02/04/2024

CODE-A

Aakash
Medical | IIT-JEE | Foundations

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AIM – 720

CC-144 (*Advanced* INTENSIVE *Mastery for* 720) CC-144

MM : 720 **CST – I** **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 force of 10 N is applied on a body of mass 20 kg at rest at $t = 0$. The work done by the force in 3rd second is

   (1) 12.5 J

   (2) 7.5 J

   (3) 14 J

   (4) 20 J

2. A particle of mass 5 kg is moving in a circle of fixed radius 1 m under the influence of a force in such a way that its speed at time t is given by $v = \frac{1}{2}t^2$, where v is in m s^{-1} and t is in s. The power delivered by the force at $t = 2$ s is

   (1) 10 W

   (2) 20 W

   (3) 40 W

   (4) 60 W

3. In a series *LCR* circuit, the voltage in the circuit is leading the current. Now the capacitor got short circuited, while other circuit remains fully functional. Then phase difference between the current and voltage

   (1) Will increase

   (2) Will remain same

   (3) Will decrease

   (4) May increase or decrease

4. The energy stored in a coil having inductance L and resistance R is U. Now this coil is divided into four equal parts and connected in parallel to same source. The total energy stored in the combination becomes

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

(3) $\frac{U}{16}$ (4) $16U$

5. The work functions of calcium (Ca), molybdenum (Mo) and lead (Pb) are 3.20 eV, 4.17 eV and 4.25 eV respectively. If incident electromagnetic radiation has energy of 4.20 eV, which of these photosensitive surfaces may emit photoelectrons?

(1) Ca only

(2) Pb only

(3) Both Ca and Mo

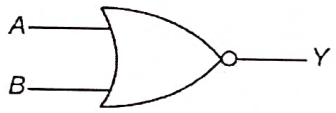
(4) All three Ca, Mo and Pb

6. A nucleus of mass number 35 splits into two nuclei having mass number 27 and 8. The ratio of radii of two daughter nuclei respectively is

(1) 27 : 8 (2) 1 : 1

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

7. 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	1
0	1	0
1	0	0
1	1	0

(3)

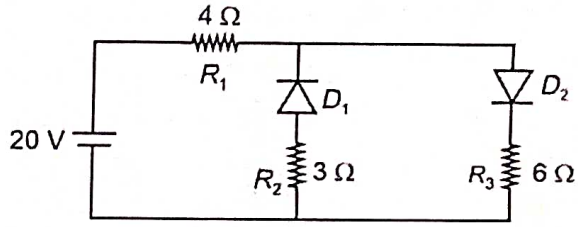
A	B	Y
0	0	1
0	1	1
1	0	0
1	1	0

(4)

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

8. The given circuit has two ideal diodes connected as shown in the figure given below.

The current flowing through the resistance R_3 will be



(1) 1 A (2) 2 A

(3) Zero (4) 4 A

9. The equation of a transverse wave is given by $y = 10 \sin\pi (0.01\, x - 2.00\, t)$ where y and x are in cm and t in second. The speed of the wave will be

(1) 100 cm/s (2) 200 cm/s

(3) 50 cm/s (4) 150 cm/s

10. A conducting sphere have charge q and radius R. The ratio of electric field intensity at $r = 2R$ to $r = 3R$ will be

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

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

11. A uniform electric field of 10 N/C exists along y axis in space. The potential difference ($V_B - V_A$) for the points A(3 m, 4 m) and B(6 m, 1 m) is

(1) 40 V (2) –20 V

(3) –10 V (4) 30 V

12. The equation of motion of a particle in SHM is $a + 4\pi^2 x = 0$ where 'a' is linear acceleration (in m/s^2) of the particle at displacement 'x' in metre. The time period of SHM in second is

(1) 2 (2) 1

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

13. A wheel of moment of inertia 10 kg m^2 is subjected to a torque of 20 N m. If it starts rotating from rest then its angular speed after 4 second will be

(1) 8 rad/s (2) 16 rad/s

(3) 4 rad/s (4) 2 rad/s

Space for Rough Work

14. Moment of inertia of a disc of mass 'M' and radius 'R' about an axis passing through one of its diameter is

(1) MR^2 (2) $\frac{MR^2}{2}$

(3) $\frac{MR^2}{4}$ (4) $\frac{3MR^2}{4}$

15. At what depth below earth's surface, weight of body becomes zero? (R = Radius of Earth)

(1) $\frac{R}{8}$ (2) $\frac{R}{4}$

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

16. Fractional decrease in the volume of a solid sphere subjected to a hydraulic pressure 10 MPa is 0.2%. The bulk modulus of sphere is

(1) 10 GPa (2) 5 GPa

(3) 20 GPa (4) 40 GPa

17. Which of the following pairs of physical quantities has different dimensional formula?

(1) Work and Kinetic energy

(2) Torque and Potential energy

(3) Force and Pressure

(4) Angular momentum and Planck's constant

18. An athlete completes one round of circular track of radius R in 20 seconds. The displacement of the athlete at the end of 2 min 20 second is

(1) $2\pi R$ (2) πR

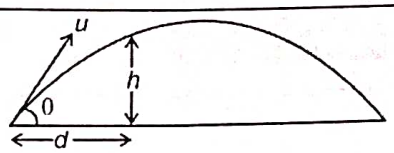
(3) Zero (4) $7\pi R$

19. The motion of a body is given by the equation $\frac{dv}{dt} = 6 - 3v$, where v is speed in m/s and t is time in second. If the body was at rest at $t = 0$, then the magnitude of initial acceleration is

(1) 3 m/s^2 (2) 5 m/s^2

(3) 6 m/s^2 (4) Zero

20. If a stone is to pass through a point which is at a distance d away and at a height h above the point from where the stone starts, then which equation among the given options may be true based upon the above given information? [Assume the origin to be at point of projection]



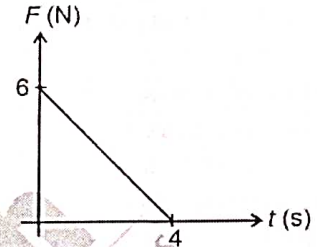
(1) $h + \frac{gd^2}{2u^2\cos^2\theta} = d\tan\theta$

(2) $h + \frac{gd^2}{2u^2\sin^2\theta} = d\tan\theta$

(3) $d + \frac{gh^2}{2u^2\cos^2\theta} = h\tan\theta$

(4) $d - \frac{gh^2}{2u^2\cos^2\theta} = h\tan\theta$

21. The impulse of the force in 4 seconds as shown in the figure is



(1) 9 Ns (2) 12 Ns

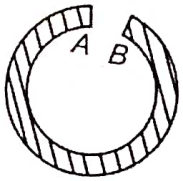
(3) 15 Ns (4) 8 Ns

22. The ratio of average translational kinetic energy to average rotational kinetic energy for a H_2 molecule at 300 K is

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

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

23. A small annular ring is heated as shown in figure. The gap AB in the ring will



(1) Increase

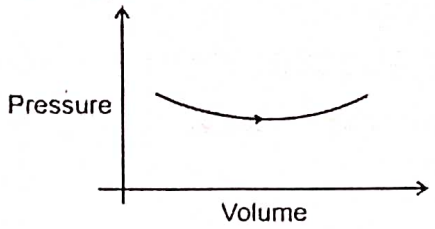
(2) Decrease

(3) Remain same

(4) First decrease then after contact does not change

Space for Rough Work

24. For the thermodynamic process depicted below the work done by the system



(1) Continuously increases
(2) Continuously decreases
(3) First increases then decreases
(4) First decreases then increases

25. An ideal gas is compressed from same initial volume V_1 to same final volume V_2 by different process. Which of the following processes will result in maximum final pressure?
(1) Isothermal compression
(2) Adiabatic compression
(3) Isobaric compression
(4) Same in all of the above

26. Consider the following statements and choose the correct option.
(I) A liquid may rise or fall in a capillary tube depending upon the nature of liquid and material of capillary.
(II) In a glass capillary having mercury there is an excess pressure just outside the mercury meniscus.
(1) Only (I) is correct
(2) Only (II) is correct
(3) Both (I) and (II) are correct
(4) Both (I) and (II) are incorrect

27. In the Young's double-slit experiment, the intensity of light at a point on the screen where the path difference is $\frac{\lambda}{4}$ is I_0, (λ being the wavelength of light used). The intensity at a point where the path difference is λ will be
(1) $2I_0$ (2) I_0
(3) $\frac{I_0}{2}$ (4) $\frac{I_0}{4}$

28. If the plane surface of a plano-convex lens of focal length 20 cm is silvered, then it will behave as
(1) Plane mirror
(2) Convex mirror of focal length 40 cm
(3) Concave mirror of focal length 10 cm
(4) Concave mirror of focal length 20 cm

29. Refractive index of the material of a plano- concave lens is $\frac{5}{3}$ and the radius of curvature is 20 cm. Focal length of the lens in air is
(1) +60 cm (2) –60 cm
(3) 30 cm (4) –30 cm

30. The unit of expression $\mu_0\varepsilon_0$ is, where μ_0 is permeability of free space and ε_0 is permittivity of free space
(1) $m\ s^{-1}$ (2) $m^2\ s^{-2}$
(3) $s^2\ m^{-2}$ (4) $s\ m^{-1}$

31. A potential difference is applied across the ends of a metallic wire. If the potential difference is halved, the drift velocity of electrons inside the conductors will
(1) Be halved
(2) Be doubled
(3) Be quadrupled
(4) Remain same

32. Two identical cells whether connected in parallel or in series give the same current when connected to load resistance of 3 Ω. The value of internal resistance of each cell is
(1) 1 Ω (2) 1.5 Ω
(3) 6 Ω (4) 3 Ω

33. The force between two parallel long current-carrying wires is dependent on
(1) Magnitude of currents through them
(2) Separation between them
(3) Both (1) and (2)
(4) Neither (1) nor (2)

Space for Rough Work

34. A circular arc of wire having radius R subtends an angle of $\frac{2\pi}{3}$ radian at its centre. If the wire has current i flowing through it, then the magnetic field at its centre is

(1) $\frac{\mu_0 i}{6R}$ (2) $\frac{\mu_0 i}{2R}$

(3) $\frac{\mu_0 i}{3R}$ (4) Zero

35. The magnetic susceptibility of a material is 699. The permeability of vacuum is $4\pi \times 10^{-7}$ H m^{-1}, then the permeability of the material is (in H m^{-1})

(1) $28\pi \times 10^{-6}$ (2) $28\pi \times 10^{-5}$

(3) $4\pi \times 10^{-5}$ (4) $20\pi \times 10^{-6}$

SECTION-B

36. Two particles each of masses m having charges $2q$ and q are placed in a uniform electric field E and allowed to move for the same time. The ratio of kinetic energies will be

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

(3) 1 : 1 (4) 1 : 8

37. A parallel plate capacitor is disconnected from the battery after being charged. A dielectric slab(K) is fully filled in it. Column-I contains few quantities associated with it while Column-II contains their change. Match the columns and tick the correct option.

	Column-I		Column-II
(A)	Charge on plates of capacitor	(P)	Becomes K times
(B)	Electric field between plates of capacitor	(Q)	Becomes $\frac{1}{K}$ times
(C)	Capacitance of capacitor	(R)	Becomes K^2 times
(D)	Potential energy stored in the capacitor	(S)	Remains same

(1) A → S, B → P, C → Q, D → R

(2) A → S, B → P, C → Q, D → Q

(3) A → S, B → Q, C → P, D → R

(4) A → S, B → Q, C → P, D → Q

38. A beam of light having wavelength λ = 400 nm from a distant source fall on a single slit 1 mm wide and resulting diffraction pattern is observed on a screen 1 m away. The width of central maxima is

(1) 0.4 mm (2) 0.2 mm

(3) 0.8 mm (4) 1.6 mm

39. An astronomical telescope has an angular magnification of magnitude 4. The separation between the objective and the eye-piece is 45 cm and the final image is formed at infinity. The focal length f_o of the objective and the focal length f_e of the eye-piece respectively are

(1) 40 cm, 5 cm (2) 36 cm, 9 cm

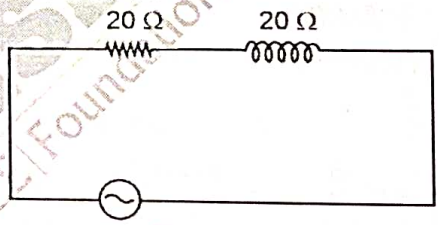
(3) 30 cm, 15 cm (4) 40 cm, 10 cm

40. A current carrying loop of area 0.02 m^2 is kept inside a magnetic field which is normal to its plane. The magnetic field changes from 4 tesla to 2 tesla in 2 millisecond. If the resistance of the loop is 4 Ω, the power consumed in the loop is

(1) 10 W (2) 5 W

(3) 50 W (4) 100 W

41. An AC source is connected to series combination of $R - L$ as shown



$200\sqrt{2}\sin(100\pi t)$ V

The voltage across the inductor (V_L) is given by equation

(1) $\frac{200}{\sqrt{2}}\sin(100t + \frac{\pi}{4})$ V

(2) $200\sin(100\pi t + \frac{\pi}{4})$ V

(3) $\frac{200}{\sqrt{2}}\sin(100t - \frac{\pi}{4})$ V

(4) $200\sqrt{2}\sin(100\pi t + \frac{\pi}{4})$ V

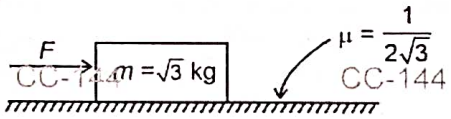
Space for Rough Work

42. Radius of a solid sphere is increasing at the rate of 1 cm s^{-1}. Rate of increase in volume of the sphere at any instant when radius of sphere is 2 cm, will be

(1) 12π $cm^3 s^{-1}$ (2) 16π $cm^3 s^{-1}$

(3) 64π $cm^3 s^{-1}$ (4) 8π $cm^3 s^{-1}$

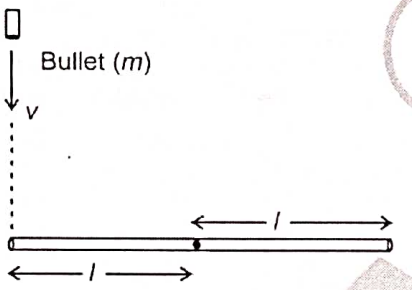
43. What is the minimum value of the force F such that block shown in the figure below is just about to move? (Where symbols have their usual meaning)



(1) 2 N (2) 5 N

(3) 4 N (4) 3 N

44. A rod of mass '$3m$' and length $2l$ (pivoted at centre) is hit by a bullet of mass 'm' moving at speed 'v' (as shown). If bullet gets embedded after striking the rod, then angular velocity of system just after collision will be



(1) $\frac{v}{l}$ (2) $\frac{2v}{l}$

(3) $\frac{v}{2l}$ (4) $\frac{3v}{4l}$

45. Work done to constitute a hollow sphere of mass 'm' and radius 'R' against gravitational force, will be

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

(3) $\frac{Gm^2}{2R}$ (4) $\frac{Gm^2}{4R}$

46. The wettability of a surface by a liquid primarily depends on

(1) Surface tension

(2) Viscosity of liquid

(3) Density of liquid

(4) Angle of contact between the surface and the liquid

47. A seconds pendulum clock has a metal wire. The clock is calibrated at 30°C. If the temperature is increased to 60°C then the new time period of pendulum is ($\alpha = 1.2\times10^{-5}$ °C^{-1} of metal wire)

(1) 2.00012 (2) 2.00036

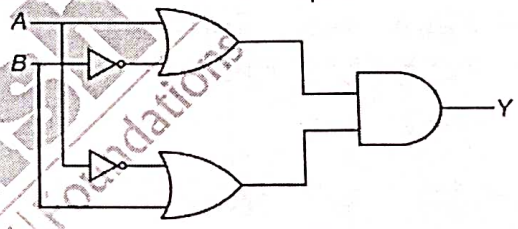
(3) 2.00018 (4) 2.00054

48. In hydrogen spectrum, the largest wavelength in the Lyman series is λ. The largest wavelength in the Balmer series is

(1) $\frac{5}{27}\lambda$ (2) 4λ

(3) $\frac{\lambda}{4}$ (4) $\frac{27}{5}\lambda$

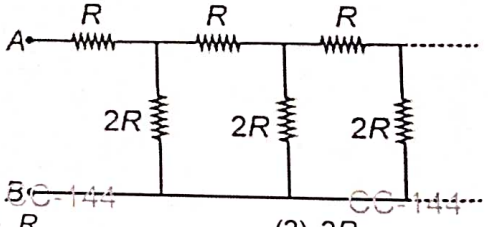
49. In the combination of the following gates, the output Y can be written in terms of inputs A and B as



(1) $\overline{A \cdot B}$ (2) $\overline{A + B}$

(3) $\overline{A} \cdot B + A \cdot \overline{B}$ (4) $A \cdot B + \overline{A} \cdot \overline{B}$

50. Infinite resistors are connected in the following manner. The net resistance between the point A and B is



(1) R (2) $2R$

(3) $\frac{2R}{3}$ (4) Infinite

Space for Rough Work

CHEMISTRY

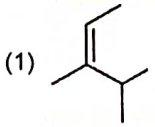
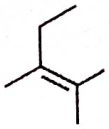
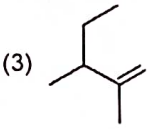
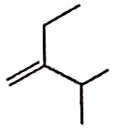
SECTION-A

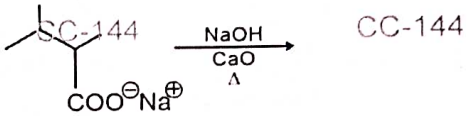
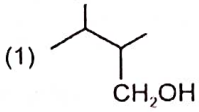
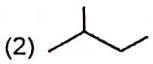
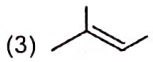
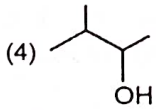
51. In which of the given compounds, sulphur exhibits highest oxidation state?
(1) SO_2 (2) H_2S
(3) H_2SO_4 (4) H_2SO_3

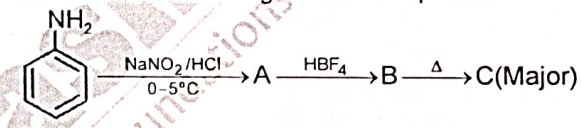
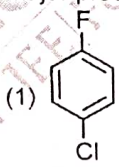
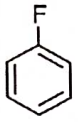
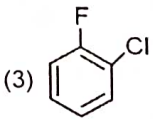
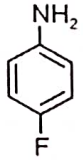
52. Which of the following reactions are disproportionation reaction?
a. $CuI_2 \longrightarrow Cu_2I_2 + I_2$
b. $2KMnO_4 \xrightarrow{\Delta} K_2MnO_4 + MnO_2 + O_2$
c. $2H_2O_2 \xrightarrow{h\nu} 2H_2O + O_2$
d. $Cl_2 + 2OH^- \longrightarrow ClO^- + Cl^- + H_2O$
(1) a, b and c only (2) c and d only
(3) a, b, c and d (4) a, c and d only

53. Number of σ bonds and π bonds respectively in a molecule of anisole is
(1) 14 and 4 (2) 14 and 3
(3) 16 and 4 (4) 16 and 3

54. Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R** :
Assertion (A): Electromeric effect is a permanent effect.
Reason (R): Electromeric effect operates in the organic compounds containing carbon-carbon single bonds only.
In the light of the above statements, choose the **correct** answer from the options given below:
(1) Both (A) and (R) are true statements and (R) is the correct explanation of (A)
(2) Both (A) and (R) are true statements but (R) is not the correct explanation of (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false statements

55. Which compound on reductive ozonolysis gives acetone as one of the products?
(1) 
(2) 
(3) 
(4) 

56. Major product of the given reaction is

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

57. Consider the following reaction sequence

Major product C is
(1) 
(2) 
(3) 
(4) 

58. For the gas phase reaction,
$2Cl(g) \rightarrow Cl_2(g)$
Which of the following conditions are correct?
(1) $\Delta H > 0$ and $\Delta S < 0$ (2) $\Delta H = 0$ and $\Delta S < 0$
(3) $\Delta H > 0$ and $\Delta S > 0$ (4) $\Delta H < 0$ and $\Delta S < 0$

Space for Rough Work

59. Consider the following statements:

I. $[Co(NH_3)_6]^{3+}$ and $[Ni(NH_3)_6]^{2+}$ both are outer orbital complexes

II. $[Co(NH_3)_6]^{3+}$ is a diamagnetic species

III. $[Fe(CN)_6]^{3-}$ is paramagnetic in nature

The correct statements is/are

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

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

60. In the formation of N_2^+ from N_2, the electron is removed from

(1) σ - molecular orbital (2) π - molecular orbital

(3) σ^* - molecular orbital (4) π^* - molecular orbital

61. Given below are the two statements labelled as Assertion (A) and Reason (R).

Assertion (A): Dipole moment of NH_3 is greater than that of NF_3.

Reason (R): Shape of NH_3 is pyramidal while the shape of NF_3 is planar.

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

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

(2) Both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion

(3) Assertion is true statement but Reason is false

(4) Both Assertion and Reason are false statements

62. Mole fraction of urea in its 1 molal aqueous solution is nearly

(1) 0.009 (2) 0.018

(3) 0.035 (4) 0.070

63. Which of the following solutions has the highest boiling point?

(1) 0.1 m glucose in water

(2) 0.1 m sucrose in water

(3) 0.1 m sodium chloride in water

(4) 0.1 m calcium chloride in water

64. The number of hydrogen atoms in 2 mg methane is approximately

(1) 3.01×10^{23} (2) 6.02×10^{23}

(3) 3.01×10^{20} (4) 6.02×10^{20}

65. What mass of NaOH is required to make 100 mL of 0.25 molar aqueous solution?

(1) 0.5 g (2) 10 g

(3) 5 g (4) 1 g

66. Unit of rate of reaction for first order reaction is

(1) s^{-1} (2) mol $L^{-1}s^{-1}$

(3) mol^{-1} Ls^{-1} (4) mol^{-1} Ls

67. On addition of dil. H_2SO_4 in a salt solution, a gas is evolved which turns lime water milky. Anion present in the salt may be

(1) NO_3^- (2) CO_3^{2-}

(3) Cl^- (4) Br^-

68. Match the groups of the basic radicals given in list-1 with their group reagent given in list-2 and choose the correct option.

	List-1		List-2
(a)	Group-I	(I)	NH_4OH in presence of NH_4Cl
(b)	Group-II	(II)	H_2S in presence of NH_4OH
(c)	Group-III	(III)	Dilute HCl
(d)	Group-IV	(IV)	H_2S gas in presence of dil. HCl

(1) (a)(III), (b)(IV), (c)(I), (d)(II)

(2) (a)(I), (b)(II), (c)(III), (d)(IV)

(3) (a)(IV), (b)(III), (c)(II), (d)(I)

(4) (a)(II), (b)(I), (c)(IV), (d)(III)

69. The electronic configuration of an element (X) is $1s^2$, $2s^2$ $2p^6$, $3s^2$ $3p^2$. The atomic number of element which is just below (X) in the modern periodic table is

(1) 32 (2) 50

(3) 31 (4) 49

Space for Rough Work

70. Match List-I with List-II and choose the correct code

	List-I (Oxides)		List-II (Nature)
(a)	Al_2O_3	(i)	Acidic
(b)	Cl_2O_7	(ii)	Amphoteric
(c)	CO	(iii)	Neutral
(d)	Na_2O	(iv)	Basic

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

71. Mass of aluminium formed during the electrolysis of $AlCl_3$(molten) by 19.3 A current for 100 s is
(1) 0.03 g (2) 2.76 g
(3) 0.27 g (4) 0.18 g

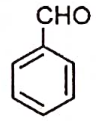
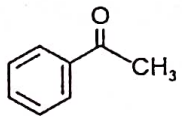
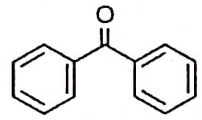
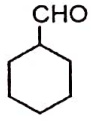
72. The orbital angular momentum of an electron in *d* orbital is equal to
(1) $\frac{h}{\pi}\sqrt{\frac{3}{2}}$ (2) $\frac{h}{\pi}\sqrt{2}$
(3) $\frac{h}{\pi}\sqrt{3}$ (4) $\sqrt{6}\frac{h}{4\pi}$

73. Which of the following ions will exhibit colour in their aqueous solutions?
(1) Zn^{2+} (2) Mn^{2+}
(3) Ti^{4+} (4) Sc^{3+}

74. If 0.2 M acetic acid solution is 2% ionised, then pH of this acetic acid solution is
(1) 2.1 (2) 2.7
(3) 2.4 (4) 3.0

75. Which of the given solutions will make basic buffer?
(1) 75 mL of 0.1 M NaOH + 50 mL of 0.1 M CH_3COOH
(2) 200 mL of 0.1 M CH_3COOH + 200 mL of 0.1 M NaOH
(3) 150 mL of 0.1 M HCl + 200 mL of 0.1 M NH_4OH
(4) 50 mL of 0.1 M HCl + 50 mL of 0.1 M NaOH

76. Which among the following will not give Aldol condensation?

(i) 
(ii) 
(iii) 
(iv) 

(1) (i) and (iii) only (2) (iii) and (iv) only
(3) (i), (ii) and (iii) only (4) (i), (iii) and (iv) only

77. Consider the following reaction

$$CH_3CH_2COOH \xrightarrow[(ii)\ H_2O]{(i)\ Red\ P/Cl_2} \underset{(Major)}{(A)}$$

Product (A) is
(1) $CH_2(Cl)-CH_2-COOH$
(2) $CH_3-CH_2-C(=O)-Cl$
(3) $CH_3-CH(Cl)-C(=O)-OH$
(4) $CH_3-CH_2-CH_2-Cl$

78. The compound that does not reduce Tollen's reagent is
(1) Glucose (2) Fructose
(3) Maltose (4) Sucrose

79. Consider the following statements:
Statement I: Zinc reacts with dilute HNO_3 to evolve nitrous oxide gas.
Statement II: Copper reacts with concentrated HNO_3 to evolve nitrogen dioxide gas.
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 correct but statement II is incorrect
(4) Statement I is incorrect but statement II is correct

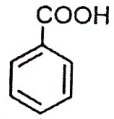
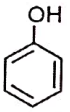
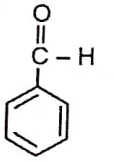
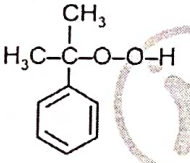
Space for Rough Work

80. Match the following column A with column B.

	Column A		Column B
(a)	Hypophosphorous acid	(i)	$H_4P_2O_5$
(b)	Hypophosphoric acid	(ii)	H_3PO_2
(c)	Pyrophosphorous acid	(iii)	$H_4P_2O_7$
(d)	Pyrophosphoric acid	(iv)	$H_4P_2O_6$

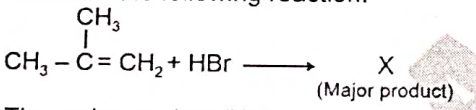
Choose the correct match
(1) (a)(iv), (b)(i), (c)(ii), (d)(iii)
(2) (a)(iii), (b)(ii), (c)(iv), (d)(i)
(3) (a)(ii), (b)(iv), (c)(i), (d)(iii)
(4) (a)(i), (b)(ii), (c)(iii), (d)(iv)

81. The order of reactivity of hydrogen halides towards ethers is
(1) HI > HBr > HCl (2) HCl > HI > HBr
(3) HCl > HBr > HI (4) HI > HCl > HBr

82. When cumene is oxidised in the presence of air and further it is treated with dilute acid then it forms?
(1) 
(2) 
(3) 
(4) 

83. In diborane, the H – B – H bond angles are
(1) 90°, 120° (2) 60°, 90°
(3) 97° and 120° (4) 120°, 180°

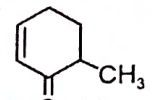
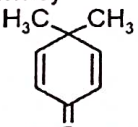
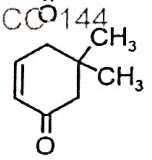
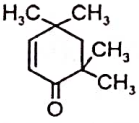
84. Consider the following reaction.



The major product (X) is
(1) 1-Bromobutane
(2) 1-Bromo-2-methylpropane
(3) 2-Bromobutane
(4) 2-Bromo-2-methylpropane

85. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)** :
Assertion (A): t-Butyl chloride undergoes nucleophilic substitution by S_N1 mechanism.
Reason (R): t-Butyl carbocation is a highly stable species.
In the light of the above statements, choose the **correct** answer from the options given below:
(1) Both (A) and (R) are true statements and (R) is the correct explanation of (A)
(2) Both (A) and (R) are true statements but (R) is not the correct explanation of (A)
(3) (A) is the true statement while (R) is false
(4) Both (A) and (R) are false statements

SECTION-B

86. Tautomerism will not be shown by
a. 
b. 
c. 
d. 
(1) a and b only (2) b and d only
(3) a, b and c only (4) d only

87. Choose the incorrect statement about group 16 elements
(1) The acidic character of hydrides increases from H_2O to H_2Te
(2) The thermal stability of hydrides decreases from H_2O to H_2Te
(3) The H-E bond dissociation enthalpy decreases from H_2O to H_2Te
(4) All the hydrides possess reducing property except H_2Te

88. $CH_3 - CH = CH_2 \xrightarrow[(ii)\ H_2O, H_2O_2, OH^{\ominus}]{(i)\ B_2H_6} X$
In the above reaction X is
(1) $CH_3 - CH_2 - CH_3$ (2) $CH_3 - CH_2 - CHO$
(3) $CH_3 - CH_2 - CH_2OH$ (4) $CH_3 - \underset{\displaystyle OH}{\underset{|}{CH}} - CH_3$

89. Consider the following statements.
(a) Boiling point of 2-Methylbutane is more than that of n-pentane.
(b) Methane on reaction with oxygen in presence of Mo_2O_3 gives methanal.
(c) Melting point of 2, 2-Dimethylpropane is higher than 2-Methylbutane.
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

90. Aniline on reaction with bromine water gives a white precipitate of
(1) 2, 4 – Dibromoaniline
(2) 2 – Bromoaniline
(3) 2, 4, 6 – Tribromoaniline
(4) 4 – Bromoaniline

91. Match the vitamins given in column I with their deficiency diseases given in column II.

	Colum I		Colum II
(a)	Riboflavin	(i)	Bleeding gums
(b)	Thiamine	(ii)	Convulsions
(c)	Pyridoxine	(iii)	Digestive disorders and burning sensation of the skin
(d)	Ascorbic acid	(iv)	Loss of appetite

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

92. Enthalpy of neutralisation of a strong acid and a strong base (at room temperature) is –57.1 kJ mol^{-1}.
The amount of heat evolved when 500 ml of $\frac{N}{10}$ H_2SO_4 is mixed with 500 ml of $\frac{N}{20}$ NaOH is
(1) 57.1 kJ (2) 14.3 kJ
(3) 1.43 kJ (4) 5.71 kJ

93. The type of isomerism exhibited by $[Co(H_2O)_4(NO_2)_2]Cl$ is
A. Linkage B. Ionization
C. Geometrical D. Coordination
E. Optical
(1) B, D and E only (2) A, C and E only
(3) A, B and C only (4) A, B, C and D only

94. Consider the following statements and choose the correct option.
Statement I : PCl_5 is a trigonal planar.
Statement II : XeF_2 is a linear molecule.
(1) Both the statements I and II are correct
(2) Both the statements I and II are incorrect
(3) Statement I is correct and statement II is incorrect
(4) Statement I is incorrect and statement II is correct

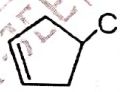
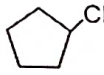
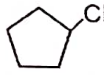
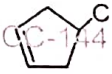
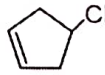
95. If half-life of a first order reaction is 4 hours, then the $t_{75\%}$ for the reaction is
(1) 8 hours (2) 6 hours
(3) 10 hours (4) 7 hours 30 min

96. Standard reduction potential values for the given species are as follows below:
$A^+/A = -2.93$ V
$B^{3+}/B = 0.79$ V
$C^{2+}/C = -0.74$ V
The correct order of reducing power is
(1) A < B < C (2) B < A < C
(3) A < C < B (4) B < C < A

97. Number of moles of MnO_4^- required to oxidise one mole of oxalic acid completely in acidic medium is
(1) 0.4 (2) 1
(3) 2 (4) 0.6

98. The number of angular nodes and radial nodes in 3*d* orbital respectively are
(1) 1 and 0 (2) 0 and 2
(3) 2 and 0 (4) 2 and 1

99. For the equilibrium $XY_{(g)} \rightleftharpoons X_{(g)} + Y_{(g)}$, K_p is 2 times of the total pressure, degree of dissociation of compound XY is
(1) $\frac{2}{\sqrt{3}}$ (2) $\frac{1}{\sqrt{3}}$
(3) $\sqrt{\frac{2}{3}}$ (4) 2

100.  $CH = CH - CH_2 - CHO \xrightarrow{LiAlH_4} (X)$
The product (X) is
(1)  $CH_2 - CH_2 - CH_2 - CHO$
(2)  $CH_2 - CH_2 - CH_2 - CH_2OH$
(3)  $CH = CH - CH_2 - CH_2OH$
(4)  $CH_2 - CH_2 - CH_2 - CH_2OH$

Space for Rough Work

BOTANY

SECTION-A

101. Match column-I with column-II and choose the **correct** option.

	Column I		Column II
a.	*Lac i*	(i)	Responsible to increase permeability of the cell to β-galactosides
b.	*Lac y*	(ii)	Constitutive expression
c.	*Lac z*	(iii)	Responsible for the transfer of acetyl group to β-galactoside
d.	*Lac a*	(iv)	Responsible for the hydrolysis of the disaccharide

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

102. Which of the following options depict the basis of DNA fingerprinting?
(1) Relative amount of DNA in the ridge and grooves of the fingerprint
(2) Relative proportion of purine and pyrimidine
(3) An inheritable mutation observed in a population at high frequency
(4) Proportion of all genes that are expressed as RNA

103. Which one of the following is **wrongly** matched?

(1)	VNTR	–	0.1 to 20 Kb in size
(2)	SNPs	–	Present at 4.6 million locations in *E. coli* genome
(3)	Dystrophin	–	2.4 million bases
(4)	Y chromosome	–	231 genes

104. A translational unit in mRNA is
(1) The sequence of RNA that is flanked by AUG and the stop codon
(2) The region that has introns only
(3) Only composed of UAA, UAG and UGA type of codons
(4) Composed of anticodons

105. Read the following statements of Assertion and Reason and select the **correct** option.

Assertion : Some tropical plants show a special type of photosynthesis called C_4 pathway.

Reason : In the bundle sheath cells of C_4 plants, Calvin pathway is carried out for the synthesis of organic acids only.

(1) Both assertion and reason are false
(2) Assertion is true but reason is false
(3) Both assertion and reason are true and reason is the correct explanation of assertion
(4) Both assertion and reason are true but reason is the not the correct explanation of assertion

106. The primary CO_2 acceptor in C_4 plants is
(1) RuBP (2) 3-PGA
(3) PEP (4) OAA

107. In one turn of citric acid cycle
(1) Two molecules of $NADH_2$ are produced
(2) One decarboxylation reaction occurs
(3) One substrate level phosphorylation reaction occurs
(4) One ATP, two $FADH_2$ and three $NADH_2$ are produced

108. Select the **incorrect** match regarding the symbols used in pedigree analysis.
(1)  – Consanguineous mating
(2)  – Sex unspecified
(3)  – Four unaffected offspring
(4)  – Parents with male child affected with disease

109. Who coined the term linkage to describe the physical association of genes on chromosome?
(1) Gregor Mendel
(2) T.H. Morgan
(3) Walter Sutton
(4) Theodore Boveri

Space for Rough Work

110. Given below are two statements.
Statement I: Grasshopper males have only one X chromosome besides the autosomes.
Statement II: In birds, the females have one Z and one W chromosomes besides the autosomes, whereas males have a pair of Z chromosomes besides the autosomes.
In the light of above statements, choose the **correct** answer from the options given below.
(1) Statement I is incorrect but statement II is correct
(2) Both statements I and II are correct
(3) Both statements I and II are incorrect
(4) Statement I is correct but statement II is incorrect

111. Identify the **correct** statements and choose the option accordingly.
(a) β thalassemia is controlled by single gene HBB on chromosome 16 of each parent.
(b) Autosomal recessive disease can be transmitted from parents to offspring when both the partners are carriers for the gene.
(c) Turner's syndrome is the result of aneuploidy.
(d) The family pedigree of Queen Victoria shows a number of sickle cell anaemia descendents as she was a carrier of the disease.
(1) (b) and (c) only (2) (b), (c) and (d) only
(3) (a) and (d) only (4) (a), (b) and (c) only

112. In species area relationship equation log S = log C + Z log A, the term Z represents
(1) Species richness (2) Y-intercept
(3) Area (4) Slope of the line

113. Choose the **incorrect** match.
(1) Khasi and Jaintia hills – Meghalaya
(2) Aravalli hills – Rajasthan
(3) Chanda and Bastar – Maharashtra
(4) Western Ghat region – Karnataka

114. **Statement A:** Biological names are latinised or derived from Latin irrespective of their origin.
Statement B: Dogs, mammals and animals are different taxa at different level.
Select the **correct** option in light of above statements
(1) Both statements A and B are incorrect
(2) Only statement A is correct
(3) Both statements A and B are correct
(4) Only statement B is correct

115. Read the following statements of Assertion and Reason and select the **correct** option.
Assertion : Archaebacteria can survive in extreme conditions.
Reason : Archaebacteria have different cell wall structure than other bacteria.
(1) Assertion is true statement but reason is false
(2) Assertion is false statement but reason is true
(3) Both assertion and reason are true and reason is the correct explanation of assertion
(4) Both assertion and reason are true statements but reason is not the correct explanation of assertion

116. Select the **odd** one w.r.t. euglenoids
(1) Majority are freshwater organisms
(2) They can behave like heterotrophs
(3) Cell wall is rich in proteins and also called pellicle
(4) Photosynthetic pigments are identical to higher plants

117. The **correct** sequence of different regions of root from root apex to the stem base is

(1)	Maturation zone	–	Cell division zone	–	Elongation zone
(2)	Cell division zone	–	Elongation zone	–	Maturation zone
(3)	Cell division zone	–	Maturation zone	–	Elongation zone
(4)	Elongation zone	–	Maturation zone	–	Cell division zone

118. Phyllotaxy of *Calotropis* and *Alstonia* respectively are
(1) Alternate and Opposite
(2) Opposite and Whorled
(3) Whorled and Alternate
(4) Opposite and Alternate

119. Flowers in which of the following plants have superior ovary?
Sesbania, *Trifolium*, Lupin, *Asparagus*, Cabbage, Belladonna, Soyabean
(1) Three (2) Two
(3) Six (4) Seven

120. A few chromosomes have non-staining secondary constriction at constant location. This gives the appearance of a small fragment called
(1) Chromatin (2) Kinetochore
(3) Chromatid (4) Satellite

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121. Which of the following structures does not differ in bacteria and algae?
(1) Composition of cell wall
(2) Cell membrane structure
(3) Type of cytoplasmic ribosomes
(4) Chromosomal organization

122. Which of the following statements is **correct**?
(1) Cells of all living organisms have a nucleus.
(2) A unicellular organism carries out its life activities within a cell.
(3) Robert Brown discovered the cell for the first time.
(4) In prokaryotes, ribosomes are membrane bound organelles.

123. Read the following statements and choose the **correct** option.
Statement A: In S-phase of cell cycle, amount of DNA per cell doubles.
Statement B: G_2 phase corresponds to the interval between mitosis and initiation of DNA replication.
(1) Both the statements A and B are correct
(2) Both the statements A and B are incorrect
(3) Only statement A is correct
(4) Only statement B is correct

124. Homologous chromosomes in the form of tetrad are clearly visible during which of the following stages of cell division?
(1) Leptotene (2) Zygotene
(3) Metaphase II (4) Pachytene

125. Which of the given statements is **incorrect** regarding meiosis?
(1) Four haploid cells are formed from a diploid cell at the end of meiosis II.
(2) Interkinesis is followed by prophase I.
(3) Prophase II is a much simpler phase than prophase I.
(4) Meiosis involves two sequential cycles of nuclear and cell division.

126. Distant most region of the stem axis is occupied by
(1) Root Apical Meristem
(2) Shoot Apical Meristem
(3) Lateral Meristem
(4) Intercalary Meristem

127. Which of the following features is/are **true** w.r.t. anatomy of dicot stem?
(i) Presence of starch sheath.
(ii) Presence of sclerenchymatous hypodermis.
(iii) Presence of ring arrangement of vascular bundles.
(1) (i) and (iii) (2) Only (ii)
(3) Only (i) (4) (ii) and (iii)

128. Select the **incorrect** match w.r.t. roles of different plant growth regulators.
(1) Internode elongation – Gibberellins
(2) Nutrient mobilisation – Cytokinin
(3) Fruit ripening – Auxin
(4) Seed maturation – Abscisic acid

129. Innermost anther wall layer having dense cytoplasm, generally more than one nucleus and role in nourishment is
(1) Endothecium (2) Tapetum
(3) Epidermis (4) Middle layers

130. Find the **incorrectly** matched pair.
(1) Parthenocarpic fruit – Banana
(2) Dioecious plant – Papaya
(3) Wind pollination – Grasses
(4) False fruit – Coconut

131. Natural system of classifications are based on
(1) Evolutionary relationships
(2) Natural affinities
(3) Vegetative characters only
(4) Anatomical characters only

132. Which of the following systems of classification is based on the assumption that organisms belonging to the same taxa have common ancestor?
(1) Natural system (2) Artificial system
(3) Phylogenetic system (4) Linnaeus system

133. The biomass available for the consumption to heterotrophs (herbivores and decomposers) is called
(1) Gross primary productivity
(2) Net primary productivity
(3) Secondary productivity
(4) Standing crop

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134. The population interaction in which one species is benefited and other is neither harmed nor benefited is known as
(1) Competition (2) Parasitism
(3) Mutualism (4) Commensalism

135. Improved nutritional quality of curd is due to enriched content of vitamin
(1) A (2) B_{12}
(3) C (4) K

SECTION-B

136. Cell-free system for protein synthesis is devised by
(1) Marshall Nirenberg (2) Severo Ochoa
(3) Har Gobind Khorana (4) George Gamow

137. 'Some amino acids are coded by more than one codon.' This statement infers to which property of genetic code?
(1) Triplet nature (2) Degeneracy
(3) Universal nature (4) Punctuationless

138. Which of the following microbes is present in the gut of several ruminant animals?
(1) *Halobacterium* (2) *Thermoproteus*
(3) *Methanobacterium* (4) *Thiobacillus*

139. Which of the following is **correct** floral formula for Brassicaceae?
(1) $\oplus ♀♂ K_{(5)} \overset{\frown}{C_{(5)}} A_5 \underline{G}_{(2)}$ (2) $\% ♀♂ C_{1+2+(2)} A_{(9)+1} \underline{G}_1$
(3) $\oplus ♀♂ K_5 \overset{\frown}{C_5} A_5 \underline{G}_{(2)}$ (4) $\oplus ♀♂ K_{2+2} C_4 A_{2+4} \underline{G}_{(2)}$

140. In eukaryotes, the cytochromes associated with the ETS are located in the
(1) Matrix of mitochondria
(2) Inter-membrane space attached to the outer mitochondrial membrane
(3) Cristae of mitochondria
(4) Mesosome

141. In typical Mendelian dihybrid cross, done by considering shape and colour of pea seed, what is the ratio of pea seeds having atleast one dominant allele in F_2 generation?
(1) $\frac{1}{16}$ (2) $\frac{15}{16}$
(3) $\frac{1}{2}$ (4) $\frac{9}{16}$

142. Read the statements of **Assertion** and **Reason** carefully and choose the **correct** option.
Assertion (A): Cell is called the fundamental structural and functional unit of all living organisms.
Reason (R): Anything less than a complete structure of a cell does not ensure independent living.
(1) Both the statements (A) and (R) are correct and (R) is the correct explanation of (A)
(2) Both the statements (A) and (R) are correct but (R) is not the correct explanation of (A)
(3) Both the statements (A) and (R) are incorrect
(4) Statement (A) is correct and statement (R) is incorrect

143. The cell division in which **no** spindle fibre formation occurs is
(1) Meiosis I
(2) Mitosis in haploid cells
(3) Amitosis
(4) Meiosis II

144. State **True (T)** or **False (F)** to the given statements and select the **correct** option.
(i) Secondary growth occurs only in roots and stems of angiosperms.
(ii) In vertical section of monocot leaves, vascular bundles are seen near similar in sizes except in main veins.
(iii) Sclereids are found in seed coat of legumes and tea leaves.
(iv) Bigger sieve tubes are found in protophloem and narrow in metaphloem.
(v) A mature sieve tube has peripheral cytoplasm, small vacuole and large nucleus.

	(i)	(ii)	(iii)	(iv)	(v)
(1)	F	T	T	F	F
(2)	T	T	T	F	F
(3)	F	F	T	T	T
(4)	T	T	F	F	T

145. Given below are two statements A and B
Statement (A): Differentiation of xylem is controlled by the plant growth regulator which is composed of indole compounds.
Statement (B): Abscisic acid stimulates opening of stomata.
In the light of above statements, choose the **correct** option

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(1) Both the statements (A) and (B) are correct
(2) Only statement (A) is correct
(3) Only statement (B) is correct
(4) Both statements (A) and (B) are incorrect

146. Select the option having **incorrect** statements.
(i) *Yucca* and *Pronuba* do not show obligate relationship.
(ii) Black pepper and beet have perispermic seeds.
(iii) Feathery stigma is a characteristic of wind pollinated flowers.
(iv) Cleistogamous flowers do not produce assured seed set even in absence of pollinators.
(v) Water hyacinth and water lily are pollinated by water
(1) (i), (iv) and (v) only (2) (i) and (ii) only
(3) (ii) and (iv) only (4) (i), (iii) and (iv) only

147. Which of the following statements is **not** correct?
(1) Phenetics involves usage of numerical methods for the evaluation of similarities and differences between species.
(2) Karyotaxonomy is based on cytological informations
(3) Chemotaxonomy is based on the chemical constituents of the plants to resolve confusion.
(4) Evolutionary relationships form the core of cytotaxonomy

148. Read the following statements and choose the **correct** option.
Statement (A): Standing state is the amount of nutrients present in the soil at any given time.
Statement (B): Standing crop is the amount of living material present in different trophic levels at a given time.
(1) Only statement A is correct
(2) Only statement B is correct
(3) Both statements A and B are correct
(4) Both statements A and B are incorrect

149. Select the **incorrect** statement w.r.t. adaptation.
(1) Many desert plants have a thick cuticle on their leaf surface and also have sunken stomata.
(2) Mammals from colder climates generally have shorter ears and limbs to minimise heat loss which is called Allen's rule.
(3) In the polar sea, a thick layer of fat is found in aquatic mammals below their skin and this acts as an insulator.
(4) Desert lizards have the physiological ability to manage their body temperature.

150. Toddy is a traditional drink of some parts of south India and is obtained from sap of palm trees through fermentation by
(1) Unicellular prokaryote
(2) Methanogens
(3) Naturally occurring yeast
(4) A symbiotic bacterium

ZOOLOGY

SECTION - A

151. Any plane passing through the longitudinal central axis of the body divides all of the given organisms into two identical halves, **except**
(1) *Pennatula* (2) *Meandrina*
(3) *Fasciola* (4) *Hydra*

152. The rapid transfer of ions, small molecules and sometimes big molecules in between the adjoining cells is facilitated by
(1) Neuro-muscular junctions
(2) Gap junctions
(3) Adhering junctions
(4) Tight junctions

153. In 1951, India initiated 'Family Planning Programmes' at a national level to attain
(1) Total reproductive health as a social goal
(2) Only physical health as a social goal
(3) Only complete awareness about STIs as a social goal
(4) Only complete child health care as a social goal

154. Coca alkaloid or cocaine is obtained from coca plant which is native to
(1) East America (2) North America
(3) India (4) South America

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155. Which of the following statements is incorrect w.r.t. amoebiasis?
(1) It is caused by a protozoan parasite found in the large intestine of human.
(2) Food contaminated by mechanical carrier is the only source of infection.
(3) Houseflies act as mechanical carriers for the parasite.
(4) Its symptoms include constipation, abdominal pain and cramps, stools with excess mucous and blood clots.

156. The partial pressure of oxygen in systemic veins in a healthy man is
(1) 45 mm Hg (2) 95 mm Hg
(3) 40 mm Hg (4) 104 mm Hg

157. Bt toxin is coded by *cry* gene. Proteins encoded by the gene *CryIAc* controls
(1) Corn borer (2) Cotton bollworm
(3) Flatworm (4) Roundworm

158. How many types of muscles are identified in humans on the basis of their location?
(1) Two (2) Three
(3) Four (4) Five

159. The process through which two or more organs interact and complement the functions of one another is called
(1) Coordination (2) Implementation
(3) Antagonism (4) Command

160. How many biomolecules given in the box below are found in the retentate upon chemical analysis of a living tissue?

Nucleosides, Lipids, Amino acids, Polysaccharides, Proteins, Nitrogenous bases

Select the correct option.
(1) Four (2) Three
(3) Two (4) Five

161. The process of making identical copies of any DNA template is known as
(1) Bioprocess engineering
(2) Cloning
(3) Spooling
(4) Transformation

162. Which of the following is the first restriction endonuclease enzyme isolated, whose functioning depends on a specific DNA nucleotide sequence?
(1) *Hind* II (2) *Sal* I
(3) *Pvu* I (4) *Pst* I

163. Complete the analogy and select the correct option.
Renin : Kidney :: Aldosterone : _____
(1) Adrenal medulla (2) Pars nervosa
(3) Adrenal cortex (4) Hypothalamus

164. Two hormones 'X' and 'Y' interact with intracellular receptors and mostly regulate gene expression or chromosomal function by the interaction of hormone-receptor complex with the genome. Both 'X' and 'Y' are different in their chemical nature. Select the option that correctly identifies 'X' and 'Y' respectively.
(1) Testosterone, estrogen
(2) Progesterone, testosterone
(3) Growth hormone, FSH
(4) Estrogen, thyroxine

165. The theory that attempts to explain us the origin of Universe talks of
(1) Constituents of ozone layer in the primitive Earth
(2) Type of atmosphere present on early Earth
(3) A singular huge explosion unimaginable in physical terms
(4) Transfer of spores to different planets

166. Exocrine glands secrete
(1) Mucus, digestive enzymes and thyroxine
(2) Earwax, oxytocin and digestive enzymes
(3) Lipase, protease and saliva
(4) Milk, mucus and insulin

167. Read the following statements w.r.t. humans.
(a) A diffusion membrane in lungs is made up of three major cellular layers.
(b) Solubility of CO_2 in blood plasma is 20 – 25 times higher than that of O_2.
(c) Total thickness of a diffusion membrane in lungs is much less than a millimetre.
Select the option with correct statement(s).
(1) (a), (b) and (c) (2) (a) and (b)
(3) Only (b) (4) (b) and (c)

168. In mammals, colostrum is the milk
(1) Produced throughout pregnancy
(2) Produced during initial few days of lactation
(3) Produced only by cattles
(4) That contains several antibodies essential to prevent resistance against diseases for the new-born babies

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169. Which of the following options is true about *Chelone*, *Neophron*, *Macropus* and *Betta*?
(1) They all possess dorsal heart.
(2) None of them is aquatic.
(3) They all have bony endoskeleton.
(4) They all are homeothermous animals.

170. Which of the following represents the correct order of different parts of human sperms?
(1) Head → Middle piece → Neck → Tail
(2) Neck → Head → Middle piece → Tail
(3) Head → Neck → Middle piece → Tail
(4) Middle piece → Head → Neck → Tail

171. **Assertion (A):** For the multiplication of any alien piece of DNA in a host, it needs to be a part of chromosome(s) which has specific sequence known as 'origin of replication'.
Reason (R): Origin of replication is responsible for initiating replication of DNA.
In the light of above statements, select 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, (R) is false
(4) Both (A) and (R) are false

172. Which of the following statements is **incorrect** w.r.t. frogs?
(1) Their skin is smooth and slippery due to the presence of mucus.
(2) Their eyes are bulged and covered by a nictitating membrane.
(3) Their hind limbs end in four digits and fore limbs end in five digits.
(4) They never drink water but absorb it through the skin.

173. Blood pumped by the heart is always circulated through a closed network of blood vessels. This pattern of circulation is found in
(1) Arthropods (2) Urochordates
(3) Vertebrates (4) Hemichordates

174. Read the following statements and select the correct option.
Statement I: During a cardiac cycle, each ventricle pumps out about 70 mL of blood which is known as cardiac output.
Statement II: Cardiac output is equal to the product of stroke volume and heart rate.
(1) Statement I is correct but statement II is incorrect
(2) Statement I is incorrect but statement II is correct
(3) Both statements I and II are correct
(4) Both statements I and II are incorrect

175. Match Column I with Column II and select the correct option w.r.t. levels of protein structures.

	Column I		Column II
(a)	Primary structure	(i)	Assembly of more than one polypeptide or subunits
(b)	Tertiary structure	(ii)	Only right-handed helices are observed
(c)	Secondary structure	(iii)	3-D view of a protein
(d)	Quaternary structure	(iv)	Positional information of amino acids in a protein

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

176. Ovaries are considered as primary sex organs because they produce
(1) Ova and female sex hormones
(2) Androgens and female sex hormones
(3) Ova and male sex hormones only
(4) Progestins and male sex hormones

177. Select the **odd** one w.r.t. aromatic amino acids.
(1) Tyrosine (2) Phenylalanine
(3) Lysine (4) Tryptophan

178. Consider the given diagrams of dinosaurs. Select the correct option w.r.t. (A) and (B).


(A) (B)

(1) Both (A) and (B) were herbivores.
(2) (A) was characterised by 3-horned face.
(3) (B) was long necked plant eater.
(4) (A) was the biggest dinosaur of maximum 20 feet in height and had huge fearsome dagger like teeth.

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179. Select the **incorrect** match.

(1)	*Homo sapiens*	–	Muscular movement
(2)	*Hydra*	–	Ciliary movement
(3)	*Amoeba*	–	Amoeboid movement
(4)	*Euglena*	–	Flagellar movement

180. During formation of Earth, the UV rays from the sun brokeup water into 'X' and 'Y' and 'X' being lighter escaped. Select the option that correctly identifies 'X'.
(1) Carbon (2) Hydrogen peroxide
(3) Hydrogen (4) Oxygen

181. Consider the following w.r.t. emphysema.
(a) Usually caused in chronic cigarette smokers
(b) Can be treated by α-1-antitrypsin
(c) Characterised by the fibrosis of lungs
Select the **correct** option.
(1) (a) and (b) only (2) (b and (c) only
(3) (a) and (c) only (4) (a), (b) and (c)

182. Cerebrum wraps around a structure 'A' which is a major coordinating centre for sensory and motor signaling. Identify 'A' and choose the **correct** option.
(1) Hypothalamus (2) Thalamus
(3) Cerebellum (4) Midbrain

183. In the year 1963, the two enzymes responsible for restricting the growth of bacteriophage in 'X' were isolated. The 'X'
(1) Is also a causative agent of typhoid
(2) Carries resistance against kanamycin
(3) Is closely related to the genus *Salmonella*
(4) Is most commonly used as a cloning vector

184. A symptom of acute chest pain that appears when no enough oxygen is reaching the heart muscles, is called
(1) Atherosclerosis (2) Angina pectoris
(3) Cardiac arrest (4) Heart failure

185. **Assertion (A):** Steroidal oral contraceptive pills prevent ovulation and alter the quality of cervical mucus.
Reason (R): Steroidal oral contraceptive pills contain progestogens alone or progestogen-estrogen combinations.
Select the correct option.
(1) Both (A) and (R) are true but (R) is not the correct explanation of (A)
(2) Both (A) and (R) are true and (R) is the correct explanation of (A)
(3) (A) is true but (R) is false
(4) (A) is false but (R) is true

SECTION - B

186. How many of the ARTs mentioned in the box given below do not involve *in-vitro* fertilisation?

ZIFT, GIFT, ICSI, IUT, IUI

Select the correct option.
(1) Four (2) Two
(3) One (4) Three

187. **Assertion (A):** In humans, spermatogenesis starts at the age of puberty.
Reason (R): GnRH significantly increases at puberty in humans.
In the light of 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) Both (A) and (R) are false
(4) Both (A) and (R) are true and (R) is the correct explanation of (A)

188. Select the **incorrect** match.

(1)	Saheli	–	Developed at CDRI, Lucknow
(2)	RCH	–	Reproductive and Child Health Care
(3)	Amniocentesis	–	Used to detect genetic disorders like cleft palate
(4)	STIs	–	AIDS and hepatitis-B

189. Read the following w.r.t. RNAi
(a) Takes place in all eukaryotic organisms as a method of cellular defense.
(b) Involves the silencing of a specific mRNA due to a complementary dsDNA molecule.
(c) This method prevents translation of the mRNA.
Choose the correct option.
(1) Statements (a) and (b) are correct
(2) Statements (a) and (c) are correct
(3) Statements (b) and (c) are incorrect
(4) Statements (a), (b) and (c) are correct

190. How many of the following statement(s) is/are correct?
(a) Carbon dioxide is produced only during the anabolic reactions in our body.
(b) Mechanisms of breathing vary among different group of animals depending on their habitats only.
(c) Humans can directly alter the pulmonary volume.

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Select the **correct** option.
(1) One (2) Two
(3) Three (4) Zero

191. Select the hormone that is stored and released by neurohypophysis but not synthesized by it.
(1) Growth hormone
(2) Melanocyte stimulating hormone
(3) Vasopressin
(4) Adrenocorticotrophic hormone

192. Consider the given features w.r.t. muscle fibres.
(a) Multinucleated
(b) Innervated by branches from spinal nerves
(c) Unbranched
The above given features are associated with the type of muscle fibres found in
(1) Heart (2) Stomach
(3) Iris of eye (4) Biceps

193. The mesoderm is present as scattered pouches in between the endoderm and ectoderm in
(1) Earthworm (2) Hookworm
(3) Cockroach (4) Sea-hare

194. The scientists who proposed the theory of chemical evolution described the
(1) Formation of first form of life from pre-existing non-living organic molecules
(2) Generation of living organisms from decaying and rotting matter present on Earth
(3) Origin of life from pre-existing life
(4) Formation of life from outer space

195. Male frog differs from female frog in having all of the following, **except**
(1) Vocal sacs
(2) Copulatory pads on the first digit of the forelimbs
(3) Bidder's canal
(4) Tympanum

196. Which of the following statements is **correct** w.r.t. human kidneys?
(1) The cortex extends in between the medullary pyramids as renal columns called columns of Bertini.
(2) Glomerulus is a tuft of capillaries formed by the efferent arteriole.
(3) Both kidneys have nearly one million complex tubular structures called nephrons.
(4) The medullary pyramids are divided into a few conical masses projecting into the renal columns.

197. In a double stranded DNA, the percentage of nitrogenous base 'X', which is present only in DNA and not in RNA, is 28%. The percentage of other nitrogenous base which forms complimentary base pair with the 'X' will be
(1) 28% (2) 44%
(3) 22% (4) 56%

198. Which among the following is used as a selectable marker in a cloning vector?
(1) *ori* sequence
(2) Tumor inducing plasmid
(3) Tetracycline resistance gene
(4) Recognition sequence

199. The resting potential at the site of excitation of an axon is restored by
(1) Rise in permeability of Na^+
(2) Rise in permeability of K^+
(3) Active transport of both Na^+ and K^+
(4) Blockage of $Na^+ - K^+$ pump

200. Select the incorrectly matched option.

(1)	Helminthic diseases	–	Ascariasis, Elephantiasis, Filariasis
(2)	Bacterial diseases	–	Dysentery, Plague, Diphtheria
(3)	Viral diseases	–	Common cold, Dengue, Chikungunya
(4)	Fungal diseases	–	Ringworms, Tetanus, Rheumatoid arthritis

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Space for Rough Work