22/2019

Question Booklet Alpha Code	A	Question Booklet Serial Number	

Total Number of Questions : 100 **Time : 75 Minutes**

Maximum Marks : 100

INSTRUCTIONS TO CANDIDATES

1. The question paper will be given in the form of a Question Booklet. There will be four versions of question booklets with question booklet alpha code viz. **A**, **B**, **C** & **D**.
2. The Question Booklet Alpha Code will be printed on the top left margin of the facing sheet of the question booklet.
3. The Question Booklet Alpha Code allotted to you will be noted in your seating position in the Examination Hall.
4. If you get a question booklet where the alpha code does not match to the allotted alpha code in the seating position, please draw the attention of the Invigilator IMMEDIATELY.
5. The Question Booklet Serial Number is printed on the top right margin of the facing sheet. If your question booklet is un-numbered, please get it replaced by new question booklet with same alpha code.
6. The question booklet will be sealed at the middle of the right margin. Candidate should not open the question booklet, until the indication is given to start answering.
7. Immediately after the commencement of the examination, the candidate should check that the question booklet supplied to him contains all the 100 questions in serial order. The question booklet does not have unprinted or torn or missing pages and if so he/she should bring it to the notice of the Invigilator and get it replaced by a complete booklet with same alpha code. This is most important.
8. A blank sheet of paper is attached to the question booklet. This may be used for rough work.
9. **Please read carefully all the instructions on the reverse of the Answer Sheet before marking your answers.**
10. Each question is provided with four choices (A), (B), (C) and (D) having one correct answer. Choose the correct answer and darken the bubble corresponding to the question number using Blue or Black Ball Point Pen in the OMR Answer Sheet.
11. **Each correct answer carries 1 mark and for each wrong answer 1/3 mark will be deducted. No negative mark for unattended questions.**
12. No candidate will be allowed to leave the examination hall till the end of the session and without handing over his/her Answer Sheet to the Invigilator. Candidates should ensure that the Invigilator has verified all the entries in the Register Number Coding Sheet and that the Invigilator has affixed his/her signature in the space provided.
13. Strict compliance of instructions is essential. Any malpractice or attempt to commit any kind of malpractice in the Examination will result in the disqualification of the candidate.

22/2019

1. Maximum permissible limit of nitrate nitrogen in drinking water as per WHO standard is :
   (A) 45 mg/L (B) 5 mg/L (C) 10 mg/L (D) 25 mg/L

2. It is desirable that CRH of a fertilizer should be :
   (A) High (B) Low (C) Very low (D) Medium

3. When a pesticide dose of 0.5 to 2.0 kg/ha is applied, its concentration in the upper soil layer is :
   (A) 0.25 to 1.0 mg/kg (B) 0.5 to 2.0 mg/kg
   (C) 0.1 to 1.0 mg/kg (D) 1.0 to 2.0 mg/kg

4. Ammonia volatilization losses are of great importance in :
   (A) Acidic soils (B) Soils with high CEC
   (C) Calcareous soils (D) Soils with high clay content

5. Producer gas contains :
   (A) Hydrogen and carbon monoxide (B) Nitrogen and hydrogen
   (C) Carbon monoxide and nitrogen (D) All the above

6. On comparing with humic acid, fulvic acid has :
   (A) More hydrophilic group (B) Higher carbon and lower oxygen content
   (C) Higher molecular weight (D) More polymerized compounds

7. Amino acids are positively charged :
   (A) At pH value above the isoelectric point
   (B) Under neutral pH
   (C) Under alkaline pH
   (D) At pH value below the isoelectric point

8. Feldspars belong to the silicate mineral group.
   (A) Inosilicate (B) Cyclosilicate
   (C) Tektosilicate (D) Phyllosilicate

9. *Bacillus* comes under the group.
   (A) Aerobes (B) Facultative anaerobes
   (C) Oligate anaerobes (D) Microaerobes

10. Average chlorine content in plant tissue.
(A) 0.1% (B) 20 mg/kg (C) 0.1 mg/kg (D) 100 mg/kg

11. Smectite group consists of the following mineral/minerals :
(A) Montmorillonite (B) Beidellite (C) Nontronite (D) All the above

12. White alkali soils have :
(A) pH > 8.5 (B) Neutral soluble salts
(C) EC < 4.0 dS/m (D) ESP > 15% of CEC

13. Which one of the following is an easily weathered mineral :
(A) Feldspar (B) Quartz (C) Muscovite (D) Olivine

14. The dominant mineral in shale is :
(A) Clay (B) Quartz (C) Calcite (D) Feldspar

15. The net effect of adding organic matter to acidic soils is generally an :
(A) Increase or decrease in pH (B) Decrease in pH
(C) Increase in pH (D) None of the above

16. Ammonium polyphosphate contain _____ % P_2O_5.
(A) 48 (B) 60
(C) 28 (D) None of the above

17. The contribution of organic matter of CEC is greatest for soils having :
(A) High complexation of aluminium and iron
(B) Minerals with high charge density
(C) Low clay content
(D) None of the above

18. Approximate half life of 2,4-D in soil is :
(A) One month (B) One year (C) Six months (D) Five days

19. Strontium-90 behaves in soil much the same as :
(A) Potassium (B) Calcium (C) Magnesium (D) Iron

20. Ammonium ion moves through the plasma membrane primarily by :
(A) Active transport (B) Mass flow (C) Diffusion (D) All the above

21. SO_4^{-2} adsorption capacity of the soil is decreased by :

(A) Increased soil pH (B) Decreased P content

(C) Decreased soil pH (D) None of the above

22. Major sources of atmospheric sulfur.

(A) Oceans (B) Soils

(C) Volcanic emissions (D) Soils and industry

23. Deficiency of _____ element is expected in organic soils due to the formation of stable complexes with organic matter.

(A) Zinc (B) Copper (C) Mn (D) Fe

24. Available water is held in the soil against a pressure of upto approximately _____ bar.

(A) 0.1 (B) 0.3 (C) 15 (D) 31

25. A soil to be designated as clay if it has a clay separate of :

(A) Not less than 40% (B) > 30%

(C) 30 - 35% (D) > 20%

26. Particle density of soil is affected by :

(A) Fineness of particle of a given mineral

(B) Arrangement of soil solids

(C) Organic matter content

(D) All the above

27. Ionic radii of Al^{3+} is :

(A) 0.39 Å (B) 0.50 Å

(C) 0.64 Å (D) 0.41 Å

28. NO_3 reduction in plants is closely linked to :

(A) Photosynthesis (B) Respiration

(C) Fatty acid metabolism (D) All the above

29. Cation exchange capacity of chlorite is same as that of _____.

(A) Montmorillonite (B) Illite

(C) Vermicullite (D) None of the above

30. Nitrogenase enzyme consists of :

(A) 8 protein complex (B) 2 protein complex

(C) 6 protein complex (D) 4 protein complex

31. Polyphenols are produced in soil during the mineralization of lignin.
(A) Under aerobic conditions with pH > 5.5
(B) Anaerobic environment
(C) Acid conditions
(D) Alkaline conditions

32. The equilibrium constant K_{eq} depends on :
(A) Pressure (B) Temperature
(C) Composition of the system (D) All the above

33. The three carbon compound formed by the reaction between CO_2 and RUBP is :
(A) G_3P (B) Oxaloacetate (C) Malate (D) PGA

34. Montmorillonite has a unit layer charge of :
(A) 0.5 (B) 1.0
(C) 2.0 (D) None of the above

35. Zeta potential can be reduced by :
(A) Lowering of pH (B) Introducing multi charged ions
(C) Adding simple salts (D) All the above

36. Which one of the following is a photosynthetic N fixing bacteria ?
(A) *Azotobacter* (B) *Beijerinckia* (C) *Rhodospirillum* (D) *Clostridium*

37. The most abundant form of organic P compound in soil is :
(A) Inositol phosphate (B) Phospholipid
(C) Nucleic acid (D) Phosphoproteins

38. The first study on legume - *Rhizobium* symbiosis conducted in India by :
(A) Sen and Pal (B) V. Iswaran (C) N.V. Joshi (D) Boussingault

39. Environmental Protection Act came into force in the year :
(A) 1927 (B) 1948 (C) 1974 (D) 1986

40. The Universal Soil Loss Equation was developed by :
(A) Wischmeier and Smith (B) Chepil and Woodruff
(C) Sharma and Prasad (D) Dhruva Narayana

41. Which state in India is the largest producer of saffron ?

(A) Jammu and Kashmir (B) Sikkim

(C) Himachal Pradesh (D) Gujarat

42. Which one of the following is NOT a basic feature of the Indian Constitution ?

(A) Parliamentary form of Government

(B) Federal Government

(C) Independence of Judiciary

(D) Presidential form of Government

43. Who is the present Chairman of NITI Aayog ?

(A) Mr. Rajiv Kumar (B) Shri Narendra Modi, The Prime Minister

(C) Dr. Bibek Debroy (D) Prof. Ramesh Chand

44. Who presided over the Surat Session of the Indian National Congress ?

(A) Rashbehari Ghosh (B) Dadabhai Naoroji

(C) W.C. Banerji (D) Gopalakrishna Gokhale

45. In which language Gandhiji published the paper Harijan ?

(A) Gujarati (B) Hindi (C) English (D) Urdu

46. On which date Prime Minister Shri Narendra Modi announced, Ayushman Bharat Health Insurance Scheme ?

(A) 25th September, 2018 (B) 15th August, 2018

(C) 22nd October, 2018 (D) 23rd September, 2018

47. Who built the Dutch Palace at Mattancherry in 1555 ?

(A) The Dutch East India Company (B) The French East India Company

(C) The English East India Company (D) The Portuguese

48. The most important lake in North Kerala is :

(A) Kavvayi lake (B) Vembanad lake

(C) Kayamkulam lake (D) Sastham Kotta lake

49. Which Travancore ruler, shifted the Capital of Travancore from Padmanabhapuram to Thiruvananthapuram ?

(A) Marthanda Varmma (B) Gowri Parvathi Bhai

(C) Balarama Varmma (D) Dharma Raja

50. In which year was Ancharakandy Cinnamon estates established ?
(A) 1700 (B) 1789 (C) 1767 (D) 1800

51. In which works Chattampi Swamikal has expressed his profound faith in Ahimsa or non-violence ?
(A) Adi Bhasha (B) Advaita Chinta Paddhati
(C) Kristu Matanirupanam (D) Jivita Karunyanirupanam

52. The first of the temples consecrated by Sri Narayana Guru was at :
(A) Aruvippuram in Neyyattinkara (B) Jaganath Temple, Tellicherry
(C) Advaita Asramam at Alwaye (D) Sarada Matam, Shivagiri

53. Chirayankizh Taluk Muslim Samajam was founded by :
(A) Ali Musliyar (B) Kalathingal Muhammed
(C) Vakkom Abdul Khadar Maulavi (D) Muhammed Abdu Rahiman

54. In which year Kuriakose Chavara established CMI Church at Mannanam ?
(A) 1871 (B) 1831 (C) 1805 (D) 1806

55. 'Kallumala Samaram' an agitation under the leadership of Shri Ayyankali took place at :
(A) Veganoor (B) Oorattambalam (C) Changanasseri (D) Perinad

56. Who is the architect of 'Statue of Unity', world's tallest statue built at Kevadiya in Gujarat ?
(A) B.V. Dhoshi (B) R.V. Suthar
(C) Anupama Kundoo (D) Raj Rewal

57. Who is the present Chief Minister of Sikkim ?
(A) Pawan Kumar Chamling (B) Sarbananda Sonowal
(C) Nongthombam Biren Singh (D) Jai Ram Thakur

58. Who won the ONV Literary Award for the year 2018 ?
(A) Sugatha Kumari (B) M. Mukundan
(C) M.T. Vasudevan Nair (D) Subhash Chandran

59. Who has won the women's singles title in the Australian open, 2018 ?
(A) Serena Williams (B) Venus Williams
(C) Simona Halep (D) Caroline Wozniacki

60. Who is the director of the film 'Kayamkulam Kochunni' ?

(A) Nivin Pauly (B) R. Sukumaran

(C) Roshan Andrews (D) Lal Jose

61. The effective nuclear charge felt by the 4s electron of Mn atom is :

(A) 3.25 (B) 3.60 (C) 5.1 (D) 1.65

62. Which among the following is the most appropriate statement(s) ?

(I) Bromides have higher lattice energies and higher stabilities.

(II) The Solubility of ionic compounds in polar solvents decreases with decrease in the degree of polarisation.

(III) The hardness of ionic compounds increases with increase in the degree of polarisation.

(IV) The solubility of ionic compounds in polar solvents decreases with increase in the degree of polarisation.

(V) Bromides have lesser lattice energies and higher stabilities.

(A) Statement (V) is correct.

(B) Statements (I) and (II) are correct.

(C) Statements (I) and (IV) are correct.

(D) Statements (I), (III) and (IV) are correct.

63. The geometry of ClO_3^- ion as predicted by VSEPR theory is :

(A) Trigonal Planar (B) Pyramidal (C) T shaped (D) Tetrahedral

64. Choose the **incorrect** pair :

(A) Sharp transition and fluorescence in lanthanides

(B) d-d transition and colour of the compounds

(C) Charge transfer and high molar absorption coefficient

(D) High magnetic moment among lanthanides and Samarium (III)

65. $Al(CH_3)_3$ is an example of :

(A) A hard acid (B) A hard base (C) A soft acid (D) A soft base

66. The non-aqueous solvent with longest liquid range is :

(A) HF (B) NH_3 (C) N_2O_4 (D) H_2SO_4

67. In the pressure range 1 kPa to 100 kPa, the Hill constants for Hemoglobin and Myoglobin are :

(A) 2.8 and 1.0 respectively (B) 1.0 and 3.0 respectively

(C) 4.0 and 1.0 respectively (D) 1.0 and 4.0 respectively

68. An old wooden stool was found to give 7.7 disintegrations g^{-1} min^{-1}. If a fresh wooden material showed a C^{14} ($t_{1/2}$ = 5730 years) activity of 15.4 disintegrations g^{-1} min^{-1}, age of the sample is :

(A) 3433 years (B) 8271 years (C) 5732 years (D) 9144 years

69. Choose the **odd** function among the following :

(A) cos$x$ (B) x^2 sin$x$ (C) cosh$x$ (D) e^{ix}

70. The Van Der Waals constants of a gas are : a = 0.7 dm^6 atm.mol^{-2} and b = 0.02 $dm^3 mol^{-1}$. The critical temperature of the gas is :

(A) 65 K (B) 126 K (C) 0.06 K (D) 10.4 K

71. Choose the **incorrect** relation from the following thermodynamic equations :

(A) $\left(\frac{\partial T}{\partial V}\right)_S = -\left(\frac{\partial P}{\partial S}\right)_V$ (B) $\left(\frac{\partial S}{\partial V}\right)_T = \left(\frac{\partial P}{\partial T}\right)_V$

(C) $\left(\frac{\partial S}{\partial P}\right)_T = -\left(\frac{\partial A}{\partial V}\right)_T$ (D) $\left(\frac{\partial H}{\partial P}\right)_S = \left(\frac{\partial G}{\partial P}\right)_T$

72. The molar ionic conductance at infinite dilution of lithium chloride (LiCl) is found to be 8.92 mS m^2 mol^{-1}. If the molar ionic conductance of Li^+ ion is 3.87 mS m^2 mol^{-1}, the molar ionic conductance of chloride ion would be :

(A) 12.79 mS m^2 mol^{-1} (B) 4.33 mS m^2 mol^{-1}

(C) 2.31×10^{-4} S m^2 mol^{-1} (D) 50.5×10^{-4} S m^2 mol^{-1}

73. If k, the rate constant for the decomposition of N_2O_5 is 5×10^{-4} s^{-1}, the time required for the N_2O_5 concentration to be 50% of the original value is :

(A) 1.38×10^3 s (B) 2×10^3 s

(C) 6.02×10^2 s (D) None of the above

74. The **correct** order of efficacy for coagulating a lyophobic sol. is given by :

(A) $Mg^{2+} > Ba^{2+} > Ca^{2+} > Na^+ > K^+$ (B) $Ba^{2+} > Mg^{2+} > Ca^{2+} > K^+ > Na^+$

(C) $Ca^{2+} > Ba^{2+} > Mg^{2+} > K^+ > Na^+$ (D) $Mg^{2+} > Ca^{2+} > Ba^{2+} > Na^+ > K^+$

75. The dissociation constant of acetic acid is 2×10^{-5} at 25°C. What would be the pH of an aqueous solution obtained by mixing 0.3 g of acetic acid and 4.1 g of sodium acetate and making a 500 ml solution ?

(A) 5.8 (B) 3.79

(C) 4.25 (D) None of the above

76. For the system :

$$Ni_{(s)} + 2Ag^{+}_{(aq)} \rightarrow Ni^{2+}_{(aq)} + 2Ag_{(s)}$$

the Nernst equation can be written as :

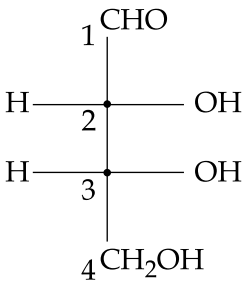
(A) $E_{cell} = E^{0}_{cell} - \frac{RT}{2F} ln \left[\frac{Ni^{2+}}{Ag^{+}}\right]$

(B) $E_{cell} = E^{0}_{cell} - \frac{RT}{2F} ln \frac{\left[Ni^{2+}\right]^{2}}{\left[Ag^{+}\right]^{2}}$

(C) $E_{cell} = E^{0}_{cell} - \frac{RT}{2F} ln \frac{\left[Ni^{2+}\right]}{\left[Ag^{+}\right]^{2}}$

(D) $E_{cell} = E^{0}_{cell} - \frac{RT}{2F} ln \frac{\left[Ni^{2+}\right]}{\left[Ag^{+}\right]^{1/2}}$

77. The **correct** IUPAC name of the compound A is :



Compound A

(A) (2R, 3R)-2, 3, 4-trihydroxybutanal

(B) (2S, 3S)-2, 3, 4-trihydroxybutanal

(C) (2R, 3S)-2, 3, 4-trihydroxybutanal

(D) (2S, 3R)-2, 3, 4-trihydroxybutanal

78. In the most stable conformation of *trans*-1-t-butyl-3-methylcyclohexane, the t-butyl group at C1 and methyl group at C3 are :

(A) Equatorial and axial respectively

(B) Axial and equatorial respectively

(C) Equatorial and equatorial respectively

(D) Axial and axial respectively

79. Choose the **correct** statement(s) about [18]-Annulene.

(A) [18]-Annulene is non-aromatic due to the non-planar structure

(B) All the hydrogens are in the same environment as indicated by a singlet at δ (9.25 ppm) in ^{1}H-NMR at room temperature

(C) Six inner hydrogens are well shielded and shows an NMR signal at δ (−2.88 ppm)

(D) There are two singlets in the NMR spectrum of [18]-Annulene at 100°C

80. The reaction in which nitrene is **not** an intermediate is :

(A) Curtius reaction (B) Arndt-Eistert reaction

(C) Hoffman reaction (D) Schmidt reaction

81. The reaction used for the conversion of an aldose into the next higher ketose is :

(A) Wohl's Method (B) Ruff's Method

(C) Wolfram's Method (D) Sowden-Fischer Synthesis

82. The intermediate associated with Wolff rearrangement reaction is :

(A) Nitrene (B) Ketene (C) Carbene (D) Carbanion

83. Which of the following vitamins and their deficiency diseases are **not** correctly matched ?

(A) Vitamin C - Scurvy (B) Vitamin B_{12} - Pernicious Anemia

(C) Vitamin B_4 - Pellagra (D) Vitamin B_6 - Beri-beri

84. The reaction used for the synthesis of α-amino acids is :

(A) Schmidt reaction (B) Hoffman's degradation reaction

(C) Strecker's synthesis (D) Carius method

85. In the complexometric estimation of Ca^{2+}, which of the following is a masking agent ?

(A) Cyanide ion (B) Eriochrome Black T

(C) NH_4Cl (D) NH_4OH

86. The molar absorption coefficient of a complex is 1200 $dm^3\,mol^{-1}\,cm^{-1}$ and the minimum detectable absorbance is 0.01. The minimum concentration of the complex that can be detected using a sample cell of 1 cm is :

(A) 0.8×10^{-6} M (B) 0.01 M (C) 0.12 M (D) 8.33×10^{-6} M

87. The number of significant figures in the following measurement is :

Temperature = 0.0045°C

(A) 4 (B) 2 (C) 5 (D) 1

88. Choose the **correct** sentence(s) regarding accuracy and precision.
(I) A precise value shows the agreement between several experiments.
(II) The precise value must be in agreement with true value.
(III) Standard deviation is used to express the accuracy of experiments.
(IV) Error distribution curves for a more accurate set of results is in close proximity to the true value.
(A) All the statements are correct
(B) Statements (I) and (IV) are correct
(C) Statements (I) and (III) are correct
(D) Statements (II) and (IV) are correct

89. The sharp band at wavelength 528 nm in the UV - Vis absorption spectra of $KMnO_4$ can be attributed to :
(A) LMCT transition (B) d-d transition
(C) MLCT transition (D) Jahn-Teller distortion

90. The **correct** order of decreasing vibrational frequency for C–Cl, C–C, C–Br, C–H and C–O is :
(A) C–Br, C–Cl, C–O, C–H, C–C (B) C–O, C–H, C–Br, C–Cl, C–C
(C) C–Cl, C–Br, C–O, C–C, C–H (D) C–H, C–C, C–O, C–Cl, C–Br

91. In the mass spectrum of CH_2Cl_2, a group of three peaks at m/z = 84, 86 and 88 in a ratio 9 : 6 : 1 are assigned to the parent ion. These peaks are due to :
(A) The two Cl atoms are cleaved easily
(B) The hydrogens can be cleaved easily
(C) Cl has two isotopes
(D) Cl has three isotopes

92. A ^{1}H–NMR spectrum of compound contains a singlet, a triplet and a quartet peaks. Choose the possible compound from the following :
(A) $CH_3CH_2CH_2CHCl_2$ (B) $CH_3CCl_2CH_2CH_3$
(C) $CH_3CH_2CHClCHCl_2$ (D) $CH_3CHClCHClCH_3$

93. Which of the following statement(s) is **true** for condensation polymers ?
(I) Polymer structure contains only C–C bonds
(II) Monomers used can be bifunctional or polyfunctional
(III) A small by-product molecule is eliminated
(A) All are correct (B) Only (III) is correct
(C) (I) and (II) are correct (D) (II) and (III) are correct

94. Which of the following is an auxochrome ?
(A) –OH (B) $-NO_2$ (C) –N=N– (D) –N=O

95. The compound showing insecticidal properties is :

(A) hexachlorobenzene (B) β-hexachlorocyclohexane
(C) γ-hexachlorocyclohexane (D) θ-hexachlorocyclohexane

96. Which of the following is NOT a function of a food additive ?

(A) Maintaining the product taste (B) Keeping the nutritive value
(C) Controlling the pH (D) None of the above

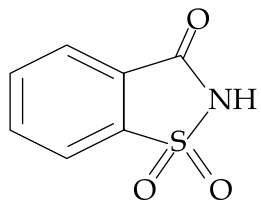
97. The antibiotic effect of sulfadrugs is due to :

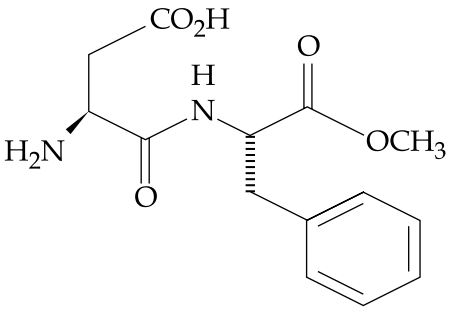
(A) The presence of sulphur which is an antibiotic
(B) Their structural similarity with *p*-aminobenzoic acid amide
(C) Their ability to burst the cell walls of bacteria
(D) Their reaction with folic acid

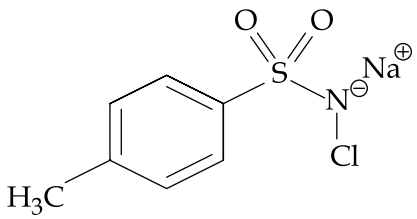
98. Identify a molecule which can be used as soap :

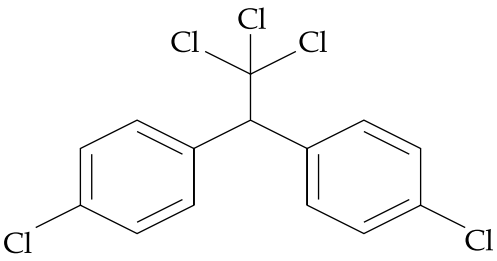
(A) Calcium palmitate (B) Potassium adipate
(C) Magnesium linoleate (D) Sodium stearate

99. Which of the following is saccharin ?

(A) 

(B) 

(C) 

(D) 

100. The condition in which the ratio of chemical nutrients in ecosystem increases beyond optimal value is known as :

(A) Bioaccumulation (B) Eutrophication
(C) Biomagnification (D) Pollution

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SPACE FOR ROUGH WORK

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