

TEST ID : 124  
MAX. MARKS : 720  
EXAM DURATION : 3 HOURS

Roll No.

Name :

Exam Date : .....

# M-STAR<sup>★</sup>

Momentum Scholarship Test for Admission & Rewards

8<sup>th</sup> Edition, 2023-24

Talent HUNT Exam



**Class XII Studying Students (NEET Aspirants)  
Physics, Chemistry, Botany & Zoology**

## INSTRUCTIONS FOR CANDIDATE

1. This booklet is your Question Paper. Do not open this booklet before being instructed to do so by the invigilator.
2. You may complete Your Name, Roll No. on the cover page.
3. Blank spaces and blank pages are provided in this booklet for your rough work. No Additional sheet will be provided for rough work.
4. Blank papers, clipboards, log tables, slide rules, calculators, cameras, cellular phones, pagers and electronic gadgets are NOT allowed inside the examination hall.
5. **Using a Blue/Black Pen, Darken the bubbles on the OMR sheet**
6. DO NOT TAMPER WITH/MUTILATE THE OMR OR THE BOOKLET
7. In the booklet, check that all the 200 questions and corresponding answer choices are legible.
8. Write your name, class and the Father's name in the boxes provided on the right part of the OMR. Do not write any of this information anywhere else. Darken the appropriate bubble under each digit of your Roll Number and Test ID Number.
9. The test booklet contains 200 multiple choice questions (four options with a single correct answer) from **Physics, Chemistry, Botany and Zoology** subject.  
(a) **Section A** shall consist of 35 Questions in each subject (**Question No. 1 to 35, 51 to 85, 101 to 135 and 151 to 185**). All questions are compulsory.  
(b) **Section B** shall consist of 15 Questions in each subject of (**Question No. 36 to 50, 86 to 100, 136 to 150 and 186 to 200**). In Section B, a candidate needs to attempt any 10 questions out of 15 in each subject.
10. Candidate are advised to read all 15 questions in each subject of section B before they start attempting the question paper. In the event of a candidate attempting more than 10 questions, the first 10 Question's answer by the candidate shall he evaluated.
11. Marking Scheme: **+4** for correct answer, **0** for unattempted and **-1** for wrong attempt .
12. On completion of the test, the candidate must hand over the **OMR** Sheet to the invigilator on duty in the Room/Hall.



**MOMENTUM**

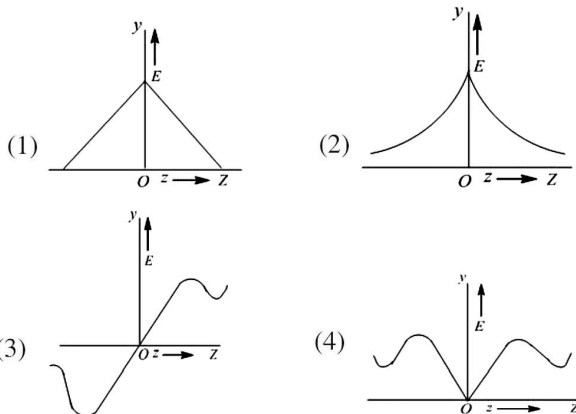
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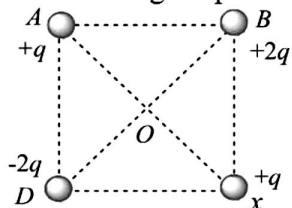
**PART - I : PHYSICS**

**SECTION - A**

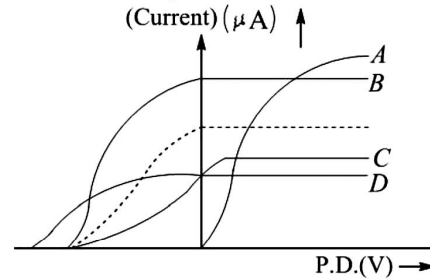
1. A circular ring carries a uniformly distributed positive charge and lies in  $X - Y$  plane with centre at origin of coordinate system. If at a point  $(0, 0, z)$  the electric field is  $E$ , then which of the following graphs is correct?



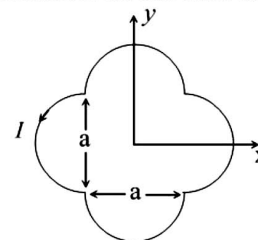
2. Capacitance (in  $F$ ) of a spherical conductor with radius  $1m$  is  
 (1)  $1.1 \times 10^{-10}$  (2)  $10^{-6}$   
 (3)  $9 \times 10^{-9}$  (4)  $10^{-3}$
3. Four charges arranged the at the corners of a square  $ABCD$ , as shown in the adjoining figure. The force on the charge kept at the centre  $O$  is



- (1) Zero  
 (2) Along the diagonal  $AC$   
 (3) Along the diagonal  $BD$   
 (4) Perpendicular to side  $AB$
4. A photoelectric cell is connected to a source of variable potential difference, connected across it and the photoelectric current resulting ( $\mu A$ ) is plotted against the applied potential difference (V). The graph in the broken line represents one for a given frequency and intensity of the incident radiation. If the frequency is increased and the intensity is reduced, which of the following graphs of unbroken line represents the new situation?

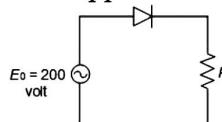


- (1) A (2) B  
 (3) C (4) D
5. An oil drop carrying a charge  $q$  has a mass  $m$  kg. It is falling freely in air with terminal speed  $v$ . The electric field required to make the drop move upwards with the same speed is  
 (1)  $\frac{mg}{q}$  (2)  $\frac{2mg}{q}$   
 (3)  $\frac{mgv}{q^2}$  (4)  $\frac{2mgv}{q}$
6. What will be the most suitable combination of three resistors  $A = 2\Omega$ ,  $B = 4\Omega$ ,  $C = 6\Omega$  so that  $\left(\frac{22}{3}\right)\Omega$  is equivalent resistance of combination?  
 (1) Parallel combination of A and C connected in series with B.  
 (2) Parallel combination of A and B connected in series with C.  
 (3) Series combination of A and C connected in parallel with B.  
 (4) Series combination of B and C connected in parallel with A.
7. A loop carrying current  $I$  lies in the  $x-y$  plane as shown in the figure. The unit vector  $\hat{k}$  is coming out of the plane of the paper. The magnetic moment of the current loop is



- (1)  $a^2 I \hat{k}$  (2)  $\left(\frac{\pi}{2} + 1\right) a^2 I \hat{k}$   
 (3)  $-\left(\frac{\pi}{2} + 1\right) a^2 I \hat{k}$  (4)  $(2\pi + 1) a^2 U \hat{k}$

8. A spherical condenser has inner and outer spheres of radii  $a$  and  $b$  respectively. The space between the two is filled with air. The difference between the capacities of two condensers formed when outer sphere is earthed and when inner sphere is earthed will be
- (1) Zero (2)  $4\pi\epsilon_0 a$   
 (3)  $4\pi\epsilon_0 b$  (4)  $4\pi\epsilon_0 a \left(\frac{b}{b-a}\right)$
9. The image formed by an objective of a compound microscope is
- (1) virtual and diminished (2) real and diminished  
 (3) real and enlarged (4) virtual and enlarged
10. Which one of the following statement is FALSE
- (1) The resistance of intrinsic semiconductor decreases with increase of temperature  
 (2) Pure  $SI$  doped with trivalent impurities gives a  $p$ -type semiconductor  
 (3) Majority carriers in a  $n$ -type semiconductor are holes  
 (4) Minority carriers in a  $p$ -type semiconductor are electrons
11. If voltage across a bulb rated 220 Volt-100 Watt drops by 2.5% of its rated value, the percentage of the rated value by which the power would decrease is:
- (1) 20% (2) 2.5%  
 (3) 5% (4) 10%
12. A conduction rod of 1 m length and 1 kg mass is suspended by two vertical wires through its ends. An external magnetic field of 2 T is applied normal to the rod. Now the current to be passed through the rod so as to make the tension in the wires zero is  
 [Take  $g = 10 \text{ ms}^{-2}$ ]
- (1) 0.5 A (2) 15 A  
 (3) 5 A (4) 1.5 A
13. The resistance of a cell does not depend on
- (1) Current drawn from the cell  
 (2) Temperature of electrolyte  
 (3) Concentration of electrolyte  
 (4) The  $e.m.f.$  of the cell
14. A person 6 feet in length can see his full size erect image in a mirror 2 feet in length. This mirror has to be
- (1) Plane or convex  
 (2) Plane or concave  
 (3) Necessarily convex  
 (4) Necessarily concave
15. A sinusoidal voltage of peak value 283 V and angular frequency 320/s is applied to a series LCR circuit. Given that  $R = 5\Omega$ ,  $L = 25 \text{ mH}$  and  $C = 1000 \mu\text{F}$ . The total impedance, and phase difference between the voltage across the source and the current will respectively be :
- (1)  $10 \Omega$  and  $\tan^{-1}\left(\frac{5}{3}\right)$  (2)  $7 \Omega$  and  $45^\circ$   
 (3)  $10 \Omega$  and  $\tan^{-1}\left(\frac{8}{3}\right)$  (4)  $7 \Omega$  and  $\tan^{-1}\left(\frac{5}{3}\right)$
16. In Bohr's model of hydrogen atom, let PE represent potential energy and TE the total energy. In going to a higher orbit,
- (1) PE increases, TE decreases  
 (2) PE decreases, TE increases  
 (3) PE increases, TE increases  
 (4) PE decreases, TE decreases
17. In AC circuit a resistance of  $R \Omega$  is connected in series with an inductance  $L$ . If the phase difference between the current and voltage is  $45^\circ$ , the inductive reactance will be
- (1)  $R/2$   
 (2)  $R/4$   
 (3)  $R$   
 (4) None of the above
18. A sinusoidal voltage of peak value 200 volt is connected to a diode and resistor  $R$  in the circuit figure, so that halfwave rectification occurs. If the forward resistance of the diode is negligible compared to  $R$ , the RMS voltage (in volt) across  $R$  is approximately



- (1) 200 (2) 100  
 (3)  $\frac{200}{\sqrt{2}}$  (4) 280

19. Two charges  $q_1$  and  $q_2$  are placed in vacuum at a distance  $d$  and the force acting between them is  $F$ . If a medium of dielectric constant 4 is introduced between them, the force now will be

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

20. Two spherical conductors A and B of radii 1mm and 2mm are separated by a distance of 5cm and are uniformly charged. If the spheres are connected by a conducting wire then in equilibrium condition, the ratio of the magnitude of the electric fields at the surfaces of spheres A and B is

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

21. The ratio of thickness of plates of two transparent mediums A and B is 6 : 4. If light takes equal time in passing through them, then refractive index of B with respect to A will be

- (1) 1.4 (2) 1.5  
 (3) 1.75 (4) 1.33

22. Which of the following is in the increasing order for penetrating power

- (1)  $\alpha, \beta, \gamma$  (2)  $\beta, \alpha, \gamma$   
 (3)  $\gamma, \alpha, \beta$  (4)  $\gamma, \beta, \alpha$

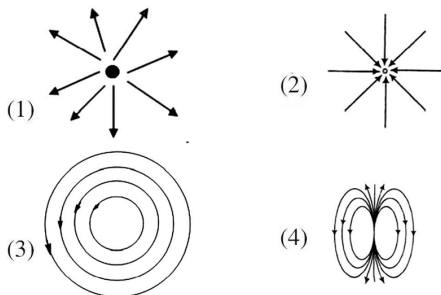
23. At a certain place, the angle of dip is  $30^\circ$  and the horizontal component of earth's magnetic field is 0.50 oersted. The earth's total magnetic field (in oersted) is

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

24. The coils of a step down transformer have 500 and 5000 turns. In the primary coil an ac of 4 ampere at 2200 volts is sent. The value of the current and potential difference in the secondary coil will be

- (1) 20 A, 220 V (2) 0.4 A, 22000 V  
 (3) 40 A, 220 V (4) 40 A, 22000 V

25. Which of the field pattern given in the figure is valid for electric field as well as for magnetic field?



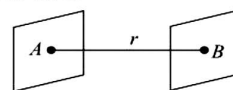
26. In a Young's double slit experiment (slit distance  $d$ ) monochromatic light of wavelength  $\lambda$  is used and the figure pattern observed at a distance  $L$  from the slits. The angular position of the bright fringes are

- (1)  $\sin^{-1}\left(\frac{N\lambda}{d}\right)$  (2)  $\sin^{-1}\left(\frac{(N+\frac{1}{2})\lambda}{d}\right)$   
 (3)  $\sin^{-1}\left(\frac{N\lambda}{L}\right)$  (4)  $\sin^{-1}\left(\frac{(N+\frac{1}{2})\lambda}{L}\right)$

27. The resistance of a wire is  $5\Omega$  at  $50^\circ\text{C}$  and  $6\Omega$  at  $100^\circ\text{C}$ . The resistance of the wire at  $0^\circ\text{C}$  will be

- (1)  $2\Omega$  (2)  $1\Omega$   
 (3)  $4\Omega$  (4)  $3\Omega$

28. Figure shows two parallel surfaces A and B at the same potential, kept at a small distance  $r$  from each other. A point charge  $q$  is taken from the surface A to B



The amount of work done is

- (1)  $\frac{q^2}{2\pi\epsilon_0 r}$  (2)  $\frac{q^2}{8\pi\epsilon_0 r}$   
 (3)  $\frac{q^2}{4\pi\epsilon_0 r}$  (4) Zero

29. If 200 MeV energy is released in the fission of a single nucleus of  ${}_{92}^{235}\text{U}$ . How many fissions must occur per second to produce a power of 1 kW?

- (1)  $3.125 \times 10^{13}$  (2)  $6.250 \times 10^{13}$   
 (3)  $1.525 \times 10^{13}$  (4) None of these

30. The frequency of a light wave in a material is  $2 \times 10^{14}$  Hz and wavelength is 5000 Å. The refractive index of material will be

- (1) 1.50 (2) 3.00  
 (3) 1.33 (4) 1.40

31. On an average, a neutron loses half of its energy per collision with a quasi-free proton. To reduce a 2 MeV neutron to a thermal neutron having energy 0.04 eV, the number of collisions required is nearly

- (1) 50 (2) 52  
 (3) 26 (4) 15

32. The speed of an electron having a wavelength of  $10^{-10}\text{m}$  is

- (1)  $7.25 \times 10^6\text{m/s}$  (2)  $6.26 \times 10^6\text{m/s}$   
 (3)  $5.25 \times 10^6\text{m/s}$  (4)  $4.24 \times 10^6\text{m/s}$

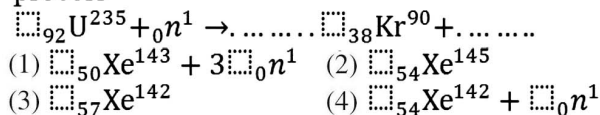
33. An electron of an atom transits from  $n_1$  to  $n_2$ . In which of the following maximum frequency of photon will be emitted?

- (1)  $n_1=1$  to  $n_2=2$       (2)  $n_1=2$  to  $n_2=1$   
 (3)  $n_1=2$  to  $n_2=6$       (4)  $n_1=6$  to  $n_2=2$

34. The light waves from two coherent sources have same intensity  $I_1 = I_2 = I_0$ . In interference pattern the intensity of light at minima is zero. What will be the intensity of light at maxima?

- (1)  $I_0$       (2)  $2 I_0$   
 (3)  $5 I_0$       (4)  $4 I_0$

35. Complete the equation for the following fission process



### SECTION - B

(Attempt any 10(Ten) questions out of 15 (Fifteen))

36. If a piece of metal was thought to be magnet, which one of the following observations would offer conclusive evidence

- (1) It attracts a known magnet  
 (2) It repels a known magnet  
 (3) Neither (1) nor (2)  
 (4) It attracts a steel screw driver

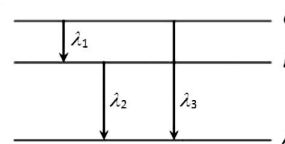
37. The SI unit of surface integral of electric field is

- (1) V-m      (2) V  
 (3)  $\text{NC}^{-1}\text{m}$       (4)  $\text{Cm}^{-3}$

38. The ratio of longest wavelength and the shortest wavelength observed in the fifth spectral series of emission spectrum of hydrogen is

- (1)  $4/3$       (2)  $525/376$   
 (3)  $36/11$       (4)  $960/11$

39. Energy levels A, B, C of a certain atom corresponding to increasing values of energy, i.e.,  $E_A < E_B < E_C$ . If  $\lambda_1, \lambda_2, \lambda_3$  are the wavelength of radiations corresponding to the transitions C to B, B to A and C to A respectively, which of the following statements is correct

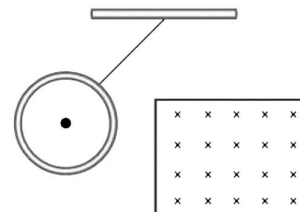


- (1)  $\lambda_3 = \lambda_1 + \lambda_2$       (2)  $\lambda_3 = \frac{\lambda_1 \lambda_2}{\lambda_1 + \lambda_2}$   
 (3)  $\lambda_1 + \lambda_2 + \lambda_3 = 0$       (4)  $\lambda_3^2 = \lambda_1^2 + \lambda_2^2$

40. The depletion layer in a silicon diode is  $1 \mu\text{m}$  wide and its knee potential is 0.6 V, then the electric field in the depletion layer will be

- (1)  $0.6 \text{Vm}^{-1}$       (2)  $6 \times 10^4 \text{Vm}^{-1}$   
 (3)  $6 \times 10^5 \text{Vm}^{-1}$       (4) Zero

41. A metallic ring connected to a rod oscillates freely like a pendulum. If now a magnetic field is applied in horizontal direction so that the pendulum now swings through the field, the pendulum will



- (1) Keep oscillating with the old time period  
 (2) Keep oscillating with a smaller time period  
 (3) Keep oscillating with a larger time period  
 (4) Come to rest very soon

42. Which is the correct ascending order of wavelengths?

- (1)  $\lambda_{\text{visible}} < \lambda_{\text{X-ray}} < \lambda_{\text{gamma-ray}} < \lambda_{\text{microwave}}$   
 (2)  $\lambda_{\text{gamma-ray}} < \lambda_{\text{X-ray}} < \lambda_{\text{visible}} < \lambda_{\text{microwave}}$   
 (3)  $\lambda_{\text{X-ray}} < \lambda_{\text{gamma-ray}} < \lambda_{\text{visible}} < \lambda_{\text{microwave}}$   
 (4)  $\lambda_{\text{microwave}} < \lambda_{\text{visible}} < \lambda_{\text{gamma-ray}} < \lambda_{\text{X-ray}}$

43. A metal surface is illuminated by a light of given intensity and frequency to cause photoemission. If the intensity of illumination is reduced to one-fourth of its original value, then the maximum KE of emitted photoelectrons will become

- (1)  $(1/16)^{\text{th}}$  of original value  
 (2) Unchanged  
 (3) Twice the original value  
 (4) Four times the original value

44. Two nucleons are at a separation of 1 fm. The net force between them is  $F_1$  if both neutrons,  $F_2$  if both are protons, and  $F_3$  if one is a proton and the other is a neutron.
- (1)  $F_1 > F_2 > F_3$                       (2)  $F_2 > F_1 > F_3$   
 (3)  $F_1 = F_3 > F_2$                       (4)  $F_1 = F_2 > F_3$
45. Three capacitors each of capacitance  $1 \mu\text{F}$  are connected in parallel. To the combination, a fourth capacitor of capacitance  $1 \mu\text{F}$  is connected in series. The resultant capacitance of the system is
- (1)  $4 \mu\text{F}$                                       (2)  $(4/3)\mu\text{F}$   
 (3)  $2 \mu\text{F}$                                       (4)  $(3/4)\mu\text{F}$
46. The magnetic field between the plates of radius 12 cm separated by distance of 4 mm of a parallel plate capacitor of capacitance 100 pF along the axis of plates having conduction current of 0.15 A is
- (1) Zero                                        (2) 1.5 T  
 (3) 15 T                                        (4) 0.15 T
47. In an electrical cable there is a single wire of radius 9 mm of copper. Its resistance is  $5\Omega$ . The cable is replaced by 6 different insulated copper wires, the radius of each wire is 3mm. Now the total resistance of the cable will be
- (1)  $7.5 \Omega$                                       (2)  $45 \Omega$   
 (3)  $90 \Omega$                                       (4)  $270 \Omega$
48. The magnetic field of a plane electromagnetic wave is given by :
- $$\vec{B} = 2 \times 10^{-8} \sin(0.5 \times 10^3 x + 1.5 \times 10^{11} t) \hat{j} \text{ T.}$$
- The amplitude of the electric field would be :
- (1)  $6 \text{ Vm}^{-1}$  along x-axis    (2)  $3 \text{ Vm}^{-1}$  along z-axis  
 (3)  $6 \text{ Vm}^{-1}$  along z-axis    (4)  $2 \times 10^{-8} \text{ Vm}^{-1}$  along z-axis
49. **Statement-1** : A nucleus having energy  $E_1$  decays by  $\beta^-$  emission to daughter nucleus having energy  $E_2$ , but then  $\beta^-$  rays are emitted with a continuous energy spectrum having end point energy  $E_1 - E_2$ .  
**Statement-2** : To conserve energy and momentum in  $\beta^-$  decay at least three particle must take part in the transformation.
- (1) Statement-1 is correct but Statement-2 is not correct.  
 (2) Statement-1 and Statement-2 both are correct and Statement-2 is the correct explanation of Statement-1.  
 (3) Statement-1 is correct, statement-2 is correct and statement-2 is not the correct explanation of Statement-1  
 (4) Statement-1 is incorrect, statement-2 is correct.
50. Two identical batteries each of e.m.f 2V and internal resistance  $1\Omega$  are available to produce heat in an external resistance bypassing a current through it. The maximum power that can be developed across R using these batteries is
- (1) 3.2 W                                        (2) 2.0 W  
 (3) 1.28 W                                      (4) 8/9 W

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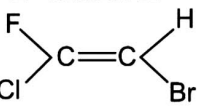
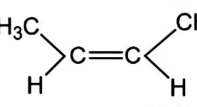
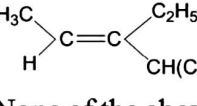
## PART - II : CHEMISTRY

## SECTION - A

51. Which one of the following compounds contains  $\beta$ -C<sub>1</sub>-C<sub>4</sub> glycosidic linkage ?

- (1) Lactose (2) Sucrose  
(3) Maltose (4) Amylose

52. The '*E*'-isomer is

- (1) 
- (2) 
- (3) 
- (4) None of the above

53. CaF<sub>2</sub> possesses :

- (1) Face centred cubic  
(2) Body centred cubic  
(3) Simple cubic  
(4) Hexagonal closed packing

54. The EAN of nickel in K<sub>2</sub>[Ni(CN)<sub>4</sub>] is:

- (1) 35 (2) 34  
(3) 36 (4) 38

55. Which reagent is effective in direct conversion of a carboxylic group with a 1°-alcoholic group ? (–COOH → –CH<sub>2</sub>OH)

- (1) Na-Ethanol  
(2) NaBH<sub>4</sub>  
(3) Catalytic hydrogenation  
(4) LiAlH<sub>4</sub>

56. For a chemical reaction at 27°C, the activation energy is 600 R. The ratio of the rate constants at 327°C to that of at 27°C will be

- (1) 2 (2) 40  
(3) e (4) e<sup>2</sup>

57. Which has the lowest melting point?

- (1) Cs (2) Na  
(3) Hg (4) Sn

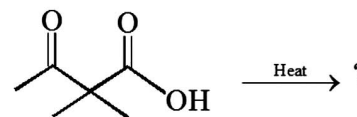
58. The cleavage of an aryl-alkyl ether with cold HI gives

- (1) Alkyl iodide and water  
(2) Aryl iodide and water  
(3) Alkyl iodide, aryl iodide and water  
(4) Phenol and alkyl iodine

59. The freezing point depression constant for water is 1.86 K kg mol<sup>-1</sup>. If 45 g of ethylene glycol is mixed with 600 g of water, the freezing point of the solution is

- (1) 2.2 K (2) 270.95 K  
(3) 273 K (4) 275.35 K

60. Predict the product of the following reaction.

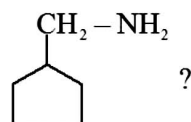


- (1) 3-methyl-2-butanone  
(2) 3,3-dimethylmalonic acid  
(3) propane  
(4) 3,3-dimethyl-2,4-pentadione

61. Colloidal solution commonly used in treatment of eye disease is :

- (1) Colloidal sulphur  
(2) Colloidal silver  
(3) Colloidal gold  
(4) Colloidal antimony

62. How many positional isomers are possible for



- (1) 3 (2) 5  
(3) 6 (4) 8

63. Match column A (catalyst) with column B (process)

A	B
1. SiO <sub>2</sub>	I. Cracking of Hydrocarbon
2. Pt	II. of benzene
3. Zeolites	III. Automobile converter

- (1) 1 → I, 2 → II, 3 → III  
(2) 1 → III, 2 → II, 3 → I  
(3) 1 → II, 2 → III, 3 → I  
(4) 1 → III, 2 → I, 3 → II

64. Which of the following factors may be regarded as the main cause of lanthanide contraction ?

- (1) Greater shielding of 5d electrons by 4f electrons
- (2) Poorer shielding of 5d electrons by 4f electrons
- (3) Effective shielding of one of the 4f electrons by another in the subshell
- (4) Poor shielding of one of 4f electrons by another in the subshell

65. The electronic configurations of bivalent europium and trivalent cerium are :

(atomic number : Xe = 54, Ce = 58, Eu = 63)

- (1)  $[\text{Xe}]4f^2$  and  $[\text{Xe}]4f^7$
- (2)  $[\text{Xe}]4f^9$  and  $[\text{Xe}]4f^7$
- (3)  $[\text{Xe}]4f^7 6s^2$  and  $[\text{Xe}]4f^2 6s^2$
- (4)  $[\text{Xe}]4f^6$  and  $[\text{Xe}]4f^9$

66. The concentration of a reactant X decreases from 0.1M to 0.005 M in 40 min. If the reaction follows first order kinetics, the rate of the reaction when the concentration of X is 0.01 M will be

- (1)  $1.73 \times 10^{-4} \text{Mmin}^{-1}$
- (2)  $3.47 \times 10^{-4} \text{Mmin}^{-1}$
- (3)  $3.47 \times 10^{-5} \text{Mmin}^{-1}$
- (4)  $7.5 \times 10^{-4} \text{Mmin}^{-1}$

67. Which of the following statements concerning lanthanides elements is false?

- (1) Lanthanides are separated from one another by ion-exchange method
- (2) Ionic radii of trivalent lanthanides steadily increase with increase in the atomic number
- (3) All lanthanides are highly dense metals
- (4) More characteristic oxidation state of lanthanides elements is +3

68. Tertiary amine is obtained in the reaction

- (1) Aniline  $\xrightarrow{\text{CH}_3\text{I}} \xrightarrow{\text{CH}_3\text{I}}$
- (2) Aniline  $\xrightarrow{\text{CH}_3\text{I}}$
- (3) Nitrobenzene  $\xrightarrow{\text{Sn/HCl}}$
- (4) None of these

69. The emf of the cell,

$\text{Ag} | \text{Ag}^+ (0.1 \text{ M}) || \text{Ag}^+ (1 \text{ M}) | \text{Ag}$  at 298 K is

- (1) 0.0059 V
- (2) 0.059 V
- (3) 5.9 V
- (4) 0.59 V

70. Consider the reaction,  $M^{n+}(\text{aq}) + ne^- \rightarrow M^0(\text{s})$ . The standard reduction potential values of the metals  $M_1, M_2$  and  $M_3$  are  $-0.34 \text{ V}, -3.05 \text{ V}$  and  $-1.66 \text{ V}$  respectively.

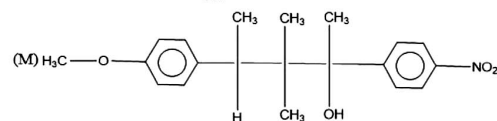
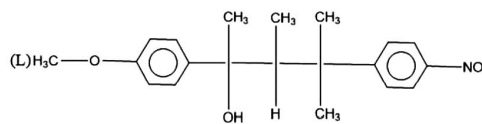
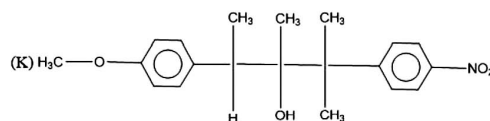
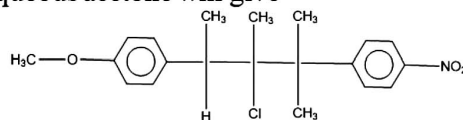
The order of their reducing power will be :

- (1)  $M_1 > M_2 > M_3$
- (2)  $M_3 > M_2 > M_1$
- (3)  $M_1 > M_3 > M_2$
- (4)  $M_2 > M_3 > M_1$

71. The electrode with reaction:  $\text{Cr}_2\text{O}_7^{2-}(\text{aq}) + 14\text{H}^+(\text{aq}) + 6e^- \rightarrow 2\text{Cr}^{3+}(\text{aq}) + 7\text{H}_2\text{O}$  can be represented as

- (1)  $\text{Pt} | \text{H}^+(\text{aq}), \text{Cr}_2\text{O}_7^{2-}(\text{aq})$
- (2)  $\text{Pt} | \text{H}^+(\text{aq}), \text{Cr}_2\text{O}_7^{2-}(\text{aq}), \text{Cr}^{3+}(\text{aq})$
- (3)  $\text{Pt}_{\text{H}_2} | \text{H}^+(\text{aq}), \text{Cr}_2\text{O}_7^{2-}$
- (4)  $\text{Pt}_{\text{H}_2} | \text{H}^+(\text{aq}), \text{Cr}_2\text{O}_7^{2-}(\text{aq}), \text{Cr}^{3+}(\text{aq})$

72. The following compound on hydrolysis in aqueous acetone will give



- (1) Mixture of (K) and (L)
- (2) Mixture of (K) and (M)
- (3) Only (M)
- (4) Only (K)

73. The vapour pressure of pure benzene  $\text{C}_6\text{H}_6$  at  $50^\circ\text{C}$  is 268 torr. How many moles of non-volatile solute per mole of benzene is required to prepare a solution of benzene having a vapour pressure of 167 torr at  $50^\circ\text{C}$ ?

- (1) 0.377
- (2) 0.605
- (3) 0.623
- (4) 0.395



74. Magnetic moment of  $\text{Cr}(Z = 24)$ ,  $\text{Mn}^+(Z = 25)$  and  $\text{Fe}^{2+}(Z = 26)$  are  $x, y, z$ . They are in order  
 (1)  $x < y < z$  (2)  $x = y < z$   
 (3)  $z < x = y$  (4)  $x = y = z$
75. The fraction of total volume occupied by the atoms present in a simple cube is  
 (1)  $\frac{\pi}{3\sqrt{2}}$  (2)  $\frac{\pi}{4\sqrt{2}}$   
 (3)  $\frac{\pi}{4}$  (4)  $\frac{\pi}{6}$
76. Which statement is wrong?  
 (1) The catalyst does not alter the equilibrium of a reaction  
 (2) Reaction with higher activation energy has higher rate constant  
 (3) In the endothermic reaction, the activation energy of the reaction is higher than that of heat of reaction  
 (4) Half-life period of a first order reactions is independent of initial concentration
77. The deficiency of vitamin C causes:  
 (1) Scurvy  
 (2) Rickets  
 (3) Pyroheia  
 (4) Pernicious anaemia
78. The common metal in brass, bronze and german silver is:  
 (1) Cu (2) Mg  
 (3) Al (4) Zn
79.  $\text{CuSO}_4$  when reacts with KCN forms CuCN, which is insoluble in water. It is soluble in excess of KCN, due to formation of the following complex  
 (1)  $\text{K}_2[\text{Cu}(\text{CN})_4]$  (2)  $\text{K}_3[\text{Cu}(\text{CN})_4]$   
 (3)  $\text{CuCN}_2$  (4)  $\text{Cu}[\text{KC}u(\text{CN})_4]$
80. Cinnamic acid on decarboxylation gives:  
 (1) Benzene (2) Toluene  
 (3) Styrene (4) Benzaldehyde
81. Phenol is less soluble in water. It is due to:  
 (1) Non-polar nature of phenol  
 (2) Acidic nature of  $-\text{OH}$  group  
 (3) Non-polar hydrocarbons part in it  
 (4) None of the above
82. Total volume of atoms present in face-centred cubic unit cell of a metal is ( $r$  is atomic radius)  
 (1)  $\frac{20}{3}\pi r^3$  (2)  $\frac{24}{3}\pi r^3$   
 (3)  $\frac{12}{3}\pi r^3$  (4)  $\frac{16}{3}\pi r^3$
83. Arrange the following Cobalt complexes in the order of increasing Crystal Field Stabilization Energy (CFSE) value. Complexes :  
 $[\text{CoF}_6]^{3-}$ ,  $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$ ,  
 $[\text{Co}(\text{NH}_3)_6]^{3+}$  and  $[\text{Co}(\text{en})_3]^{3+}$   
 Choose the correct option :  
 (1)  $A < B < C < D$  (2)  $B < A < C < D$   
 (3)  $B < C < D < A$  (4)  $C < D < B < A$
84. The spin only magnetic moments (in BM) for free  $\text{Ti}^{3+}$ ,  $\text{V}^{2+}$  and  $\text{Sc}^{3+}$  ions respectively are  
 (At. No. Sc : 21, Ti : 22, V : 23)  
 (1) 3.87, 1.73, 0 (2) 1.73, 3.87, 0  
 (3) 1.73, 0, 3.87 (4) 0, 3.87, 1.73
85. For a  $d^4$  metal ion in an octahedral field, the correct electronic configuration is:  
 (1)  $t_{2g}^3 e_g^1$  when  $\Delta_0 < P$  (2)  $t_{2g}^2 e_g^2$  when  $\Delta_0 > P$   
 (3)  $t_{2g}^4 e_g^0$  when  $\Delta_0 < P$  (4)  $e_g^2 t_{2g}^2$  when  $\Delta_0 < P$

## SECTION - B

(Attempt any 10(Ten) questions out of 15 (Fifteen))

86. The resistance of 1N solution of acetic is  $250\Omega$ , when measured in a cell having a cell constant of  $1.15\text{cm}^{-1}$ . The equivalent conduction (in  $\text{ohm}^{-1}\text{cm}^2\text{equiv}^{-1}$ ) of 1N acetic acid is  
 (1) 2.3 (2) 4.6  
 (3) 9.2 (4) 18.4
87. The epimer of glucose is:  
 (1) Galactose (2) Fructose  
 (3) Mannose (4) Arabinose
88. How many compounds with molecular formula  $\text{C}_5\text{H}_{10}\text{O}$  may be reduced with  $\text{NaBH}_4$  to a primary alcohol?  
 (1) 2 (2) 3  
 (3) 4 (4) 5

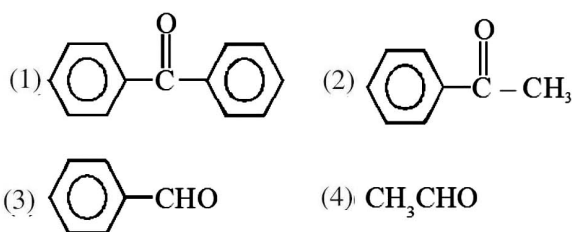
89. Two solutions of a substance (non electrolyte) are mixed in the following manner 480 mL of 1.5 M first solution + 520 mL of 1.2 M second solution. What is the molarity of the final mixture

- (1) 1.20 M (2) 1.50 M  
(3) 1.344 M (4) 2.70 M

90. Which one of the following complex species does not obey the EAN rule?

- (1)  $[\text{Cu}(\text{CN})_4]^{3-}$  (2)  $[\text{Cr}(\text{NH}_3)_6]^{3+}$   
(3)  $[\text{Fe}(\text{CN})_6]^{4-}$  (4)  $[\text{Ni}(\text{CO})_4]$

91. Select the least reactive carbonyl compound for nucleophilic addition.



92. Which of the following is not a synthetic polymer?

- (1) Polyisoprene  
(2) Polybutadiene  
(3) Polythlene terephthalate  
(4) Polyethylene

93. The d-electron configuration of  $[\text{Ru}(\text{en})_3]\text{Cl}_2$  and  $[\text{Fe}(\text{H}_2\text{O})_6]\text{Cl}_2$ , respectively are :

- (1)  $t_{2g}^6 e_g^0$  and  $t_{2g}^6 e_g^0$  (2)  $t_{2g}^4 e_g^2$  and  $t_{2g}^6 e_g^0$   
(3)  $t_{2g}^6 e_g^0$  and  $t_{2g}^4 e_g^2$  (4)  $t_{2g}^4 e_g^2$  and  $t_{2g}^4 e_g^2$

94. An alkali salt of palmitic acid is known as:

- (1) An alkoxide (2) An ester  
(3) A soap (4) An epoxide

95. In the metallurgical extraction of zinc from  $\text{ZnO}$ , the reducing agent used is?

- (1) Nitric oxide (2) Sulphur dioxide  
(3) Carbon monoxide (4) Carbon dioxide

96. Interstitial compound is formed by

- (1) Fe, Co (2) Co, Ni  
(3) Fe, Ni (4) All of these

97. Match the metals (column I) with the coordination compound(s)/enzyme(s) (column II) :

(column I) (column II)  
Metals Coordination compound(s)/enzyme(s)

- (A) Co (i) Wilkinson catalyst  
(B) Zn (ii) Chlorophyll  
(C) Rh (iii) Vitamin  $\text{B}_{12}$   
(D) Mg (iv) Carbonic anhydrase

- (1) (A)-(iii), (B)-(iv); (C)-(i); (D)-(ii)  
(2) (A)-(i), (B)-(ii); (C)-(iii); (D)-(iv)  
(3) (A)-(ii), (B)-(i); (C)-(iv); (D)-(iii)  
(4) (A)-(iv), (B)-(iii); (C)-(i); (D)-(ii)

98. The color of  $\text{KMnO}_4$  is due to :

- (1)  $\text{L} \rightarrow \text{M}$  charge transfer transition  
(2)  $\sigma-\sigma^*$  transition  
(3)  $\text{M} \rightarrow \text{L}$  charge transfer transition  
(4) d - d transition

99. The compound that inhibits the growth of tumors is :

- (1) *trans*- $[\text{Pt}(\text{Cl})_2(\text{NH}_3)_2]$  (2) *cis*- $[\text{Pd}(\text{Cl})_2(\text{NH}_3)_2]$   
(3) *cis*- $[\text{Pt}(\text{Cl})_2(\text{NH}_3)_2]$  (4) *trans*- $[\text{Pd}(\text{Cl})_2(\text{NH}_3)_2]$

100. Which of the following name formula combination is not correct ?

	Formula	Name
(1)	$\text{K}_2[\text{Pt}(\text{CN})_4]$	Potassium tetracyanoplatinate (II)
(2)	$[\text{Mn}(\text{CN})_5]^{2-}$	Pentacyanomanganate (II) ion
(3)	$\text{K}[\text{Cr}(\text{NH}_3)_2\text{Cl}_4]$	Potassium diammine tetrachlorochromate (III)
(4)	$[\text{Co}(\text{NH}_3)_4(\text{H}_2\text{O})\text{I}]\text{SO}_4$	Tetraammineaquaiodido cobalt (III) sulphate.

## PART - III : BOTANY

## SECTION - A

101. Which one of the following statements is correct?

- (1) Sporogenous tissue is haploid
- (2) Endothecium produces the microspores
- (3) Tapetum nourishes the developing pollen
- (4) Hard outer layer of pollen is called intine

102. Geitonogamy involves:

- (1) Fertilization of a flower by the pollen from a flower of another plant belonging to a distant population
- (2) Fertilization of a flower by the pollen from another flower of the same plant
- (3) Fertilization of a flower by the pollen from the same flower
- (4) Fertilization of a flower by the pollen from a flower of another plant in the same population

103. Function of filiform apparatus is to:

- (1) Guide the entry of pollen tube
- (2) Recognize the suitable pollen at stigma
- (3) Stimulate division of generative cell
- (4) Produce nectar

104. Seed coat is derived from:

- (1) Pericarp
- (2) Epicarp
- (3) Integuments of ovule
- (4) Nucellus

105. Identify the wrong statements regarding post-fertilization development:

- (1) The ovary wall develops into pericarp
- (2) The outer integument of ovule develops into tegmen
- (3) The fusion nucleus (triple nucleus) develops into endosperm
- (4) The ovule develops into seed

106. Which of the following statements about sporopollenin is false?

- (1) Exine is made up of sporopollenin
- (2) Sporopollenin is most resistant organic material
- (3) Exine has apertures called germ pores where sporopollenin is present
- (4) Sporopollenin can withstand high temperature and strong acids

107. Wind pollinated flowers are:

- (1) Small, brightly coloured, producing large number of pollens
- (2) Small, producing large number of pollen grains
- (3) Large, producing abundant nectar and pollens
- (4) Small, producing nectar and dry pollens

108. Find out the correct option :

- A. Tapetum nourishes the developing pollen grains.
  - B. Hilum represents the junction between ovule and funicle.
  - C. In aquatic angiosperms, such as water hyacinth and water lily, the pollination is by water.
  - D. The primary endosperm nucleus is  $3n$ .
- (1) A and B are correct but C and D are wrong
  - (2) A, B and D are correct but C is wrong
  - (3) B, C and D are correct but A is wrong
  - (4) Only A and D are correct but B and C are wrong

109. Which of the following is true for the location of few genes of *Drosophila* studied by T.H. Morgan :

- (1)  $y$ ,  $w$  and  $m$  genes are located on Y chromosome
- (2)  $y^+$ ,  $w^+$  and  $m^+$  genes are located on Y chromosome
- (3)  $y$ ,  $y^+$ ,  $w$ ,  $w^+$ ,  $m$  and  $m^+$  genes are located on X-chromosome
- (4)  $y$ ,  $y^+$ ,  $w$ ,  $w^+$ ,  $m$  and  $m^+$  genes are autosomal

110. How many different types of gametes would be formed in an individual who is heterozygous for four different loci ?

- (1) 16
- (2) 12
- (3) 8
- (4) 4




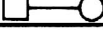
111. Morgan's choice of *Drosophila* has been proven to be useful even today for genetic experiments for following reason (s) :

- (1) It has only four pairs of chromosomes
- (2) Easy and inexpensive maintenance with short generation time and large number of offsprings
- (3) Very large number of visible as well as biochemically mutant phenotypes
- (4) All of the above

112. In ZW-ZZ type of sex determination in birds :

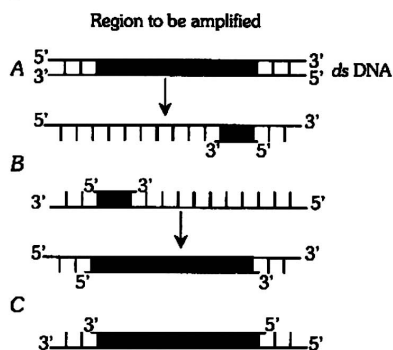
- (1) Males are heterogametic
- (2) Females are heterogametic
- (3) Females are homogametic
- (4) Both males and females are homogametic

113. Match the column w.r.t. pedigree symbols :

Column-I	Column-II
A. Consanguineous mating	(i) 
B. Mating	(ii) 
C. Sex-unspecified	(iii) 
D. Affected male	(iv) 

- (1) A = (i), B = (ii), C = (iv), D = (iii)
- (2) A = (iii), B = (ii), C = (i), D = (iv)
- (3) A = (i), B = (iv), C = (ii), D = (iii)
- (4) A = (iv), B = (ii), C = (iii), D = (i)

114. In a dihybrid cross, if you get 9 : 3 : 3 : 1 ratio it denotes that:
- (1) The alleles of two genes are interacting with each other
  - (2) It is a multigenic inheritance
  - (3) It is a case of multiple allelism
  - (4) The alleles of two genes are segregating independently
115. All genes located on the same chromosome :
- (1) Form different groups depending upon their relative distance
  - (2) Form one linkage group
  - (3) Will not form any linkage groups
  - (4) Form interactive groups that affect the phenotype
116. In sickle cell anaemia glutamic acid is replaced by valine. Which one of the following triplets codes for valine?
- (1) GGG
  - (2) AAG
  - (3) GAA
  - (4) GUG
117. What is the first step in the southern blot technique
- (1) Denaturation of DNA on the gel for hybridization with specific probe
  - (2) Production of a group of genetically identical cells
  - (3) Digestion of DNA by restriction enzyme
  - (4) Denaturation of DNA from a nucleated cell such as the one from the scene of crime
118. EcoRI is an example of
- (1) Exonuclease
  - (2) Endonuclease
  - (3) Specific site of restriction endonuclease
  - (4) RNA polymerase
119. Which of the following is used to select genes of interest from a genomic library
- (1) Restriction enzymes
  - (2) Cloning vectors
  - (3) Gene targets
  - (4) DNA probes
120. The figure below shows three steps (A, B, C) of Polymerase Chain Reaction (PCR). Select the option giving correct identification together with what it represents



Options

- (1) B - Denaturation at a temperature of about 98° C separating the two DNA strands
- (2) A - Denaturation at a temperature of about 50° C
- (3) C - Extension in the presence of heat stable DNA polymerase
- (4) A - Annealing with two sets of primers

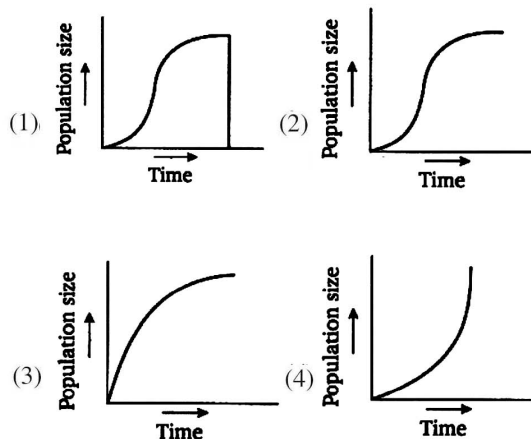
121. Biolistics (gene-gun) is suitable for
- (1) Disarming pathogen vectors
  - (2) Transformation of plant cells
  - (3) Constructing recombinant DNA by joining with vectors
  - (4) DNA fingerprinting
122. What is it that forms the basis of DNA Fingerprinting
- (1) The relative proportions of purines and pyrimidines in DNA
  - (2) The relative difference in the DNA occurrence in blood, skin and saliva
  - (3) The relative amount of DNA in the ridges and grooves of the fingerprints
  - (4) Satellite DNA occurring as highly repeated short DNA segments
123. Which one is a true statement regarding DNA polymerase used in PCR
- (1) It is used to ligate introduced DNA in recipient cells
  - (2) It serves as a selectable marker
  - (3) It is isolated from a virus
  - (4) It remains active at high temperature
124. Amplification of gene of interest by using DNA polymerase may go upto
- (1) 0.1 million times
  - (2) 1.0 million times
  - (3) 1.0 billion times
  - (4) 1.0 trillion times
125. In genetic fingerprinting, the 'probe' refers to ....
- (1) A radioactively labelled single stranded DNA molecule
  - (2) A radioactively labelled single stranded RNA molecule
  - (3) A radioactively labelled double stranded RNA molecule
  - (4) A radioactively labelled double stranded DNA molecule
126. In his experiments on the chemistry of DNA, Chargaff estimated the base composition of human sperms and found that Adenine constituted 31% and Guanine 19%. The quantity of Cytosine in the DNA of human somatic cell is likely to be
- (1) 31%
  - (2) 19%
  - (3) 38%
  - (4) 68%
127. Which type of RNA is most abundant in cell
- (1) m RNA
  - (2) t RNA
  - (3) r RNA
  - (4) catalytic RNA
128. Which statement cannot be taken for granted while considering an ecological pyramid?
- (1) that producers are always more in number
  - (2) biomass of producers is always more
  - (3) energy is always going towards the higher trophic levels
  - (4) both (1) and (2)

129. 'Nutrients incorporated in microorganisms that remain unavailable to plants' is referred to as :
- (1) standing state
  - (2) nutrient immobilization
  - (3) standing biomass
  - (4) microbial nutrientse
130. What are the decomposers in an aquatic ecosystem?
- (1) fungi, bacteria and flagellated protozoans
  - (2) fungi, insects
  - (3) insects and moths
  - (4) depends from system to system
131. Primary productivity depends upon :
- (1) plant species only
  - (2) environmental factors
  - (3) both (1) and (2) hi
  - (4) both (1) and (2) and the photosynthetic capacity of plants
132. Select the incorrect statement.
- (1) Species diversity increases as we move away from the equator towards the poles.
  - (2) Stellar's sea cow and passenger pigeon got extinct due to over exploitation by man.
  - (3) Lantana and Eichhornia are invasive weed species in India.
  - (4) The historic convention on biological diversity was held in 1
133. One of the ex situ conservation methods for endangered species is
- (1) wildlife sanctuaries
  - (2) biosphere reserves
  - (3) cryopreservation
  - (4) National parks.
134. Biosphere reserves differ from National parks and wildlife sanctuaries because in the former
- (1) human beings are not allowed to ente
  - (2) people are an integral part of the system
  - (3) plants are paid greater attention than the animals
  - (4) living organisms are brought from all over the world and preserved for prosperity.
135. Hot spots are priority areas for in situ conservation. The key criteria for determining a hot spot is/are
- (1) location in developed/undeveloped country
  - (2) vicinity to the sea
  - (3) number of endemic species and degrees of threat
  - (4) all of the above.

## SECTION - B

(Attempt any 10(Ten) questions out of 15 (Fifteen))

136. Which one of the following organisms reproduces sexually only once in its life time ?
- (1) Banana plant
  - (2) Mango
  - (3) Tomato
  - (4) *Eucalyptus*
137. Biosphere is :
- (1) A component in the ecosystem
  - (2) Composed of the plants present in the soil
  - (3) Life in the outer space
  - (4) Composed of all living organisms present on earth which interact with the physical environment
138. Population of an insect species increases explosively during rainy season and then disappears at the end of the season. It shows:
- (1) Food plants mature and at the end of rainy season
  - (2) Population of predators increases enormously
  - (3) Population growth curve is J-shaped
  - (4) Population growth curve is S-shaped
139. Which one is parasite in true sense?
- (1) Head Louse living on human scalp as well as laying eggs on human hair
  - (2) Cuckoo laying eggs in Crow's nest
  - (3) Female *Anopheles* biting and sucking blood from humans
  - (4) Human foetus inside uterus and drawing nourishment from mother
140. "Complete competitors cannot coexist" is true for:
- (1) Primary succession
  - (2) Secondary succession
  - (3) Character displacement
  - (4) Competitive exclusion
141. Which of the following is a likely graphic outcome of a population of deer introduced to an island with an adequate herbivory and without natural predators, parasites or diseases ?



142. Evidence shows that some grasses benefit from being grazed. Which of the following terms would best describe this plant-herbivore interaction ?  
(1) Predation (2) Mutualism  
(3) Commensalism (4) Competition
143. The unequivocal proof of DNA as the genetic material came from the studies on a  
(1) bacterium (2) fungus  
(3) viroid (4) bacterial virus.
144. What is not true for genetic code?  
(1) It is nearly universal.  
(2) It is degenerate.  
(3) It is unambiguous.  
(4) A codon in mRNA is read in a non-contiguous fashion.
145. Operon concept was proposed by  
(1) Jacob and Monob  
(2) David Baltimore  
(3) Allec jeffery  
(4) None of these .
146. The sequence of structural gene in Lac operon concept  
(1) *Lac A, Lac Y, Lac Z*  
(2) *Lac A, Lac Z, Lac Y*  
(3) *Lac Y, Lac Z, Lac A*  
(4) *Lac Z, Lac Y, Lac A*
147. The stand of DNA acting as template for mRNA transcription ?  
A. Coding stand  
B. Non-coding stand  
C. Sense stand  
D. Anti-sense stand

The correct answer is

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

148. In the given options identify, purines and pyrimidines and choose the correct option.

- I. Adenine II. Guanine  
III. Cytosine IV. Uracil  
V. Phosphate VI. Sugar  
VII. Thymine

- | Pyrimidines         | Purines       |
|---------------------|---------------|
| (1) I and II        | III, IV and V |
| (2) III, IV and VII | I and II      |
| (3) I and II III,   | IV and VII    |
| (4) II, III and V   | IV, V and VI  |

149. Initiation codon is

- (1) AUG (2) AGU  
(3) AAU (4) UGA.

150. Select the incorrect statement(s).

- Six codons do not code for any amino acid.
  - Codon is read in mRNA in a contiguous fashion.
  - Three codons function as stop codons.
  - The initiation codon AUG codes for methionine.
- (1) 1, 2 and 4 are incorrect  
(2) 1, 2 and 3 are incorrect  
(3) 2, 3 and 4 are incorrect  
(4) 1 alone is incorrect

*Space for rough work*

## PART - IV : ZOOLOGY

## SECTION - A

151. Match the following and select the correct option.

- |                           |                      |
|---------------------------|----------------------|
| (A) Accessory ducts       | (i) Seminal vesicles |
| (B) Accessory glands      | (ii) Vas deferens    |
| (C) Spermatids            | (iii) Uterus         |
| (D) Primary spermatocytes | (iv) 23 chromosomes  |
|                           | (v) 46 chromosomes   |

- | A               | B    | C    | D    |
|-----------------|------|------|------|
| (1) (ii), (iii) | (i)  | (iv) | (v)  |
| (2) (i), (iii)  | (ii) | (iv) | (v)  |
| (3) (ii), (iii) | (i)  | (v)  | (iv) |
| (4) (i), (iii)  | (ii) | (v)  | (iv) |

152. Corpus luteum secretes

- (1) progesterone                      (2) estrogen  
(3) luteinising hormone      (4) FSH.

153. LH surge occurs during which phase of the menstrual cycle?

- (1) Menstrual phase  
(2) At the beginning of proliferative phase  
(3) Just before the end of the proliferative phase  
(4) At the middle of the cycle

154. Which one of the following events is correctly matched with the time period in a normal menstrual cycle?

- (1) Release of egg: 5th day  
(2) Endometrium regenerates: 5-10 days  
(3) Endometrium secretes nutrients for implantation: 11-18 days  
(4) Rise in progesterone level: 1-15 days

155. Extrusion of second polar body from egg nucleus occurs

- (1) after entry of sperm before completion of fertilisation  
(2) after completion of fertilisation  
(3) before entry of sperm  
(4) without any relation of sperm entry.

156. Seminal plasma in humans is rich in

- (1) fructose and calcium but has no enzymes  
(2) glucose and certain enzymes but has no calcium  
(3) fructose and certain enzymes but poor in calcium  
(4) fructose, calcium and certain enzymes.

157. Sertoli cells are found in

- (1) ovaries and secrete progesterone  
(2) adrenal cortex and secrete adrenaline  
(3) seminiferous tubules and provide nutrition to germ cells  
(4) pancreas and secrete cholecystokinin.

158. Which one of the following statements about human sperm is correct?

- (1) Acrosome has a conical pointed structure used for piercing and penetrating the egg, resulting in fertilisation.  
(2) The sperm lysins in the acrosome dissolve the egg envelope facilitating fertilisation.  
(3) Acrosome serves as a sensory structure leading the sperm towards the ovum.  
(4) Acrosome serves no particular function.

159. Signals from fully developed foetus and placenta ultimately lead to parturition which requires the release of

- (1) estrogen from placenta  
(2) oxytocin from maternal pituitary  
(3) oxytocin from foetal pituitary  
(4) relaxin from placenta.

160. In human female the blastocyst

- (1) forms placenta even before implantation  
(2) gets implanted into uterus 3 days after ovulation  
(3) gets nutrition from uterine endometrial secretion only after implantation  
(4) gets implanted in endometrium by the trophoblast cells.

161. If for some reason, the vasa efferentia in the human reproductive system get blocked, the gametes will not be transported from

- (1) testes to epididymis  
(2) epididymis to vas deferens  
(3) ovary to uterus  
(4) vagina to uterus.

162. The Leydig's cells as found in the human body are the secretory source of

- (1) progesterone                      (2) intestinal mucus  
(3) glucagon                              (4) androgens.

163. Immunisation is based on :-  
 (1) Memory of individuals  
 (2) Pathogenic power  
 (3) Phagocytosis  
 (4) Memory of immune system
164. Which is a an infectious disease-  
 (1) Coronary thrombosis (2) Diphtheria  
 (3) Diabetes mellitus (4) Hypertension
165. The best diagnosis of cancer is done by:-  
 (1) Biopsy  
 (2) X-ray  
 (3) Microscopic examination of body fluids  
 (4) Surgery
166. Match the disease in Column I with appropriate items (pathogen/prevention/treatment) in column II
- | Column I       | Column II                               |
|----------------|---|
| (a) Amoebiasis | (i) Treponema pa/lidum                  |
| (b) Diphtheria | (ii) Use only sterilized food and water |
| (c) Cholera    | (iii) DPT Vaccine                       |
| (d) Syphilis   | (iv) Use oral rehydration therapy       |
- (1) a - (ii), b - (i), c - (iii), d - (iv)  
 (2) a - (ii), b - (iii), c - (iv), d - (i)  
 (3) a - (i), b - (ii), c - (iii), d - (iv)  
 (4) a - (ii), b - (iv), c - (i), d - (iii)
167. With respect to immunity?  
 (1) Antibodies are protein molecules, each of which has four light chains  
 (2) Rejection of a kidney graft is the function of B-lymphocytes.  
 (3) Preformed antibodies need to be injected to treat the bite by a viper snake.  
 (4) The antibodies against small pox pathogen are produced by T-lymphocytes
168. Which is the particular type of drug that is obtained from the plant whose one flowering branch is shown below:-



- (1) Hallucinogen (2) Depressant  
 (3) Stimulant (4) Pain - killer

169. In context of Amniocentesis, which of the following statement is incorrect ?  
 (1) It is usually done when a woman is between 14-16 weeks pregnant.  
 (2) It is used for prenatal sex determination  
 (3) It can be used for detection of Down syndrome  
 (4) It can be used for detection of Cleft palate
170. Which of the following is a protozoan disease ?  
 (1) Malaria (2) Amoebiasis  
 (3) Sleeping sickness (4) All of these
171. Which one of the following pairs of diseases is viral as well as transmitted by mosquitoes?  
 (1) Elephantiasis and dengue  
 (2) Yellow fever and sleeping sickness  
 (3) Encephalitis and sleeping sickness  
 (4) Yellow fever and dengue
172. Which one of the following is not an autoimmune disease?  
 (1) Graves' disease  
 (2) Pernicious anemia  
 (3) Rheumatoid arthritis  
 (4) Insomnia
173. Which one of the following immunoglobulins is found as pentamer ?  
 (1) IgG (2) IgM  
 (3) IgA (4) IgE
174. A marsupials evolved from ancestral stock, but all within Australian continent. This represents  
 (1) Adaptive radiation like in Darwin's finches  
 (2) Adaptive radiation unlike in Darwin's finches  
 (3) Convergent evolution like in Darwin's finches  
 (4) Convergent evolution unlike in Darwin's finches
175. Darwin saw that population of Galapagos finches :  
 (1) Are adapted to different island habitats  
 (2) Resemble birds in South America  
 (3) Show variation in traits  
 (4) All of the above
176. Match the following columns.

Column I	Column II
A. Analogous organs	1. Ontogeny repeat phylogeny
B. Miller and Urey	2. Experiment (chemical evolution)
C. Oparin and Haldane	3. Chemical evolution (theory)
D. Human embryo have gill	4. Wings of bird and butterfly



## Codes

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

177. The theory of spontaneous generation stated that
- (1) life arose from living forms only
  - (2) life can arise from both living and non-living
  - (3) life can arise from non-living things only
  - (4) life arises spontaneously, neither from living nor from the non-living.
178. Which of these is used as vector in gene therapy for SCID ?
- (1) Arbovirus
  - (2) Rotavirus
  - (3) Entrovirus
  - (4) Retrovirus
179. Molecular scissors, which cut DNA at specific site is
- (1) Pectinase
  - (2) Polymerase
  - (3) Restriction endonuclease
  - (4) Ligase
180. Human insulin is being commercially produced from a transgenic species of
- (1) Escherichia coli
  - (2) Mycobacterium
  - (3) Rhizobium
  - (4) Saccharomyces
181. Cry II Ab Cry I Ab produce toxins that control
- (1) Cotton bollworms and corn borer respectively
  - (2) Corn borer and cotton bollworms respectively
  - (3) Tobacco budworms and nematodes respectively
  - (4) Nematodes and tobacco budworms respectively
182. Transgenic plants are
- (1) Produced by a somatic embryo in artificial medium
  - (2) Generated by introducing foreign DNA in to a cell and regenerating a plant from that cell
  - (3) Produced after protoplast fusion in artificial medium
  - (4) Growth in artificial medium after hybridisation in the field
183. Plasmids are used in genetic engineering because they are:
- (1) Easily available
  - (2) Able to integrate with host chromosome
  - (3) Able to replicate along with chromosomal DNA
  - (4) Contain DNA sequences coding for drug resistance

184. 'Passenger DNA' is:
- (1) Plasmid vector
  - (2) Antibiotic resistance gene
  - (3) Reporter gene
  - (4) Desired gene fragment *i.e.*, gene of interest
185. YAC contain which of the following elements ?
- (1) Centromeres only
  - (2) Telomeres only
  - (3) Centromeres, telomeres and on-site
  - (4) Telomeres and centromeres

## SECTION - B

Attempt any 10(Ten) questions out of 15 (Fifteen).

186. Which of the following is hormone releasing IUD?
- (1) Lippes loop
  - (2) Cu7
  - (3) LNG-20
  - (4) Multiload 375
187. Which of the following is incorrect regarding vasectomy?
- (1) Vasa deferentia is cut and tied
  - (2) Irreversible sterility
  - (3) No sperm occurs in seminal fluid
  - (4) No sperm occurs in epididymis
188. In case of a couple where the male is having a very low sperm count, which technique will be suitable for fertilisation ?
- (1) Gamete intracytoplasmic fallopian transfer
  - (2) Artificial Insemination
  - (3) Intra cytoplasmic sperm injection
  - (4) Intrauterine transfer
189. Which one of the following is the most widely accepted method of contraception in India, as at present?
- (1) Cervical caps
  - (2) Tubectomy
  - (3) Diaphragms
  - (4) IUDs' (Intra uterine devices)
190. The Test-tube Baby programme employs which one of the following techniques ?
- (1) Gamete intra fallopian transfer (GIFf)
  - (2) Zygote intra fallopian transfer (Ziff)
  - (3) Intra cytoplasmic sperm injection (ICSI)
  - (4) Intra uterine insemination (OUI)
191. The main function of the fimbriae of the Fallopian tube in females is to :
- (1) Help in the development of overy
  - (2) Help in the development of corpus luteum
  - (3) Release to ovum from the Graafian follicle
  - (4) make necessary changes in the endometrium for implantation

- 192.** MTP is  
(1) Medical Termination of Pregnancy  
(2) Also called induced abortion  
(3) Both a and b  
(4) Aimed at decreasing population size
- 193.** *Bacillus thuringiensis* is a bacterium of  
(1) Small intestine (2) Dirty water  
(3) Skin of dog (4) Soil
- 194.** Arrange the steps of ADA-deficiency treatment in sequence:  
I. The lymphocytes with ADA cDNA is returned to the patient  
II. The lymphocytes from the blood of the patient are grown in culture outside the body  
III. A functional ADA cDNA (using retroviral vector) is introduced into the lymphocytes  
(1) I → III → II (2) I → II → III  
(3) II → I → III (4) III → II → I
- 195.** RNA interference (RNAi):  
(1) Takes place in all eukaryotic organisms as a method of cellular defense  
(2) Involves silencing of a specific mRNA due to a complementary dsRNA molecule that binds and prevents translation of the mRNA (silencing)  
(3) Involves RISC (RNA induced silencing complex)  
(4) All of the above
- 196.** In RNAi, genes are silenced using :  
(1) ss DNA (2) ds DNA  
(3) ds RNA (4) ss RNA
- 197.** Choose the correct option regarding retrovirus :  
(1) An RNA virus that can synthesise DNA during . infection  
(2) A DNA virus that can synthesise RNA during infection  
(3) A ssDNA virus  
(4) A dsRNA virus
- 198.** 'Golden rice' or 'Miracle rice' is transgenic rice rich in:  
(1) Vitamin B and iron  
(2) Vitamin A and iron  
(3) Vitamin A and Vitamin B  
(4) Iron
- 199.** A dicot plant forms crown gall when:  
(1) *Agrobacterium tumifaciens* comes in contact with the plant.  
(2) *Agrobacterium rhizogens* comes in contact with the plant.  
(3) A specific part of DNA from the Ti-plasmid gets integrated with the plant chromosome.  
(4) A specific part of DNA from the Ri-plasmid gets integrated with the plant chromosome.
- 200.** Choose the correct option regarding retrovirus.  
(1) A RNA virus that can synthesis DNA during infection  
(2) A DNA virus that can synthesis RNA during infection  
(3) A ssDNA virus  
(4) A dsRNA virus

*Space for rough work*

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