1) Lysosomes (2) Ribosomes
(3) Mitochondria (4) Chromatin

110. The phases in which new DNA molecules formed are not distinct but intertwined are
(1) G_1 and S phases (2) G_1 and G_2 phases
(3) S and G_2 phases (4) G_1 and G_0 phases

111. Which of the following process is **not** associated with first stage of karyokinesis of mitosis?
(1) Formation of mitotic apparatus
(2) Formation of compact mitotic chromosomes
(3) Untangling of chromosomal material
(4) Movement of chromatids to opposite poles

112. The phase of the cell cycle in which a major reorganisation of virtually all components of the cell occurs is
(1) Interphase (2) M phase
(3) G_2 phase (4) S phase

113. Which of the following is absent in gymnosperms?
(1) Sieve tubes (2) Sieve cells
(3) Albuminous cells (4) Tracheids

114. Select the **correctly** matched pair.
(1) Cork cambium – Forms phellem on its inner side
(2) Heartwood – Conduct water
(3) Annual rings – Give an estimate of the age of tree
(4) Lenticels – Does not permit exchange of gases

115. Cells of meristematic phase have
(a) Large conspicuous nuclei
(b) Cell walls which are secondary in nature
(c) Rich protoplasm with increased vacuolation
(d) Insufficient plasmodesmatal connections
Select the **correct** one(s).
(1) (a), (c) only (2) (a), (b), (d) only
(3) (a) only (4) All (a), (b), (c), (d)

116. Which of the following represents the basal part of ovule, present opposite to the micropylar end?
(1) Chalaza (2) Integuments
(3) Nucellus (4) Funicle

117. Select the **correct** features of *Vallisneria*
(i) Long stalk in female flowers
(ii) Always grow in marine water
(iii) Pollen grains are released deep inside water
(iv) Pollen grains are carried passively by water currents
(1) (i) and (iv) only (2) (i) and (iii) only
(3) (ii) and (iv) only (4) (ii) and (iii) only

118. Choose the **incorrect** statement.
(1) Each species has some distinct morphological differences than other closely related species
(2) The organisms of a particular species freely interbreed among themselves
(3) Each genus may have one or more than one specific epithets representing different organisms
(4) The first part of biological name consists of specific epithet

119. Which of the given protozoans have gullet that opens to the outside of the cell surface?
(1) *Entamoeba* (2) *Trypanosoma*
(3) *Paramoecium* (4) *Plasmodium*

120. Read the following statements w.r.t. Kingdom fungi.
a. Most fungi are holophytic and absorb insoluble organic matter from dead substrates.
b. Asexual reproduction is by spores called conidia or sporangiospores or zoospores.
c. With the exception of yeasts which are unicellular, fungi are filamentous.
d. Some hyphae are continuous tubes filled with multinucleated cytoplasm, these are called coenocytic hyphae.
Select the **correct** option.
(1) Only a and b are correct
(2) Only b, c and d are correct
(3) Only b and c are incorrect
(4) Only a, c and d are correct

Space for Rough Work

121. In some plants such as (A) growing in swampy areas, many roots comes out of the ground and grow vertically upwards. Such roots are called (B).

Select the **correct** option to fill (A) and (B).

	A	B
(1)	*Alstonia*	Adventitious roots
(2)	Banyan	Prop roots
(3)	*Rhizophora*	Pneumatophores
(4)	*Colocasia*	Tap roots

122. Mark the following statements as true **(T)** or false **(F)** and select the **correct** option.

A. Stem tendrils which develop from axillary buds, are slender and spirally coiled and help plants to climb.

B. In banana, pineapple and *Chrysanthemum*, the lateral branches originate from the basal and underground portion of the main stem, grow to some distance beneath the soil and then emerges out obliquely upward.

C. In parietal placentation, the ovules are borne on central axis and septa are absent.

D. Ray florets of sunflower have inferior ovary

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

123. Which of the following is **mismatched** pair?

(1) *Helianthus annus* – Asteraceae
(2) *Cynodon dactylon* – Solanaceae
(3) *Asparagus* – Liliaceae
(4) *Trifolium* – Fabaceae

124. Select the **mismatched** pair.

(1) Algin – hydrocolloids
(2) Pyrenoids – contain protein besides starch
(3) Floridean starch – *Gelidium*
(4) *Fucus* – Haplontic life cycle

125. Read the following statements.

a. Plants can live in soil but are dependent on water for sexual reproduction.

b. Sporophyte is not free living.

c. Male sex organs are present on archegoniophore.

d. They are the first terrestrial plants to possess vascular tissue.

How many of the above statements is/are **correct** regarding bryophytes?

(1) One (2) Two
(3) Three (4) Four

126. Dragonflies are used to control

(1) Aphids (2) Mosquitoes
(3) Butterfly caterpillars (4) Bacteria

127. A stage of suspended development is shown by zooplankton species to pass through unfavourable conditions. It is called

(1) Migration (2) Diapause
(3) Hibernation (4) Homeostasis

128. The pioneer species in a hydrarch succession are

(1) Phytoplanktons
(2) *Vallisneria*
(3) Lichens
(4) Free-floating angiosperms

129. Ubiquinone receives the reducing equivalents via

(1) Cytochrome c_1 (2) Cytochrome *a*
(3) $FADH_2$ (4) Copper centre

130. Who mapped the position of genes on the chromosome by using the frequency of recombination between them?

(1) Alec Jeffreys (2) Henking
(3) T.H. Morgan (4) Alfred Sturtevant

Space for Rough Work

121. In some plants such as (A) growing in swampy areas, many roots comes out of the ground and grow vertically upwards. Such roots are called (B).

Select the **correct** option to fill (A) and (B).

	A	B
(1)	*Alstonia*	Adventitious roots
(2)	Banyan	Prop roots
(3)	*Rhizophora*	Pneumatophores
(4)	*Colocasia*	Tap roots

122. Mark the following statements as true **(T)** or false **(F)** and select the **correct** option.

A. Stem tendrils which develop from axillary buds, are slender and spirally coiled and help plants to climb.

B. In banana, pineapple and *Chrysanthemum*, the lateral branches originate from the basal and underground portion of the main stem, grow to some distance beneath the soil and then emerges out obliquely upward.

C. In parietal placentation, the ovules are borne on central axis and septa are absent.

D. Ray florets of sunflower have inferior ovary

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

123. Which of the following is **mismatched** pair?

(1) *Helianthus annuus* – Asteraceae
(2) *Cynodon dactylon* – Solanaceae
(3) *Asparagus* – Liliaceae
(4) *Trifolium* – Fabaceae

124. Select the **mismatched** pair.

(1) Algin – hydrocolloids
(2) Pyrenoids – contain protein besides starch
(3) Floridean starch – *Gelidium*
(4) *Fucus* – Haplontic life cycle

125. Read the following statements.

a. Plants can live in soil but are dependent on water for sexual reproduction.

b. Sporophyte is not free living.

c. Male sex organs are present on archegoniophore.

d. They are the first terrestrial plants to possess vascular tissue.

How many of the above statements is/are **correct** regarding bryophytes?

(1) One (2) Two
(3) Three (4) Four

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Space for Rough Work

131. Choose the **incorrect** statement for male honey bee.
(1) It produce sperms by meiosis
(2) They have half the number of chromosome than that of female
(3) They develop by means of parthenogenesis
(4) They have grandfather and can have grandsons

132. Gregor Mendel conducted hybridisation experiments on garden pea within the span of
(1) 1850 – 1857 (2) 1863 – 1870
(3) 1849 – 1856 (4) 1856 – 1863

133. Select the **incorrect** match.

(1)	Co-extinction	–	Coevolved plant and pollinator
(2)	Over-exploitation	–	Extinction of passenger pigeon
(3)	Sixth mass extinction	–	Purely non-anthropogenic
(4)	*Ex-situ* conservation	–	Zoological Park

134. Turner's syndrome
(1) Caused due to trisomy of sex chromosome
(2) Inflicted individuals are sterile
(3) Individual have 44 + XXY chromosome compliment
(4) Arise due to the formation of n + 1 male or female gamete by non-disjunction and the subsequent fertilisation by a normal gamete

135. Khasi and Jaintia hills are found in
(1) Meghalaya
(2) Rajasthan
(3) Madhya Pradesh
(4) Karnataka

SECTION-B

136. Semiconservative nature of polymerisation is evident during
(1) Reverse transcription
(2) Transcription
(3) Translation
(4) Replication

137. All of the following are the components of transcription unit, **except**
(1) Promoter (2) Structural gene
(3) Terminator (4) Repressor

138. Bacterium flagellum is composed of all, **except**
(1) Filament (2) Hook
(3) Tubulin (4) Basal body

139. The complete disintegration of the nuclear envelope marks the start of the phase in which
(1) Chromosomes move to spindle equator
(2) Chromosomes identity is lost as discrete elements
(3) Cell plate formation occurs
(4) Centromere splitting takes place

140. Select the **incorrect** statements.
a. In dicot root, sclerenchymatous cells which lie between xylem and phloem called as conjunctive tissue.
b. Conjoint open vascular bundles do not have the capability to form secondary tissues.
c. Simple tissues have cells similar in structure and function.
d. In exarch condition, protoxylem lies towards the centre and metaxylem towards periphery.
(1) a, b and d only (2) a and b only
(3) b, c and d only (4) a and d only

Space for Rough Work

141. Which of the following plant hormone helps leaves/upper parts of deep water rice plants to remain above water?
(1) Cytokinin (2) Ethylene
(3) Abscisic acid (4) Gibberellins

142. In the light of given statements, choose the **correct** option.

Statement I: The portion of embryonal axis below the level of cotyledons is epicotyl.

Statement II: Embryo develops at the micropylar end of the embryo sac where zygote is situated.

(1) Only statement I is correct
(2) Only statement II is correct
(3) Both statements are correct
(4) Both statements are incorrect

143. Which of the following statements is **incorrect** w.r.t. viruses?
(1) A virus is a nucleoprotein
(2) Plant viruses generally have dsRNA as genetic material
(3) Animal viruses have genetic material
(4) No virus contains both RNA and DNA

144. Among flowers of *Calotropis*, Tulip, *Sesbania*, *Asparagus*, *Gloriosa*, Tobacco and lady's finger, how many plants have valvate aestivation of corolla or perianth?
(1) Six (2) Five
(3) Four (4) Three

145. Angiosperm does **not** show the presence of
(1) Three-celled egg apparatus
(2) Triploid endosperm
(3) Archegonia
(4) Antipodal cells in female gametophyte

146. Which of the following is not a fungal product?
(1) Cyclosporin A (2) Statins
(3) Streptokinase (4) Citric acid

147. Which of the following are **not** an example of ectoparasites?
(1) Cuscuta on hedge plant
(2) Lice on human
(3) Ticks on dogs
(4) Cuckoo and crow

148. All are example of anthropogenic ecosystem **except**
(1) Crop field
(2) Garden
(3) Aquarium
(4) Desert

149. Select the **incorrect** match.
(1) ATP synthase – Consist of two components
(2) Succinate dehydrogenase enzyme – Found on inner mitochondrial membrane
(3) Pyruvate dehydrogenase – Require Mn^{2+} and NADPH as cofactor
(4) Cytochrome *c* – Act as a mobile carrier

150. Read the following statements and choose the **incorrect** one(s) and select the correct option.
i. Haemophilia occur due to presence of defective form of blood clotting factor.
ii. Phenylketonuria inflicted individual lacks the enzyme that convert amino acid tyrosine into phenylalanine.
iii. Thalassemia is a sex-linked recessive trait.
iv. α-thalassemia involves the gene HBA1 and HBA2.
v. β-thalassemia is due to mutation in the HBB gene on chromosome 11.
(1) iii, iv and v only
(2) iii and iv only
(3) i, ii and iii only
(4) ii and iii only

Space for Rough Work

ZOOLOGY

SECTION - A

151. Which of the following systems provide chemical integration through intercellular messengers?
(1) Neural system only
(2) Endocrine system
(3) Sensory system only
(4) Cardiovascular system

152. The axons do not transmit nerve impulses away from the cell body to
(1) A synapse
(2) A neuro-muscular junction
(3) Synaptic knobs at axon terminals
(4) Dendrite of the same cell

153. Which part of human sperm possesses mitochondria?
(1) Acrosome (2) Head
(3) Middle piece (4) Tail

154. Zona pellucida in a human female is formed by
(1) Luteal cells (2) Granulosa cells
(3) Primary oocyte (4) Secondary oocyte

155. The primary oocytes get arrested in prophase-I of meiotic division when it is
(1) Not surrounded by a layer of granulosa cells
(2) Present within secondary follicle
(3) Present within tertiary follicle
(4) Surrounded by many layers of granulosa cells

156. Select the **odd** one w.r.t. carcinogens.
(1) X-rays
(2) Viral oncogenes
(3) Tobacco smoke
(4) α-interferons

157. To cope with mental illnesses like depression, all of the following drugs are used as a medicine, **except**
(1) Barbiturates
(2) Morphine
(3) Amphetamines
(4) Benzodiazepines

158. All of the following are sense organs of a frog, **except**
(1) Sensory papillae
(2) Nasal epithelium
(3) Eyes
(4) External ear

159. The main function of cilia present on the free surface of columnar or cuboidal cells is
(1) To increase the surface area for absorption
(2) To provide protection against chemical and mechanical stress
(3) To facilitate movement of particles in a specific direction
(4) To help in absorption of molecules and phagocytosis

160. Tendons and ligaments are examples of a tissue in which the cells secrete modified polysaccharides that accumulate between cells and fibres and act as matrix. The tissue is
(1) Epithelial tissue
(2) Muscle tissue
(3) Connective tissue
(4) Neural tissue

Space for Rough Work

161. Bio-pesticides have been created by cloning Bt toxin gene from the bacteria and their expression in plants provide____ to insects.

Select the option which **correctly** fills the blank.

(1) Compliance

(2) Resistance

(3) Acceptance

(4) Stability

162. Select the **odd** one w.r.t. pest resistant plants.

(1) Bt potato (2) Bt soyabean

(3) Bt corn (4) Golden rice

163. Which of the following biomolecules come under the category of acid-insoluble pool but they are not strictly macromolecules?

(1) Monosaccharides

(2) Proteins

(3) Lipids

(4) Amino acids

164. _____is the substrate concentration at which velocity of the reaction reaches half of the maximum velocity.

Select the **correct** option to fill in the blank.

(1) K_m (2) $K_m/2$

(3) $K_m/4$ (4) $V_{max}/2$

165. Select the **incorrect** statement.

(1) Generally, enzymes get denatured at high temperature.

(2) Inorganic catalysts can only function within the 25-45°C range of temperature.

(3) Enzymes are in inactive state at low temperature.

(4) Enzymatic activity is maximum at its optimum pH and temperature.

166. Choose the hormone that is synthesized by neurosecretory cells present in a structure of brain but released by an endocrine gland found attached with the same structure by a stalk.

(1) Oxytocin

(2) Prolactin

(3) Growth hormone

(4) Thyroxine

167. Which of the following can receive blood from a person with blood group A?

(1) Individuals with antigen B on their RBCs

(2) Individuals with antigen A on their RBCs

(3) Individuals with only anti-A antibodies in their blood plasma

(4) Individuals with both anti-A and anti-B antibodies in their blood plasma

168. For obtaining a standard ECG, a patient is connected to the machine with three electrical leads. Which of the following represents the **correct** way of attachment of these leads?

(1) One to each ankle and to right wrist

(2) One to each ankle and to middle of chest

(3) One to each wrist and to left ankle

(4) One to each ankle and to left wrist

169. Which of the following involves removal of a small part of the fallopian tubes for contraception?

(1) Vasectomy

(2) Tubectomy

(3) IUDs

(4) Barriers

Space for Rough Work

170. Read the statements A and B carefully and select the **correct** option.

Statement A: Nearly 45 to 50 million MTPs are performed in a year in India.

Statement B: Total number of MTPs performed in a year all over the world accounts to $\frac{1}{8^{th}}$ of total number of conceived pregnancies in a year.

(1) Only statement B is correct

(2) Both statements A and B are incorrect

(3) Both statements A and B are correct

(4) Only statement A is correct

171. How many venereal diseases mentioned in the box given below are completely curable if detected early and treated properly?

Genital warts, Chlamydiasis, Genital herpes, Trichomoniasis, Syphilis

Select the **correct** option.

(1) Five (2) Three

(3) Four (4) Two

172. In humans, trachea divides into right and left primary bronchi at the level of

(1) 5^{th} thoracic vertebra (2) 5^{th} cervical vertebra

(3) 3^{rd} thoracic vertebra (4) 3^{rd} cervical vertebra

173. Select the **correct** option related to pneumotaxic centre.

(1) Moderate the functioning of respiratory rhythm centre

(2) Increase the duration of inspiration

(3) Does not affect the functional respiratory rate

(4) Has no connection with any regulatory centre present in medulla oblongata

174. Select the **odd** one w.r.t. ammonotelic animals.

(1) *Betta* (2) *Clarias*

(3) *Pterophyllum* (4) *Pristis*

175. The partial pressure of oxygen in systemic veins of a healthy human is equal to

(1) pCO_2 in systemic artery

(2) pO_2 in pulmonary vein

(3) pCO_2 in pulmonary artery

(4) pCO_2 in systemic vein

176. All of the following are different forms of locomotory movements, **except**

(1) Walking (2) Running

(3) Flying (4) Chewing

177. Choose the **incorrect** statement.

(1) The thin filaments are firmly attached to the 'Z' line.

(2) The thick filaments are held together in the middle of 'A' band by a thick non-fibrous membrane named 'M' line.

(3) Sarcomere is the functional unit of contraction.

(4) Each 'I' band is bisected by an elastic fibre called 'Z' line.

178. Select the **odd** one w.r.t. ancestors of mammals.

(1) Synapsids (2) Pelycosaurs

(3) Thecodonts (4) Therapsids

179. Consider the given features:

(a) Probably lived in East African grasslands

(b) Had cranial capacity less than *Homo habilis*

(c) Hunted with stone weapons but essentially ate fruit

On the basis of above features, choose the **correct** option.

(1) *Australopithecus* (2) *Homo erectus*

(3) Neanderthal man (4) *Dryopithecus*

Space for Rough Work

180. Embryological support for evolution was proposed by 'A' and this proposal was disapproved on careful study performed by 'B' .

Select the option that **correctly** identifies 'A' and 'B' respectively.

(1) Louis Pasteur, Hugo de Vries

(2) Karl Ernst von Baer, Hugo de Vries

(3) Ernst Heckel, Karl Ernst von Baer

(4) Hugo de Vries, Louis Pasteur

181. Select the set of organisms that belong to the same phylum.

(1) *Fasciola* and *Pheretima*

(2) *Wuchereria* and *Aplysia*

(3) *Ophiura* and *Dentalium*

(4) *Physalia* and *Gorgonia*

182. Choose the **incorrect** option w.r.t. a plasmid.

(1) It replicates autonomously.

(2) It can be used as a cloning vector.

(3) Its replication is dependent upon the genomic DNA of host.

(4) It is double stranded and circular in structure

183. In biotechnology, the elution process is associated with the

(1) Amplification of gene of interest

(2) Methods of transformation

(3) Extraction of DNA bands from the gel piece

(4) Techniques involved in downstream processing

184. Which among the following is the step of PCR in which the primers bind to their complementary sequence on the ssDNA templates?

(1) Denaturation (2) Annealing

(3) Primer extension (4) Polymerisation

185. **Assertion (A):** *Carcharodon* has to swim constantly to avoid sinking.

Reason (R): They lack swim bladder which regulates buoyancy.

In the light of above statements, select the most appropriate option.

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

SECTION - B

186. Which of the following neural systems transmit impulses from CNS to skeletal muscles?

(1) Sympathetic

(2) Parasympathetic

(3) Somatic

(4) Visceral

187. Match Column I and Column II w.r.t. humans.

	Column I		**Column II**
(a)	Gestation	(i)	Attachment of blastocyst to uterine wall
(b)	Implantation	(ii)	Embryonic development
(c)	Menarche	(iii)	Lasts for 3-5 days
(d)	Menstruation	(iv)	Begins at puberty

Choose the **correct** option.

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

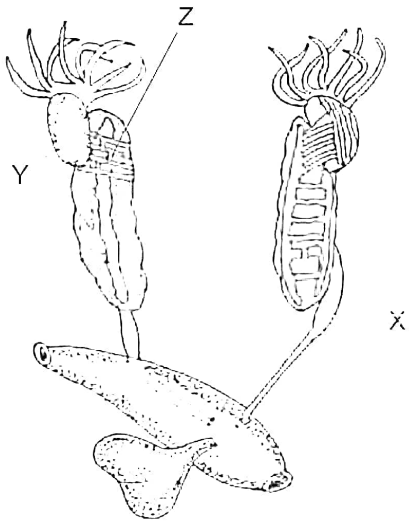
(2) (a) – (iv), (b) – (iii), (c) – (ii), (d) – (i)

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

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

Space for Rough Work

188. The given diagram shows the male reproductive system of a frog. Identify X, Y, Z and select the **correct** option.



	X	Y	Z
(1)	Ureter	Fat bodies	Kidney
(2)	Vasa efferentia	Adrenal gland	Kidney
(3)	Urinogenital duct	Testis	Vasa efferentia
(4)	Urinogenital duct	Fat bodies	Kidney

189. All of the given statements are correct, **except**

(1) Our mental state can affect our health.

(2) In AIDS, the virus infected cells can survive while viruses are being replicated and released in the blood of host.

(3) Metastasis is the most feared property of benign tumors.

(4) Addiction is a psychological attachment to certain effects of drugs such as euphoria.

190. Read the following statements carefully and choose the **correct** option.

Statement A: *Rana tigrina* is a monoecious vertebrate.

Statement B: A male cockroach can be distinguished from a female cockroach on the basis of presence of anal style.

Statement C: Spermatheca is present in the male cockroach.

(1) Statements A and B are correct

(2) Statements A and C are correct

(3) Statements B and C are correct

(4) Only statement B is not incorrect

191. Consider the given statements w.r.t. humans:

(a) Plasma constitutes nearly 55% of the blood.

(b) Plasma does not contain minerals.

(c) Clotting factors are present in plasma in their active form.

(d) 90-92% of plasma consists of proteins.

(e) Plasma with clotting factors is serum.

How many of them is/are **true** for plasma?

(1) Two

(2) One

(3) Three

(4) Five

192. Select the **incorrect** match.

(1)	Inulin	–	Polymer of amino acids
(2)	Substituted pyrimidine	–	Uracil
(3)	Collagen	–	Most abundant protein in animal world
(4)	DNA	–	Polymer of nucleotides

Space for Rough Work

193. Match the column I with column II and select the **correct** option.

	Column I		Column II
(a)	Thymosins	(i)	Synthetic effects on protein and carbohydrate metabolism
(b)	Insulin	(ii)	Suppresses the immune response
(c)	Cortisol	(iii)	Enhances the cellular glucose uptake and utilization
(d)	Androgens	(iv)	Differentiation of T-lymphocyte

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

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

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

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

194. Select the **incorrect** statement w.r.t. MTP (Amendment) Act, 2017.

(1) A pregnancy may be terminated on certain considered grounds within the first 12 weeks of pregnancy on the opinion of one registered medical practitioner.

(2) Opinion of two registered medical practitioners is required for termination of pregnancy, which lasted more than 12 weeks but fewer than 24 weeks.

(3) The MTP (Amendment) Act, 2017 was enacted by the Government of India with the intention of increasing the incidence of illegal abortion.

(4) "The continuation of the pregnancy would involve a risk to the life of the pregnant woman" is one of the required grounds for MTP.

195. Disarmed *Agrobacterium tumefaciens* is usually used as a cloning vector for the transformation of

(1) Plant cells

(2) Animal cells

(3) Fungal cells

(4) Nematode cells

196. A minute vessel of peritubular capillaries network runs parallel to the Henle's loop forming a 'U' shaped structure called

(1) Vasa recta

(2) Renal corpuscle

(3) Malpighian body

(4) Efferent arteriole

197. In a species, the colour of skin fur of animal 'X' ranges from white to black. 97% of the animals with skin fur of grey colour survive whereas 99% of the animals with white colour skin fur or black colour skin fur die. Which type of selection process is reflected in the above scenario?

(1) Disruptive selection

(2) Stabilising selection

(3) Cyclical selection

(4) Directional selection

198. Which of the following is the **correct** description w.r.t. normal skeleton of adult human?

(1) Each vertebra except sacrum has a central hollow portion through which the spinal cord passes.

(2) First vertebra is atlas and it articulates with the occipital condyles.

(3) Vertebral column is formed by 24 serially arranged units called vertebrae.

(4) Sphenoid and parietal bone of the skull are joined by cartilaginous joint.

Space for Rough Work

199. **Assertion (A):** Adult sea cucumber and sea anemone are radially symmetrical.

Reason (R): Any plane passing through the central axis of their body divides them into two identical halves.

In the light of above statements, select the **correct** option.

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

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

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

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

200. Select the **correct** option to complete the analogy.

Initial stage of the fermentation : Upstream processing : : _____ : Downstream processing

(1) Restriction digestion of cloning vector

(2) Ligation of an alien DNA with plasmid DNA

(3) Addition of preservatives to the product

(4) Isolation of desired DNA fragments

❑ ❑ ❑

Space for Rough Work