Dated : 29-01-2023

# M.L. Syal's Helix Institute

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## XII cum Competition Course for Medical

## Test - 26

MM : 720 Time : 3 hrs. 20 min.

| | | |
|---|---|---|
| Physics | : | Ray optics , Wave optics, EM waves |
| Chemistry | : | Biomolecules, Polymers, p-Block-XII, Chemical kinetics |
| Zoology | : | Human health & diseases, Microbes in human welfare, Strategies for enhancement in food production |
| Botany | : | Ecology |

## PHYSICS : SECTION-A

**All questions are compulsory in section A**

1. A container contains a liquid upto a height of 10 cm and there is a point source at the centre of the bottom of the container. The radius of the circle on the surface of the liquid through which the light escape is ($\mu_{liquid} = 1.5$)

(1) 6.67 cm (2) $\frac{30}{\sqrt{5}}$ cm

(3) $\frac{20}{\sqrt{3}}$ cm (4) $\frac{20}{\sqrt{5}}$ cm

2. In Young's double slit experiment using blue light, angular width of fringes is $0.3^\circ$. If the apparatus is dipped in water ($\mu = \frac{4}{3}$), angular width of fringes becomes

(1) $0.3^o$ (2) $0.225^o$

(3) $0.4^o$ (4) $0.15^o$

3. A lens of power + 1 diopters is placed in contact with a lens of power – 3 diopter. The combination will behave like

(1) A convergent lens of focal length 50 cm

(2) A divergent lens of focal length 100 cm

(3) A convergent lens of focal length 100 cm

(4) A divergent lens of focal length 50 cm

4. An astronomical telescope has an angular magnification of magnitude 5 for distant objects. The separation between the objective and the eye piece is 36 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 are

(1) $f_o = 45$ cm and $f_e = -9$ cm

(2) $f_o = 7.2$ cm and $f_e = 5$ cm

(3) $f_o = 50$ cm and $f_e = 10$ cm

(4) $f_o = 30$ cm and $f_e = 6$ cm

5. In a certain double slit experimental arrangement interference fringes of width 0.6 mm each are observed when light of wavelength 8000 Å is used. Keeping the set up unaltered, if the source is replaced by another source of wavelength 6000 Å, the fringe width will be

(1) 0.45 mm (2) 0.25 mm

(3) 0.35 mm (4) 0.75 mm

6. Two coherent monochromatic light beams of intensities I and 4 I are superposed. The maximum and minimum possible intensities in the resulting beam are

(1) 5 I and I (2) 5 I and 3 I

(3) 9 I and I (4) 9 I and 3 I

7. A thin lens has focal length 'f', and its aperture has diameter 'd'. It forms an image of intensity 'I'. Now the central part of the aperture upto diameter d/2 is blocked by an opaque paper. The focal length and image intensity will change to

(1) $\frac{f}{2}$ and $\frac{I}{2}$ (2) f and $\frac{I}{4}$

(3) $\frac{3f}{4}$ and $\frac{I}{2}$ (4) f and $\frac{3I}{4}$

8. Three immiscible transparent liquids with refractive indices 3/2, 4/3 and 6/5 are arranged one on top of another. If depths of the liquids are 3 cm, 4 cm and 6 cm respectively, then apparent depth of the vessel is

(1) 10 cm (2) 9 cm
(3) 8 cm (4) 7 cm

9. **Assertion** : We can hear around corners, but can't see around corners.

**Reason** : Wavelength of sound wave is much larger than that of light and for sound diffraction is possible round the corners .

(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) Assertion is false

10. A concave mirror cannot form:

(1) virtual image of virtual object
(2) virtual image of a real object
(3) real image of a real object
(4) real image of a virtual object

11. Unpolarized light of intensity $30 Wm^{-2}$ passes through three polarizers such that transmission axes of the first and second polarizer makes and angle $37^{\circ}$ with each other and transmission axis of the last polarizer is crossed with that of first. Intensity of final emerging light will be

(1) $2.72\ Wm^{-2}$ (2) $3.84\ Wm^{-2}$
(3) $3.46\ Wm^{-2}$ (4) $4.24\ Wm^{-2}$

12. A compound microscope uses objective and eye lenses of focal lengths 1 cm and 2.5 cm respectively. An object is kept 1.2 cm away from the objective lens. If the final image is formed at infinity, magnifying power of the microscope is

(1) 150 (2) 50
(3) 75 (4) 55

13. A thin mica sheet of thickness $10^{-5}$ m and refractive index, $\mu = 1.5$ is introduced in front of the upper slit. The wavelength of the wave used is 8000 Å . The central bright maximum will shift by about

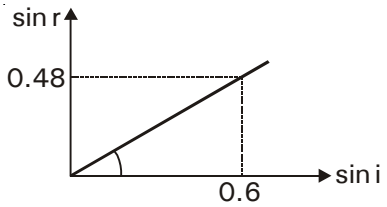
(1) 4 fringes upward
(2) 5 fringes downward
(3) 6 fringes upward
(4) 7 fringes upward

14. Focal length of a concave mirror is 'f' and distance from the object to the focus is 'x'. The ratio of size of the image to size of the object is

(1) $\frac{f+x}{f}$ (2) $\frac{f}{x}$

(3) $\sqrt{\frac{f}{x}}$ (4) $\frac{f^2}{x^2}$

15. If white light is used in Young's double slit experiments then a number of coloured fringes can be seen
(1) with a violet fringe seen next to the central white fringe
(2) with a red fringe seen next to the central white fringe
(3) with a central coloured fringe
(4) with a central black fringe

16. 


For a ray going from a rarer into a denser medium, the graph between $\sin i$ and $\sin r$ is as shown. Critical angle for the ray hitting the interface from denser side will be
(1) 30° (2) 37°
(3) 45° (4) 53°

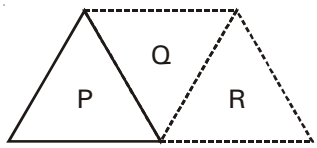
17. If amplitude of the unpolarised light incident on a polariser is 'a', then the amplitude of the polarised light transmitted through it is
(1) a (2) $\sqrt{2}a$
(3) $\frac{a}{2}$ (4) $\frac{a}{\sqrt{2}}$

18. 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

19. If the polarising angle for light entering a medium from air is 53°, the refractive index for this medium is
(1) 1.67 (2) $\sqrt{2}$
(3) 1.5 (4) 1.33

20. The dispersive powers of glasses of lenses used in a convergent achromatic pair are in the ratio 5 : 3. If the focal length of the concave lens is 15 cm, then the nature and focal length of the other lens would be
(1) convex, 9 cm (2) concave, 9 cm
(3) convex, 25 cm (4) concave, 25 cm

21. The second diffraction minima due to a single slit diffraction is at $\theta = 37°$ for a light of wavelength 6000 Å. The width of the slit is
(1) $3 \times 10^{-6}$ m (2) $1.5 \times 10^{-6}$ m
(3) $4 \times 10^{-6}$ m (4) $2 \times 10^{-6}$ m

22. 

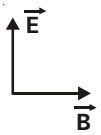

A given ray of light suffers minimum deviation in an equilateral prism 'P'. Additional prisms 'Q' and 'R' of identical shape and material are now added to 'P' as shown. The ray will suffer
(1) greater deviation
(2) same deviation
(3) no deviation
(4) total internal reflection

23. To increase Fresnel's distance
(1) wave length should be increased
(2) wave length should be decreased
(3) size of obstacle should be small
(4) frequency of wave should be decreased

24. In order to see his complete image from toe to head, a person of height 1.72 m uses a plane mirror kept at a distance 1m in front of him. Minimum length of the mirror in vertical direction is equal to

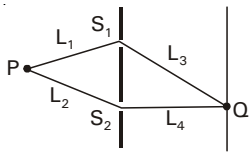
(1) 0.43 m (2) 1 m
(3) 1.72 m (4) 0.86 m

25 Two field vectors $\vec{E}$ and $\vec{B}$ for em waves is shown in figure. Direction of propagation of em wave is




(1) along $\vec{E}$
(2) along $\vec{B}$
(3) out of the plane of paper
(4) into the plane of paper

26.




Two identical narrow slits $S_1$ and $S_2$ are illuminated by light of wavelength $\lambda$ from a point source 'P' as shown in the diagram. Light is then allowed to fall on a screen. If 'n' is a positive integer, the condition for destructive interference at 'Q' is

(1) $(L_1 - L_2) = (2n + 1)\lambda/2$
(2) $(L_3 - L_4) = (2n + 1)\lambda/2$
(3) $(L_1 + L_2) - (L_2 + L_4) = n\lambda$
(4) $(L_1 + L_3) - (L_2 + L_4) = (2n + 1)\lambda/2$

27. In a plane electromagnetic wave in vaccum the equation of magnetic vector can be written as $B_y = (10^{-8}T)\sin(5 \times 10^6 \pi x + 1.5 \times 10^{15} \pi t)$. The peak value of electric field vector in the wave is

(1) 3 V/m (2) $3 \times 10^8$ V/m
(3) $10^{-8}$ V/m (4) $3 \times 10^{-8}$ V/m

28. **Assertion** :In YDSE, the fringewidth increases when a glass slab is placed in front of one of the slits .

**Reason** : The glass slab introduces additional optical path in the ray passing through it.

(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) Assertion is false

29. Which of the following waves have the maximum wavelength

(1) X-rays (2) I.R. rays
(3) UV rays (4) Radio waves

30. The time required by light to pass through a glass slab 2 mm thick is ($\mu_{glass} = 1.5$)

(1) $10^{-5}$ s (2) $10^{-11}$ s
(3) $10^{-9}$ s (4) $10^{-13}$ s

31. Velocity of an electromagnetic wave in a medium of relative permeability 1 is 2c/3. The relative permittivity of medium is (where c is speed of light in vacuum)

(1) 2 (2) 2.5
(3) 2.25 (4) 2.75

32. Angular width of central maximum of a diffraction pattern on a single slit does not depend upon
(1) distance between slit and source
(2) wavelength of light used
(3) width of the slit
(4) frequency of light used

33. In Young's double slit experiment, the phase difference between the light waves reaching a point 'A' from two slits is $7\pi$. Then point 'A' is
(1) fifth dark fringe (2) fourth dark fringe
(3) third bright fringe (4) third dark fringe

34. An astronomical telescope has a large aperture to
(1) reduce spherical aberration
(2) have high resolution
(3) increase span of observation
(4) have low dispersion

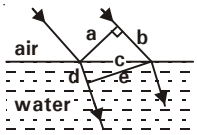
35. 

Figure shown plane waves refracted for air to water using Huygen's principle a, b, c, d, e are lengths on the diagram. The refractive index of water with respect to air is the ratio.
(1) a/e (2) b/e
(3) b/d (4) d/b

## PHYSICS : SECTION-B

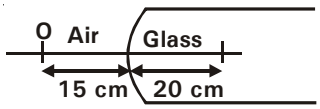
**This section has 15 questions, attempt any 10 questions of them.**

36. Two vertical plane mirrors are inclined at an angle of 80° with each other. A ray of light travelling horizontally is reflected first from one mirror and then from the other. The resultant deviation is
(1) 200° (2) 120°
(3) 180° (4) 240°

37. A candle is kept at a distance equal to double the focal length from the pole of a convex mirror. Its magnification will be
(1) $-1/3$ (2) $1/3$
(3) $2/3$ (4) $-2/3$

38. The angle of minimum deviation measured with a prism is 30° and the angle of prism is 60°. The refractive index of prism material is
(1) $\sqrt{2}$ (2) 2
(3) 3/2 (4) 4/3

39. The refractive indices of violet and red light are 1.54 and 1.52 respectively. If the angle of prism is 10°, then the angular dispersion is
(1) 0.02° (2) 0.2°
(3) 3.06° (4) 30.6°

40. A point object O is placed in front of a glass rod having spherical end of radius of curvature 20 cm. The image would be formed at ($\mu = 1.5$).


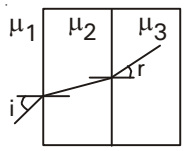
(1) 24 cm left of pole (2) infinity
(3) 36 cm left of pole (4) 18 cm left of pole

41. A convex lens forms a real image of an object for its two different positions on a screen. If height of the image in both the cases be 8 cm and 2 cm, then height of the object is
(1) 16 cm (2) 8 cm
(3) 4 cm (4) 2 cm

42. A man can see only between 60 cm and 200 cm. The power of lens to correct the far point will be
(1) + 1 D (2) + 0.5 D
(3) – 1 D (4) – 0.5 D

43. If a plane mirror is rotated through an angle of 30° and incident ray remains unchanged, then angle through which reflected ray will be rotated is
(1) 7.5° (2) 15°
(3) 60° (4) 30°

44. A thin rod of length f/2 is placed along the principal axis of a concave mirror of focal length f such that its real and elongated image just touches the rod. The length of the image of the rod is
(1) f/2 (2) f
(3) 2f (4) 3f

45. 


In the figure shown, $\mu_1 = 1, \mu_2 = 1.5, \mu_3 = 4/3$.

Then $\frac{\sin i}{\sin r} =$

(1) $\frac{9}{8}$ (2) $\frac{8}{9}$

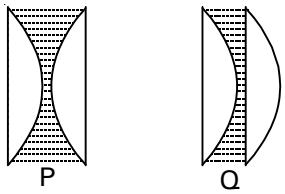
(3) $\frac{4}{3}$ (4) none of these

46. In a double slit experiment, slits are of equal width. Now, the width of one slit is made twice. Then in the interference pattern, intensity of
(1) both the maxima and the minima increase
(2) maxima increases and the minima has zero intensity
(3) maxima decreases and that of the minima increases
(4) of maxima decreases and the minima has zero intensity

47. Assume that light of wavelength 6000 Å is coming from a star. What is the limit of resolution of a telescope whose objective has a diameter of 2.44 m?
(1) $3 \times 10^{-7}$ radian (2) $2.5 \times 10^{-7}$ radian
(3) $6 \times 10^{-6}$ radian (4) $5 \times 10^{-6}$ radian

48. Average magnetic energy density in an em wave is 5 $\mu J/m^3$. The intensity of the wave is
(1) 1500 $W/m^2$ (2) 3000 $W/m^2$
(3) 2500 $W/m^2$ (4) zero

49. The reason of seeing the Sun a little before the sunrise is
(1) Reflection of sunlight
(2) Refraction of sunlight
(3) Scattering of sunlight
(4) Dispersion of sunlight

50. 


A liquid of refractive index 1.33 is placed between identical plano-convex lenses with refractive index 1.50 in two possible arrangements 'P' and 'Q' as shown. The system is
(1) divergent in P, convergent in Q
(2) convergent in P, divergent in Q
(3) convergent in both
(4) divergent in both

## CHEMISTRY : SECTION-A

**All questions are compulsory in section A**

51. For a first order reaction, $A \rightarrow B$, a graph of log [A] vs time has a slope equal to

(1) $-\frac{k}{2.303}$ (2) $+\frac{k}{2.303}$

(3) $-2.303k$ (4) $+2.303k$

52. The half life of a radioactive isotope is 3h. What mass of it remains undecayed after 15 hours if the initial mass of the radioactive isotope was 100 g?

(1) 96.87 g (2) 3.125 g

(3) 1.5 g (4) 31.95 g

53. A gaseous reaction $2A \rightarrow 4B + C$ is carried out in a closed vessel. The concentration of B is found to increase by $5 \times 10^{-3}$ mol $L^{-1}$ in 20 seconds. The rate of appearance of B is

(1) $5 \times 10^{-4}$ mol $L^{-1}s^{-1}$

(2) $1.25 \times 10^{-4}$ mol $L^{-1}s^{-1}$

(3) $2.5 \times 10^{-4}$ mol $L^{-1}s^{-1}$

(4) $5 \times 10^{-3}$ mol $L^{-1}s^{-1}$

54. Which of the following carbohydrates are branched polymer of glucose?

a. Amylose b. Amylopectin

c. Cellulose d. Glycogen

(1) a & b (2) b & c

(3) b & d (4) a & d

55. Velocity constant of a reaction at 290 K was found to be $3.2 \times 10^{-3}$. At 300 K, it will be approximately

(1) $1.28 \times 10^{-4}$ (2) $9.6 \times 10^{-3}$

(3) $6.4 \times 10^{-3}$ (4) $3.2 \times 10^{-4}$

56. The reaction of $Br_2$ and hot conc. KOH results in the formation of the following products

(1) KBrO (2) $KBrO_3$

(3) $O_2$ (4) $Br_2$

57. Unit of rate of reaction is

(1) $s^{-1}$ (2) $Mol^{-1}$ L.$s^{-1}$

(3) both the above (4) Mol. $L^{-1}s^{-1}$

58. Which is true for $PCl_5$?

(1) It can be obtained by the action of $P_4$ with $SOCl_2$

(2) It is hydrolysed to form $H_3PO_3$

(3) It can be obtained on the action of $P_4$ with $SO_2Cl_2$

(4) It exists as $[PCl_4^+]\,Cl^-$ in the solid state

59. An exothermic reaction, $X \rightarrow Y$, has an activation energy 30 kJ $mol^{-1}$. If energy change ($\Delta E$) during the reaction is $-20$ kJ, then the activation energy for the reverse reaction is

(1) $-30$ kJ (2) 20 kJ

(3) 50 kJ (4) 10 kJ

60. Match the following

| | | | |
|---|---|---|---|
| a. | Caro's acid | (i) | $Na_2S_2O_3$ |
| b. | Oleum | (ii) | $H_2S_2O_6$ |
| c. | Marshall's acid | (iii) | $H_2SO_5$ |
| d. | Hypo | (iv) | $H_2S_2O_8$ |
| e. | Dithionic acid | (v) | $H_2S_2O_7$ |

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

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

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

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

61. The rate constant of a reaction is $2 \times 10^{-2}$ mol $l^{-1}$ $sec^{-1}$. Hence the order is

(1) 1 (2) 2

(3) 0 (4) 3

62. The catalyst used in the manufacture of sulphuric acid is

(1) CaO (2) $CaCl_2$

(3) $P_2O_5$ (4) $V_2O_5$

63. Which of the following is incorrect about order of reaction?

(1) It is calculated experimentally

(2) It is sum of powers of concentration in rate law expression

(3) The order of reaction cannot be fractional

(4) There is not necessarily a connection between order and stoichiometry of a reaction

64. In $SO_3(s)$, hybridization of sulphur is
(1) sp (2) $sp^2$
(3) $sp^3$ (4) $sp^3d$

65. Due to hydrolysis there exist an equilibrium between $\alpha$ (D) glucose and $\beta$ (D) glucose. This is called as
(1) Lobry de Bruyn-van Ekenstein rearrangement
(2) Anomerisation
(3) Inversion
(4) Mutarotation

66. **Statement-I** : Although $PF_5$, $PCl_5$ and $PBr_5$ are known, the pentahalides of nitrogen have not been observed.
**Statement-II** : Phosphorus has lower electronegativity than nitrogen.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

67. Which of the following monomers form biodegradable polymers ?
(1) 3-hydroxybutanoic acid + 3-hydroxypentanoic acid
(2) Glycine + amino caproic acid
(3) Ehtylene glycol + Pthalic acid
(4) Both (1) and (2)

68. Which of the following element does not have d-orbitals in the valence shell?
(1) Nitrogen (2) Phosphorus
(3) Arsenic (4) Antimony

69. Which one of the following is incorrect formation of products
(1) $P_4 + NaOH \rightarrow Na_2HPO_2 + PH_3$
(2) $PCl_3 + H_2O \rightarrow H_3PO_3 + HCl$
(3) $P_4 + SOCl_2 \rightarrow PCl_3 + SO_2 + S_2Cl_2$
(4) $PCl_5 + H_2O \rightarrow H_3PO_4 + HCl$

70. The possible mechanisms for the reaction $2NO + O_2 \rightarrow 2NO_2$ is
a) $NO + O_2 \rightleftharpoons NO_3$(fast)
b) $NO_3 + NO \rightarrow NO_2 + NO_2$(slow)
The rate law for the above reaction is
(1) Rate = $k[NO]\,[O_2]$
(2) Rate = $k[NO_3]\,[NO]$
(3) Rate = $k[NO]^2\,[O_2]$
(4) Rate = $k[NO_2]^2$.

71. **Assertion** : Fructose, which does not have any aldehydic group still reduces Tollen's reagent.
**Reason** : Alkaline solution of fructose also contains some glucose and mannose.
(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) Assertion is false

72. Which of the following is the strongest acid ?
(1) HClO (2) $HClO_2$
(3) $HClO_3$ (4) $HClO_4$

73. Which of the following will undergo fastest cationic polymerisation?

(1) $CH_2=CH-CN$ (2) $CH_2=C(CH_3)-CH_3$

(3) $CH_2=C(CH_3)-COOCH_3$ (4) $H_2C=CF_2$

74. Which noble gas is used in discharge tubes for advertisement display purposes?
(1) He (2) Ne
(3) Ar (4) Kr

75. Nylon 6, 10 is a condensation polymer of hexamethylene diamine and
(1) Adipic acid (2) Formic acid
(3) Acetic acid (4) Sebacic acid

76. $P_4O_{10} + 6H_2O \rightarrow A$
A in the above reaction is
(1) Phosphorous acid
(2) Phosphoric acid
(3) Pyrophosphorus acid
(4) Nitric acid

77. Reaction $A \rightarrow B$ follows 2nd order kinetics, doubling the concentration of A will increase the rate of formation of B by a factor of
(1) 1/4 (2) 1/2
(3) 3 (4) 4

78. Which of the following is not for thermoplstic polymers?
(1) Thermoplastics are linear polymers
(2) They soften and melt on heating
(3) Molten polymer can be remoulded into any shape
(4) They have cross-linkages which break on heating

79. Which of the following compound does not give oxo acid of central atom on hydrolysis?
(1) $ClF_3$ (2) $NCl_3$
(3) $PCl_3$ (4) $PCl_5$

80. A first order reaction which is 30% complete in 30 minutes will be 50% complete in
(1) 24.2 min (2) 58.2 min
(3) 102.2 min (4) 120.2 min

81. Carbohydrates are classified on basis of their behaviour on hydrolysis and also as reducing or non-reducing sugar. Sucrose is a _____.
a. monosaccharide b. disaccharide
c. reducing sugar d. non-reducing sugar
(1) a & b (2) b & c
(3) b & d (4) a & d

82. Which of the following statements are true?
a. Glucose pentacetate exists in cyclic form.
b. Galactose is a $C_4$-epimer of glucose.
c. In starch, the glucose units are linked by $\beta$-linkages.
(1) a and b (2) b and c
(3) a and c (4) a, b and c

83. Analyse the following sequence of reactions

$$4NH_3(g) + 5O_2(g) \xrightarrow[\text{Hightemp}]{\text{(C)}} 4(X)(g) + 6H_2O(g)$$

$2X(g) + O_2(g) \rightleftharpoons 2Y(g)$

$3Y(g) + H_2O(l) \rightarrow 2Z(g) + (X)$

Which of the following is incorrect for the above sequence?
(1) (C) = Pt | Rh gauge (2) (X) = NO
(3) (Y) = $NO_2$ (4) (Z) = $HNO_2$

84. Which of the following hydrides of group 15 has maximum basic character?
(1) $NH_3$ (2) $BiH_3$
(3) $AsH_3$ (4) $PH_3$

85. Nylon threads are made of
(1) Polyester polymer
(2) Polyamide polymer
(3) Polyethylene polymer
(4) Polyvinyl polymer

## CHEMISTRY : SECTION-B

**This section has 15 questions, attempt any 10 questions of them.**

86. Which of the following polymers are condensation polymers?
(1) Bakelite (2) Teflon
(3) Butyl rubber (4) PVC

87. Which one is incorrect order
(1) Boiling point $HF > HI > HBr > HCl$
(2) Thermal stability $HClO < HClO_2 < HClO_3 < HClO_4$
(3) Acidic nature $HClO > HBrO > HIO$
(4) Percentage ionic character $HF < HCl < HBr < HI$

88. The slope of Arrhenius plot of lnk vs $\frac{1}{T}$ is $-2 \times 10^4$ K. Then the energy of activation of the reaction in kJ is
(1) 249 (2) 166
(3) 83 (4) 332

89. **Assertion** : Dry $SO_2$ does not bleach dry flowers.
**Reason** : Nascent hydrogen which bleaches the flowers, is produced only in presence of moisture.
(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) Assertion is false

90. What is not true about hydrides of group-16 elements?
(1) Acidic nature $H_2O < H_2S < H_2Se < H_2Te$
(2) Reducing nature $H_2O < H_2S < H_2Se < H_2Te$
(3) Thermal stability $H_2O > H_2S > H_2Se > H_2Te$
(4) Bond angle $H_2O < H_2S < H_2Se < H_2Te$

91. The simplest amino acid has _____chiral carbons
(1) zero (2) one
(3) two (4) three

92. Which of the following polymers is not correctly matched?
(1) Formation of dacron – Step growth polymerisation
(2) Fromation of polytetrafluoroethene – Step growth polymerisation
(3) Formation of polythene – Chain growth polymerisation in presence of benzoyl peroxide
(4) Formation of polyacrylonitrile – Chain growth polymerisation in presence of peroxide

93. $FeS_2 \xrightarrow{O_2} A(g) \xrightarrow{Cl_2} B \xrightarrow{P_4} C$
(C is a compound containing phosphorous)
Identify the correct statement/s w.r.t. above series
a. A shows permanent bleaching action
b. C is a chlorinating agent
c. Central atom of A and B have same hybridisation
d. A, B and C all are polar molecules
e. C fumes in moist air
(1) a, b & e (2) b & e only
(3) b, c & d (4) a, c & d

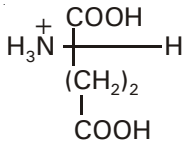
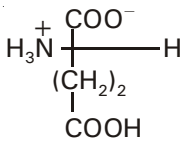
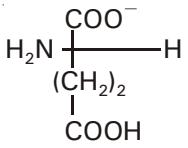
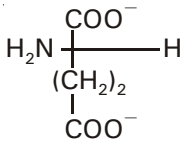
94. The ratio of $t_{2/3}$ and $t_{1/2}$ of a first order reaction $2A \rightarrow B + C$ is
(1) $\log\frac{2}{3}$ (2) $\log\frac{3}{2}$
(3) $\frac{\log 2}{\log 3}$ (4) $\frac{\log 3}{\log 2}$

95. The reaction that does not produce nitrogen gas is
(1) Heating $(NH_4)_2Cr_2O_7$
(2) Excess of $NH_3 + Cl_2$
(3) Heating $Ba(N_3)_2$
(4) $NH_4Cl + NaOH$

96. **Statement-I** : Flourine forms only one oxoacid i.e. HOF.
**Statement-II** : It can not show higher oxidation state due to absence of d-orbitals.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

97. Which of the following process is used for the preparation of chlorine gas ?
(1) Contact process
(2) Ostwald process
(3) Deacon's process
(4) By electrolysis of sodium hydroxide solution

98. Which of the following is the major solute species in a solution of glutamic acid at pH = 4.3? (Isoelectric point of glutamic acid is at pH = 5.6)

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

99. The mechanism of the reaction
$A + 2B \rightarrow D$
is as under

$2B \xrightarrow{k} B_2$ [slow]
$B_2 + A \rightarrow D$ [fast]

What is the rate, order with respect to A, B and the total order respectively?
(1) $k[B]^2$, 0, 2, 2 (2) $k[A][B]^2$, 1, 2, 3
(3) $k[A]^2$, 0, 2, 2 (4) $k[A]^2[B]$, 1, 2, 3

100. Among the followings sets, the one in which all the molecules are non polar is
(1) $XeF_4$, $XeO_3$, $XeO_3F_2$ (2) $XeF_2$, $XeF_4$, $XeO_3$
(3) $XeF_2$,$XeF_4$, $XeO_4$ (4) $XeF_2$, $XeO_3$, $XeOF_4$

## ZOOLOGY : SECTION-A

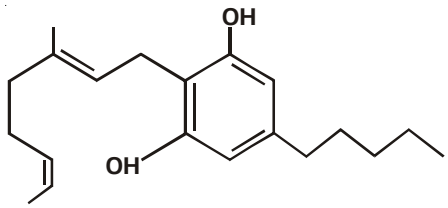
**All questions are compulsory in section A**

101. Mary Mallon, a cook by profession spread a disease through the food she prepared. This disease is characterized by
(1) Fluid accumulation in lungs.
(2) Nasal congestion and discharge
(3) Sustained high fever, stomach pain, constipation and headache
(4) Chill and high fever recurring every 3–4 days

102. What is true for sewage treatment process ?
(1) Treatment of waste water in sewage treatment plant is done by autotrophic microbes naturally present in the sewage.
(2) Floating debris is removed by sequential filteration and soil and pebbles are removed by sedimentation.
(3) BOD of waste water is inversely propotional to polluting potential of the water.
(4) All of these

103. The exaggerated response of immune system to certain antigens present in environment is called
(1) Hypersensitivity
(2) Auto immune diseases
(3) Allergy
(4) Both (1) & (3)

104. Identify the given structure, its mode of consumption and the system of body affected by consumption of these drugs.




(1) morphine, orally, respiratory system
(2) cannabinoids, inhalation and orally, cardio vascular system
(3) amphetamine, inhalation, cardiovascular system
(4) cannabinoids, orally, digestive system

105. Two common states involved in Ganga action plan and Yamuna action plan are
(1) Utrakhand and Bihar
(2) Uttar Pradesh and Utrakhand
(3) Uttar Pradesh and Haryana
(4) Bihar and West Bengal

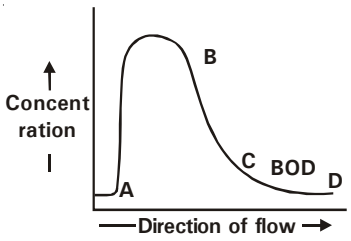
106. Organism with pseudopodia is causative agent of
(1) dengue (2) chikungunya
(3) amoebic dysentary (4) malaria

107. Find correct statement w.r.t. cancer
(1) There is breakdown of regulatory mechanisms
(2) Cancerous cells continue to divide and show contact inhibition
(3) Cancerous cells provide nourishment to normal cells
(4) All are correct

108. Large holes in 'Swiss` cheese' are due to production of a large amount of $CO_2$ by a bacterium named
(1) *Clostridium butylicum*
(2) *Acetobacter aceti*
(3) *Streptococcus*
(4) *Propionibacterium sharmanii*

109. A nitrogen fixing microbe associated with Azolla in rice fields is
(1) *Spirulina* (2) *Anabaena*
(3) *Frankia* (4) *Rhizobium*

110. If the curve in the following graph represents changing BOD, addition of untreated sewage to river water is indicated at point




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

111. Major part of activated sludge is pumped into
(1) anaerobic sludge digesters
(2) aeration tanks
(3) primary tanks
(4) secondary tanks

112. **Statement- I** : The more variety a landscape has, the more sustainable it is.
**Statement- II** : An important part of the biological farming approach is to become familiar with the various life forms that inhabit the field
(1) Both statement -I and statement- II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement- II is correct

113. The genus of fungi which can infect skin, nails and hair is
(1) *Epidermophyrton* (2) *Trichophyton*
(3) *Microsporum* (4) *Taenia*

114. Which of these is correctly matched?
(1) Out crossing – hybridisation
(2) Cross breeding – pure lines
(3) MOET – herd improvement
(4) Interspecific hybridisation – inbreeding depression

115. Match the following organisms with the products they produce

| | | | |
|---|---|---|---|
| (a) | *Lactobacillus* | (i) | Cheese |
| (b) | *Saccharomyces cerevisiae* | (ii) | Curd |
| (c) | *Aspergillus niger* | (iii) | Citric Acid |
| (d) | *Acetobacter aceti* | (iv) | Bread |
| | | (v) | Acetic Acid |

Select the correct option.

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

116. A farmer has a highyielding breed 'X' of cattle which is susceptible to many diseases. He notices a certain breed 'Y' with high resistance to diseases but poor yield. To maixmize yield from his farm he should
(1) maintain 'Y' and feed it scientifically
(2) outcross 'X' with a similar breed on another farm
(3) cross breed superior animals from 'X' and 'Y'
(4) continue with breed 'X' and improve hygiene of cattle shed

117. Group of marine edible fish is
(1) catla, mackerel, hilsa
(2) sardines, mackerel, pomfret
(3) sardines, mackerl, rohu
(4) all of these

118. **Assertion** : Multiple Ovulation Embryo Transfer Technology improves chances of successful production of hybrids
**Reason** : MOET, a natural method of breeding uses FSH like hormones for superovulation
(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) Assertion is false

119. Which of the following diseases are caused by the same group of organisms?
(1) Taeniasis, Babesiosis, Hepatitis
(2) Malaria, Dengue, Filariasis
(3) Malaria, Babesiosis, Amoebiasis
(4) Ascariasis, Amoebiasis, Hepatitis

120. How many among the following are autoimmune diseases?
**Vitiligo, Myasthenia gravis, AIDS, Psoriasis, SCID, Grave's disease, Rheumatoid arthritis, Asthma, Cancer**
(1) two (2) four
(3) six (4) five

121. Viviparity is exhibited by
(1) *Ascaris* (2) *Wuchereria*
(3) *Trichinella* (4) Both (2) and (3)

122. Which of the following is wrongly matched in the given table?

| | Microbe | Product | Application |
|---|---|---|---|
| (1) | *Streptococcus* | Clot buster | Removing blood clots from the blood vessels |
| (2) | *Trichoderma polysporum* | Cyclosporin A | Immunosuppressant |
| (3) | Yeast | Statins | Competitively inhibit enzyme responsible for cholesterol synthesis |
| (4) | Bacteria | Penicillin | Against life in context of disease causing organisms |

123. Mark the mismatched option
(1) Influenza – Mucus membrane of respiratory tract
(2) Polio – Ventral horn of spinal cord
(3) Dengue – Decline in the platelet count
(4) Common cold – Lungs

124. Which of the following is not correct w.r.t. black bile concept considered in ayurveda system of medicine?
(1) Persons with black bile belonged to hot personality
(2) It was based on scientific facts
(3) Black bile secretion results in fevers
(4) Idea was arrived at by pure reflective thought

125. Which of following is not a prophylactic measure?
(1) Introduction of *Gambusia* fish in ponds
(2) Prevention of overcrowding
(3) Consumption of suitable antibiotic with least side effects
(4) Hygiene and vaccination

126. HIV has a protein coat and genetic material which is
(1) double stranded DNA
(2) single stranded RNA
(3) single stranded DNA
(4) double stranded RNA

127. Ernest Chain & Howard Florey
(1) helped Fleming to discover pencillin
(2) worked with Fleming to isolate penicillin
(3) recognised full potential of pencillin as an effective antibiotic
(4) coined the term antibiotic

128. Which of the following statements are correct?
i. Trypanosomiasis and Leishmaniasis are protozoan diseases transmitted through insect vectors
ii. Housefly carries infective stage of *Entamoeba histolytica*
iii. Lips and nail turn grey to blue in disease caused by *Salmonella typhii*
iv. Symptoms of Ascariasis include internal bleeding, muscular pain and anemia
(1) i, ii & iv (2) i, ii & iii
(3) ii & iv only (4) ii, iii & iv

129. Which of the following pathogen can be observed inside RBC?
(1) *Entamoeba histolytica*
(2) *Plasmodium*
(3) *Wuchereria*
(4) Both (1) & (2)

130. Which of the following is not a feature of active immunity?
(1) It is long lasting
(2) Takes time to show effective response
(3) Infectious organisms gaining access into body provide active immunity
(4) Introduction of antibodies provide active immunity

131. White blood cells that are non-specific killers of microbes are
(1) B-cells (2) Monocytes
(3) T-helper cells (4) T-cytotoxic cells

132. If you suspect major deficiency of antibodies in a person, to which of the following would you look for confirmatory evidence?
(1) Fibrinogen in plasma
(2) Serum albumins
(3) Serum globulins
(4) Haemocytes

133. A person likely to develop tetanus after an injury, can be immunized by giving
(1) Weakened germs
(2) Preformed antibodies
(3) Tetanus toxoid vaccine
(4) Antibiotics

134. How many of the following bacteria produce organic acids?
*Aspergillus, Acetobacter, Lactobacillus, Clostridium, Streptomyces, Monascus, Trichoderma*
(1) 2 (2) 5
(3) 3 (4) 4

135. Which of the following is correct w.r.t. *Entamoeba histolytica*?
a. Cramps, abdominal pain
b. Stools with excess mucous and blood clots
c. Female *Anopheles* acts as mechanical carrier
d. Parasite in large intestine
(1) a, b, c are correct
(2) a, b, d are correct
(3) a, c, d are correct
(4) b, c, d are correct

## ZOOLOGY : SECTION-B

**This section has 15 questions, attempt any 10 questions of them.**

136. Match habitat of organisms in Column A with organism given in column B and select correct option

| Habitat (A) | Causative organism(B) |
|---|---|
| a. Blood | p. *Ascaris* |
| b. Lymph vessel | q. *Ancylostoma* |
| c. Small intestine | r. *Wuchereria* |
| | s. *Plasmodium* |

(1) a-r; b-s; c-q & p (2) a-s; b-r; c-p & q
(3) a-s; b-q; c-p & r (4) a-s; b-q; c-r

137. Dermatophytes are
(1) Group of closely related fungi
(2) Cause variety of clinical conditions
(3) Fungal diseases
(4) Both (1) and (2)

138. **Statement I:** STIs can cause infertility and cancer of reproductive tract if left untreated for long
**Statement I:** STIs infection is highest in people in the age group of 30-40 years
(1) Both statement -I and statement- II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement- II is correct

139. How many of the following diseases are non-infectious?
Marasmus, Cancer, Renal failure, AIDS, Influenza, Swineflu, Allergy,
(1) 4 (2) 5
(3) 6 (4) 7

140. Mark the incorrect statement w.r.t common cold
(1) Transmitted by droplet infection and contaminated fomites
(2) Vaccine is easily available
(3) Patient suffers from nasal congestion
(4) One of the most common infectious human disease

141. Which of the following effects of anabolic steroids are useful to enhance performance in sports?
a. Promote protein synthesis
b. Increase aggression
c. Cause mood swings
d. Increase muscle mass and strength
(1) a, b, c and d (2) a, b and d
(3) b and d only (4) a and c only

142. Select the correct option

| | Disease | Causative organism | Infective stage |
|---|---|---|---|
| (1) | Malaria | Arthropod | Merozoite |
| (2) | Dengue | Virus | Arthropod |
| (3) | Sleeping sickness | Bacteria | tse–tse fly |
| (4) | Malignant Malaria | Protozoa | Sporozoite |

143. Which one of the following statements is not true for cancer cells in relation to mutations?
(1) Mutations inactivate cell control
(2) Mutations inhibit production of telomerase
(3) Mutation in proto-oncogenes accelerate the cell cycle
(4) Mutations destroy telomerase inhibitor

144. Sewage treatment process in which mixture of gases like $CH_4$, $CO_2$ and $H_2S$ are released, involves digestion of
(1) bacteria only
(2) only the dead organic matter
(3) activated sludge with microbes
(4) primary sludge

145. The principle of immunization or vaccination is based on the property of
(1) Diversity
(2) Memory
(3) Specificity
(4) Descrimination between self & non-self

146. Which one of the following techniques is safest for the detection of cancers?
(1) Magnetic resonance imaging (MRI)
(2) Radiography (X-ray)
(3) Computed tomography (CT)
(4) Histopathological studies

147. Drug called 'Heroin' is synthesized by
(1) methylation of morphine
(2) acetylation of morphine
(3) glycosylation of morphine
(4) nitration of morphine

148. A cross between *Elephas maximus indicus* and *Elephas maximus maximus* would be
(1) inbreeding and would lead to inbreeding depression
(2) cross breeding and may create a new breed
(3) interspecific hybridization and would be sterile
(4) both (1) and (2)

149. **Assertion** : *Nucleopolyhedro* viruses are excellent candidates for species-specific, narrow spectrum insecticidal applications.
**Reason** : *Nucleopolyhedro* viruses have no negative impacts on plants, mammals, birds, fish or even on non-target insects
(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) Assertion is false

150. Choose the correct difference

| | **Inbreeding** | **Cross-breeding** |
|---|---|---|
| (1) | Breeding between two different breeds | Breeding amongst related individuals |
| (2) | Offspring superior to parents due to hybrid vigour | Offspring not superior to parents |
| (3) | May lead to restore fertility in long run | Reduces yield in long run |
| (4) | Maintain purity of race | Produce hybrids |

## BOTANY : SECTION-A

**All questions are compulsory in section A**

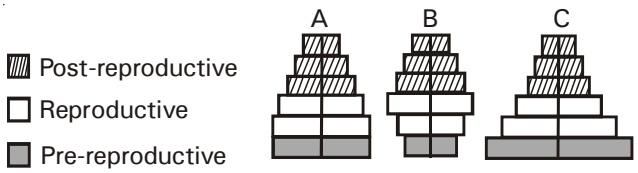
151. Which of the following statement is correct ?
(1) The biodiversity hot spots are a type of ex situ conservation .
(2) Major cause of biodiversity loss is pollution .
(3) Dachigam National Park is located in Rajasthan
(4) Amazonian rain forests occupy 6./. of earth's area presently and have maximum biodiversity.

152. Match the following

| **Column I** | | **Column II** |
|---|---|---|
| (i) | Natality | a. Sigmoid curve |
| (ii) | Exponential growth | b. Number of deaths in the population during a given period |
| (iii) | Mortality | c. J-shaped curve |
| iv) | Logistic growth | d. Number of births during given period in a population |

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

153. Illustrate the age pyramids of human population as mentioned in the figure below




(1) A-Stable, B-Expanding,C-Declining
(2) A-Expanding, B-Stable, C-Declining
(3) A-Declining,B-Expanding,C-Stable
(4) A-Stable ,B-Declining,C-Expanding

154. $\frac{dN}{dt} = rN\left[\frac{K-N}{K}\right]$ Where K is the
(1) Intrinsic rate of natural increase
(2) Carrying capacity
(3) Population density
(4) Birth rate

155. Which statement is incorrect for e-wastes
(1) Recycling is the only solution for treatment.
(2) They are buried in landfills or incinerated
(3) Bulk of the waste is biodegradable
(4) Used to recover metals like copper, iron, silicon, nickel and gold.

156. Choose the correct statements
a. Competitive exclusion principle was given by Allen
b. Some organisms undergo aestivation to avoid summer related problems
c. Keolado National Park is situated in Rajasthan
d In predation, both the interacting species are benefitted
(1) a, b (2) b, c
(3) c, d (4) a, d

157. Which of the following is a structural feature of an ecosystem?
(1) Energy flow (2) Decomposition
(3) Productivity (4) Stratification

158. The rate of formation of new organic matter by rabbit in a grassland is called
(1) Net productivity
(2) Secondary productivity
(3) Gross primary productivity
(4) Net primary productivity

159. Statement-I : According to Darwin, interspecific competition is a potent force in organic evolution.
Statement-II : Energy flow in an ecosystem occurs multidirectionally.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct.

160. An inverted pyramid of biomass can be found in which ecosystem?
(1) Forest (2) Marine
(3) Grassland (4) Parasitic food chain

161. Which of the following animals may occupy more than one trophic levels in same ecosystem at the some time?
(1) Goat (2) Frog
(3) Sparrow (4) Leopard

162. Ecological hot spots present on our earth are
(1) 25 (2) 34
(3) 3 (4) 4

163. Which of the following factor accounts for greater biodiversity in tropical regions?
(1) More solar energy
(2) Frequent glaciation in the past
(3) Less niche specialisation due to unpredictable climate
(4) More niche specialisation due to frequent change in seasons

164. Pick the correctly matched option
(1) Stellar sea cow —Coextinction
(2) Nile perch — Habitat loss
(3) Passenger pigeon — Over exploitation
(4) *Pronuba* — Alien species invasion

165. Pick the true statement
(1) Jhum cultivation is the best way to save the forest from desertification.
(2) Montreal protocol focused on reducing green house gas emissions.
(3) BOD is a measure of inorganic pollutants in water.
(4) Noise of more than 80 decibels is harmful for human beings.

166. **Assertion** : Photochemical smog is a secondary pollutant.
**Reason** : It is formed by the reaction amongst primary pollutants (unburnt hydrocarbons and nitrogen oxides)
(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) Assertion is false

167. How many of the following statements are true?
a. India has more than 1000 varieties of mango
b. India has more than 1200 species of birds
c. Sacred groves are for ex situ conservation of biodiversity
d. Species diversity on earth is not uniformly distributed
(1) None (2) Two
(3) Three (4) All

168. Which of the following is incorrect?
(1) The major causes of biodiversity extinction are habitat loss and alien species invasion.
(2) Major greenhouse gases are carbon dioxide and methane
(3) Odd environmental phenomena such as El Nino may be related to global climatic changes
(4) Forests in India occupy 40% of earth's area and have maximum biodiversity.

169. In the World Summit on Sustainable Development held in 2002 in South Africa, many countries pledged their commitment to achieve a significant reduction in the current rate of biodiversity loss at global, regional and local levels by
(1) 2010 (2) 2009
(3) 2012 (4) 2008

170. Which of the following is not a feature of in biodiversity hotspots?
(1) Endemism
(2) Accelerated species loss
(3) Species richness
(4) Lesser competition among species

171. The total amount of inorganic nutrients present in soil is
(1) standing crop (2) mineralisation
(3) standing state (4) both (2) and (3)

172. Main reservoirs of phosphorus are
(1) atmosphere
(2) oceans
(3) rocks and natural deposits
(4) forests

173. The historic convention on Biological Diversity held in Rio de Janeiro in 1992 is known as:
(1) CITES Convention (2) The Earth Summit
(3) UNDP (4) MAB Programme

174. Pick the correct statement
(1) Rapid change in species compostion in an area is ecological succession
(2) Ecosystem services includes range of economic, aesthetic and environmental goods and services
(3) Commensalism is a positive interaction in which both organisms are benfitted
(4) Eutrophication is the increase in concentration of toxic substance in the body at each trophic level

175. Minamata disease is due to pollutant
(1) lead (2) mercury
(3) $H_2S$ (4) sulphur dioxide

176. Montreal protocol was ratified in _____ year and was related with _____ respectively
(1) 1984, ozone depletion
(2) 1989, ozone depletion
(3) 1988, global warming
(4) 1999, climate change

177. **Statement-I** : Invasion by alien species is not the the greatest of threat to biodiversity loss.
**Statement-II** : Joint Forest Management was introduced by Government of India in 1974.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

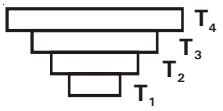
178. Biome represents
(1) all the organisms of earth
(2) flora of a land
(3) flora and fauna of a land
(4) a major ecosystem delimited by climate or geography

179. Noise pollution is measured in
(1) hertz (2) dobsun units
(3) nanometres (4) decibels

180. A taxon of animal, which is facing an extremely high risk of extinction in the wild can be best conserved with the help of
(1) biosphere reserve (2) national park
(3) botanical garden (4) zoological park

181. Municipal waste water has
(1) 99.9% sewage impurities
(2) 0.1% sewage impurities
(3) 1% non-biodegradable impurites
(4) 7% of biodegradable impurities

182. Given below is the inverted pyramid




Which of the following is correct for this pyramid.
(1) Aquatic ecosystem – pyramid of number
(2) Grassland ecosystem – pyramid of energy
(3) Forest ecosystem – pyramid of number
(4) Forest ecosystem – pyramid of biomass.

183. In which year Government of India passed the Water (Prevention and Control of Pollution) Act?
(1) 1981 (2) 1974
(3) 1987 (4) 1980

184. In textbook you came across Three Mile Island and Chernobyl disasters associated with accidental leakage of radioactive wastes. In India we had Bhopal gas tragedy. It is associated with
(1) $CO_2$ (2) Methyl Iso-Cyanate
(3) CFC's (4) Methyl Cyanate

185. Which of the following would necessarily decrease the density of a population in a given habitat?
(1) Mortality > Natality and Immigration
(2) Immigration > Emigration
(3) Immigration
(4) Natality

## BOTANY : SECTION-B

**This section has 15 questions, attempt any 10 questions of them.**

186. Loss of biodiversity in a region may lead to
(1) more resilience
(2) increased resistance to environmental perturbations
(3) no change in water use
(4) increased variability in certain ecosystem processes

187. Success of mammals is mainly because of
(1) larger body size
(2) osmoregulation
(3) thermoregulation
(4) body covered by hairs

188. In which one of the following the BOD of sewage (S), distillery effluents (DE), paper mill effluent (PE) and sugar mill effluent (SE) have been arranged in ascending order
(1) PE < S < SE < DE (2) S < DE < PE < SE
(3) SE < S < PE < DE (4) SE < PE < S < DE

189. Ozone day, world environment day and national pollution prevention day are celebrated respectively
(1) June 5, Sept. 16, Oct. 21
(2) June 5, Sept. 16, Dec. 21
(3) Sept. 16, June 5, Dec. 28
(4) Sept. 16, June 5, Dec. 2

190. Match the following columns with respect to interactions between the organisms

| Column- I | Column- II |
|---|---|
| (i) Mutualism | a. Visiting flamingo and resident fishes of shallow South American lakes |
| (ii) Commensalism | b. Human liver fluke |
| (iii) Parasitism | c. Orchid growing as epiphyte on mango branch |
| (iv) Competition | d. Lichens |

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

191. Climax community is not characterized by
(1) complex food chain
(2) low biomass
(3) more specified niche
(4) higher diversity

192. **Statement-I** : Phosphorus is required by animals in larger amounts than by plants.
**Statement-II** : The reservoir of carbon is ocean.
(1) Both statement-I and statement-II are correct
(2) Both statement-I and statement-II are incorrect
(3) Statement-I is correct but statement-II is incorrect
(4) Statement-I is incorrect but statement-II is correct

193. Ecological niche is:
(1) the surface area of the ocean
(2) an ecologically adapted zone
(3) the physical position and functional role of a species within the community
(4) formed of all plants and animals living at the bottom of a lake

194. Which of the following is a narrow utilitarian argument for conservation of bio-diversity
(1) it provides plant pollinators
(2) provides food
(3) it is source of medicines
(4) both (2) & (3)

195. **Assertion** : We never see any cattle browsing on *Calotropis* plant growing in abandoned fields due to the presence of cardiac glycosides.
**Reason** : This is a morphological defence against predation.
(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) Assertion is false

196. What were the measures taken by the government under the Supreme Court directives to control air pollution in Delhi?
a. Switching over the entire fleet of public transport from diesel to petrol by 2002
b. Phasing out of old vehicles
c. Use of unleaded petrol, use of low sulphur petrol and diesel
d. Use of catalytic converters in vehicles
e. Application of stringent pollution level norms for vehicles
(1) a, b, d, e (2) a, b, c, d, e
(3) b, c, d, e (4) b, c, d

197. How many statements is/are incorrect?
a. Stenothermal organisms can tolerate and thrive in wide range of temperature
b. Bears undergoing escape during winter is an example of hibernation
c. Diapause is a stage of suspended development in many zooplankton species
d. Mammals from warmer climates generally have shorter ears and limbs to minimise heat loss called Allen's rule.
(1) One (2) Two
(3) Three (4) Four

198. The rate of conversion of light energy into chemical energy of organic molecules in an ecosystem is
(1) net primary productivity
(2) gross primary productivity
(3) net secondary productivity
(4) gross secondary productivity

199. Find the correct match w.r.t. unit of measurement of density of a population in a habitat per unit area
(1) deer-number/volume
(2) banyan-biomass/area
(3) bacteria-biomass/area
(4) tiger-weight/area

200. In an aquatic ecosystem, there are 50 *Hydrilla* and 100 fish in 2015. In 2016, 20 *Hydrilla* were added due to new births and 40 fish were removed due to death. Calculate the birth rates and death rates respectively.
(1) 0.25 and 0.4 (2) 0.4 and 0.25
(3) 2.5 and 2.5 (4) 0.4 and 0.4