



Post Graduate School
Indian Agricultural Research Institute, New Delhi
Examination for Admission to Ph.D. Programme 2013-2014

Discipline : Agricultural Chemicals

Discipline Code : 01

Roll No.

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Please Note:

- (i) This question paper contains **13** pages. **Please check whether all the pages are printed in this set.** Report discrepancy, if any, **immediately** to the invigilator.
- (ii) **There shall be NEGATIVE marking for WRONG answers in the Multiple Choice type questions (No. 1 to 130) which carry one mark each. For every wrong answer 0.25 mark will be deducted.**

PART – I (General Agriculture)

Multiple choice questions (No. 1 to 30). Choose the correct answer (a, b, c or d) and enter your choice in the circle (by shading with a pencil) on the OMR - answer sheet as per the instructions given on the answer sheet.

1. Who is the present Chairman of Protection of Plant Varieties and Farmers' Right Authority (PPV&FRA)?
 - a) Dr. R.R. Hanchinal
 - b) Dr. P.L. Gautam
 - c) Dr. S. Nagarajan
 - d) Dr. Swapan K. Datta
2. Which among the following is another name for vitamin B₁₂?
 - a) Niacin
 - b) Pyridoxal phosphate
 - c) Cobalamin
 - d) Riboflavin
3. The largest share in India's farm export earning in the year 2011-12 was from
 - a) Basmati rice
 - b) Non-basmati rice
 - c) Sugar
 - d) Guar gum
4. The National Bureau of Agriculturally Important Insects was established by ICAR in _____, was earlier known as _____.
 - a) Bangalore; PDBC
 - b) New Delhi; National Pusa Collection
 - c) Ranchi; Indian Lac Research Institute
 - d) New Delhi; NCIPM
5. The most important sucking pests of cotton and rice are respectively
 - a) *Nilaparvata lugens* and *Aphis gossypii*
 - b) *Aphis gossypii* and *Thrips oryzae*
 - c) *Amrasca biguttula biguttula* and *Scirtothrips dorsalis*
 - d) *Thrips gossypii* and *Orseolia oryzae*
6. Which of the following microorganism causes fatal poisoning in canned fruits and vegetables?
 - a) *Aspergillus flavus*
 - b) *Penicillium digitatum*
 - c) *Clostridium botulinum*
 - d) *Rhizoctonia solani*
7. The cause of the great Bengal Famine was
 - a) Blast of rice
 - b) Brown spot of rice
 - c) Rust of wheat
 - d) Karnal bunt of wheat
8. Actinomycetes belong to
 - a) The fungi
 - b) Eukaryote
 - c) *Mycelia sterilia*
 - d) None of the above
9. A virus-free clone from a virus infected plant can be obtained by
 - a) Cotyledonary leaf culture
 - b) Axenic culture
 - c) Stem culture
 - d) Meristem tip culture
10. Which of the following is not an objective of the National Food Security Mission?
 - a) Sustainable increase in production of rice, wheat and pulses
 - b) Restoring soil fertility and productivity at individual farm level
 - c) Promoting use of bio-pesticides and organic fertilizers
 - d) Creation of employment opportunities

11. Agmarknet, a portal for the dissemination of agricultural marketing information, is a joint endeavour of
- DMI and NIC
 - DMI and Ministry of Agriculture
 - NIC and Ministry of Agriculture
 - DMI and Directorate of Economics and Statistics
12. The share of agriculture and allied activities in India's GDP at constant prices in 2011-12 was
- 14.1%
 - 14.7%
 - 15.6%
 - 17.0%
13. The average size of land holding in India according to Agricultural Census 2005-06 is
- 0.38 ha
 - 1.23 ha
 - 1.49 ha
 - 1.70 ha
14. 'Farmers First' concept was proposed by
- Paul Leagans
 - Neils Rolling
 - Robert Chamber
 - Indira Gandhi
15. In the year 2012, GM crops were cultivated in an area of
- 150 million hectare in 18 countries
 - 170 million hectare in 28 countries
 - 200 million hectare in 18 countries
 - 1.70 million hectare in 28 countries
16. The broad-spectrum systematic herbicide glyphosate kills the weeds by inhibiting the biosynthesis of
- Phenylalanine
 - Alanine
 - Glutamine
 - Cysteine
17. At harvest, the above ground straw (leaf, sheath and stem) weight and grain weight of paddy crop are 5.5 and 4.5 tonnes per hectare, respectively. What is the harvest index of paddy?
- 45%
 - 50%
 - 55%
 - 100%
18. Crossing over between non-sister chromatids of homologous chromosomes takes place during
- Leptotene
 - Pachytene
 - Diplotene
 - Zygotene
19. The term 'Heterosis' was coined by
- G.H. Shull
 - W. Bateson
 - T.H. Morgan
 - E.M. East
20. When a transgenic plant is crossed with a non-transgenic, what would be the zygosity status of the F_1 plant?
- Homozygous
 - Heterozygous
 - Hemizygous
 - Nullizygous
21. The highest per capita consumption of flowers in the world is in
- The USA
 - India
 - Switzerland
 - The Netherlands
22. Which of the following is a very rich source of betalain pigment?
- Radish
 - Beet root
 - Carrot
 - Red cabbage
23. Dog ridge is
- Salt tolerant rootstocks of mango
 - Salt tolerant rootstocks of guava
 - Salt tolerant rootstocks of grape
 - Salt tolerant rootstocks of citrus
24. Which of the following micronutrients are most widely deficient in Indian soils?
- Zinc and boron
 - Zinc and iron
 - Zinc and manganese
 - Zinc and copper
25. Which of the following fertilizers is not produced in India?
- DAP
 - Urea
 - Muriate of potash
 - TSP
26. What is the estimated extent of salt affected soils in India?
- 5.42 mha
 - 7.42 mha
 - 11.42 mha
 - 17.42 mha
27. Which of the following is not a feature of watershed?
- Hydrological unit
 - Biophysical unit
 - Socio-economic unit
 - Production unit

28. Correlation coefficient 'r' lies between
 a) 0 and 1
 b) -1 and 1
 c) -1 and 0
 d) 0 and ∞
29. For the data 1, -2, 4, geometric mean is
 a) 2
 b) 4
 c) $-\frac{7}{3}$
 d) -2
30. The relationship between Arithmetic mean (A), Harmonic mean (H) and Geometric mean (G) is
 a) $G^2=AH$
 b) $G=\sqrt{A+H}$
 c) $H^2=GA$
 d) $A^2=GH$

PART – II (Subject Paper)

Multiple choice questions (No. 31 to 130). Choose the correct answer (a, b, c or d) and enter your choice in the circle (by shading with a pencil) on the OMR - answer sheet as per the instructions given on the answer sheet.

31. The IUPAC name of the compound having the formula $CH_2 = CH - CH(CH_3)_2$
 a) 1,1-dimethyl-2-propene
 b) 3-methyl-1-butene
 c) 2-vinyl propane
 d) 1-isopropyl ethylene
32. Which of the following compound is covalent?
 a) H_2
 b) CaO
 c) KCl
 d) Na_2S
33. The compound which contains both ionic and covalent bonds is
 a) CH_4
 b) H_2
 c) KCN
 d) KCl
34. Optical isomerism is shown by
 a) Butanol-1
 b) Butanol-2
 c) Butene-1
 d) Butene-2
35. Number of stereoisomeric forms of the compound $CH_3.CH = CH.Br.CH_3$ is
 a) 2
 b) 3
 c) 4
 d) 6
36. +I effect is shown by
 a) NO_2
 b) Cl
 c) Br
 d) CH_3
37. Which of the following does not give benzoic acid on hydrolysis?
 a) Phenyl cyanide
 b) Benzoyl chloride
 c) Benzyl chloride
 d) Methyl benzoate
38. The compound that is most reactive towards electrophilic nitration is
 a) Toluene
 b) Benzene
 c) Benzoic acid
 d) Nitrobenzene
39. Which xylene gives only one monobromo derivative?
 a) Ortho
 b) Para
 c) Meta
 d) None of the above
40. Acetone will be obtained by ozonolysis of
 a) 1-butene
 b) 2-butene
 c) Isobutene
 d) 2-butyne
41. n-Propyl bromide on treatment with ethanolic potassium hydroxide produces
 a) Propane
 b) Propene
 c) Propyne
 d) Propanol
42. The most electronegative element among the following is
 a) Sodium
 b) Bromine
 c) Fluorine
 d) Oxygen
43. The 1H NMR spectrum of a compound contains a singlet, a triplet and a quartet, the compound is
 a) $CH_3CCl_2CH_2CH_3$
 b) $CH_3CHClCHClCH_3$
 c) $CH_3CH_2CHClCHCl_2$
 d) $CH_3CH_2CH_2CHCl_2$

44. Which compound has a molecular ion at $m/z=58$, an infrared absorption at 1650 cm^{-1} and just one singlet in its nmr spectrum?
- Butane
 - Acetone
 - Acetaldehyde
 - 2-methyl propane
45. Which of the following gases is unsuitable for use a GC carrier gas?
- Nitrogen
 - Helium
 - Oxygen
 - All of the above
46. In reversed phase HPLC, there is s
- Non-polar solvent/polar column
 - Polar solvent/non-polar column
 - Non-polar solvent/non-polar column
 - Any of the above
47. The number of moles of solute present in 1 kg of a solvent is called its
- Molality
 - Molarity
 - Normality
 - Formality
48. In the gaseous equilibrium, $A+2B \rightleftharpoons C+\text{heat}$, the forward reaction is favoured by
- Low pressure, high temperature
 - Low pressure, low temperature
 - High pressure, low temperature
 - High pressure, high temperature
49. Which of the following changes is not exothermic?
- Freezing water
 - Condensing steam
 - Melting copper
 - Combustion of butane
50. What is the number of moles of CO_2 which contains 16 g of oxygen?
- 0.2 mole
 - 0.25 mole
 - 0.4 mole
 - 0.5 mole
51. The number of water molecules present in a drop of water (volume 0.0018 ml) at room temperature are
- 1.568×10^3
 - 4.84×10^{17}
 - 6.023×10^{19}
 - 6.023×10^{23}
52. The following are the half-lives of four active isotopes. Which one of the following is the most dangerous to handle?
- 3 billion years
 - 100 years
 - 0.01 minute
 - 13 days
53. The molecule which has the highest percentage of ionic character among the following is
- HI
 - HF
 - HCl
 - HBr
54. The half-life period of an isotope is 2 hours. after 6 hours, what fraction of the initial quantity of the isotope will be left behind?
- 1/6
 - 1/3
 - 1/8
 - 1/4
55. The conversion of sugar $\text{C}_{12}\text{H}_{22}\text{O}_{11} \rightarrow \text{CO}_2$ is
- Oxidation
 - Reduction
 - Both of the above
 - None of the above
56. When $\text{K}_2\text{Cr}_2\text{O}_7$ is converted into K_2CrO_4 , the change in oxidation number of Cr is
- 0
 - 3
 - 4
 - 6
57. The indicator phenolphthalein works in pH range
- 3.0 - 4.4
 - 4.4 - 6.3
 - 6.0 - 8.0
 - 8.2 - 10.0
58. Which of the following is not a reducing sugar?
- Sucrose
 - Mannose
 - Lactose
 - Fructose
59. Biuret reaction is specific for
- CONH- linkages
 - CSNH₂ group
 - (NH)NH₂ group
 - All of the above

60. Which of the following is not a major photosynthetic pigment in plants?
- Chlorophyll a
 - Chlorophyll b
 - Chlorophyll c
 - Carotenoid pigments
61. Which of the following is not prepared from chloral?
- DDT
 - Methoxychlor
 - Aldrin
 - DDVP
62. The number of sulphur atoms in a molecule of phorate is/are
- 0
 - 1
 - 2
 - 3
63. The orientation of chlorines in structure of γ -HCH is
- aaeeee
 - aaaeee
 - aeeeee
 - eeeeee
64. Bordeaux mixture is a preparation obtained from
- Copper sulphate and sodium carbonate
 - Copper sulphate and ammonium carbonate
 - Copper sulphate and lime
 - Sodium sulphate and lime
65. Substitution of electron donating groups at p,p' position of DDT, the rate of dehydrochlorination
- Increases
 - Decreases
 - Not effected
 - May increase or decrease
66. Among the carbamate insecticides, which of the following is most toxic to mammals?
- Carbaryl
 - Carbofuran
 - Propoxur
 - Aldicarb
67. The minimum number of hetero atom present in an azole compound is/are
- 0
 - 1
 - 2
 - 3
68. In India, the Maximum Residue Limit (MRL) of pesticides are fixed by
- FAO/WHO Committee on Pesticide Residues
 - Central Insecticide Board
 - Central Codex Committee of Food Standards
 - Food Safety and Standards Authority of India
69. Which of the techniques is not used for pesticide residue analysis?
- GLC
 - NMR
 - HPLC
 - ELISA
70. Which of the following is not a pesticide formulation auxiliary material?
- Surfactant
 - Diluent
 - Active ingredient
 - Solvent
71. Which of the following nitrogenous fertilizers have maximum N content?
- Urea
 - Anhydrous ammonia
 - Ammonium sulphate
 - Ammonium nitrate
72. Which of the following is not a NI inhibitor?
- N-serve
 - DCD
 - MT
 - EDB
73. Fatty acids are important component of many lipids. For which of the following lipid classes or lipid derivatives fatty acids are not a significant component?
- Phospholipids
 - Steroids
 - Triglycerides
 - Waxes
74. The empirical formula of dodecane is
- C_5H_{11}
 - C_6H_{13}
 - $C_{10}H_{22}$
 - $C_{12}H_{26}$
75. The shape of acetylene is
- Trigonal planar
 - Linear
 - Tetrahedral
 - Octahedral

76. Emission of an alpha particle from the nucleus with mass number A and atomic number Z results in the daughter nucleus with mass number and atomic number given in
- A-1, Z-1
 - A-4, Z-2
 - A, Z+1
 - A-1, Z
77. Hydrogen bonding between alcohol molecules
- Induces polymerization
 - Raise the boiling point
 - Speed up fermentation
 - Decrease the viscosity
78. The process of leaching of bases from the soil contributes to the formation of
- Saline soil
 - Sodic soil
 - Acid soil
 - Both a) and b)
79. How many possible isomeric forms can arise from monosubstitution of a ring hydrogen by some group 'X' in para-xylene?
- 1
 - 2
 - 3
 - 4
80. Any alcohol containing three –OH groups is a
- Primary alcohol
 - Secondary alcohol
 - Tertiary alcohol
 - Polyhydroxy alcohol
81. The form of nitrogen produced by the process of denitrification is
- NH_4^+
 - N_2O
 - NO_3^-
 - N_2H_4
82. Which of the following is most probably an optically active organic compound?
- trans-2-butene
 - 2-bromo-2-chloro butane
 - para-dichlorobenzene
 - Chloroform
83. The addition of Br_2 to $\text{CH}_2=\text{C}(\text{CH}_3)\text{CH}=\text{CH}_2$ does not give
- $\text{CH}_2\text{Br}-\text{C}(\text{CH}_3)-\text{Br}-\text{CH}=\text{CH}_2$
 - $\text{CH}_2=\text{C}(\text{CH}_3)-\text{CH}-\text{Br}-\text{CH}_2\text{Br}$
 - $\text{CH}_2\text{Br}-\text{C}(\text{CH}_3)=\text{CH}-\text{CH}_2\text{Br}$
 - $\text{CH}_2\text{Br}-\text{C}(\text{CH}_3)-\text{Br}-\text{CH}-\text{Br}-\text{CH}_2\text{Br}$
84. Seven grams of a gaseous compound occupies 2.24 litres at STP. The empirical formula of compound is CH_2 . What is its molecular formula?
- C_5H_{10}
 - C_2H_4
 - C_3H_6
 - C_4H_8
85. Isomers formed by rotation about single bond are
- Conformers
 - Enantiomers
 - Diastereoisomers
 - Regioisomers
86. The amount of nitrogen in one mole of urea is
- 14 g
 - 28 g
 - 40 g
 - 60 g
87. Isomers which rotate the plane polarized light by equal amount and in opposite direction are
- Epimers
 - Conformers
 - Enantiomers
 - Diastereoisomers
88. The structure of (R)-glyceraldehyde is
- $$\begin{array}{c} \text{CHO} \\ | \\ \text{HO}-\text{C}-\text{CH}_2\text{OH} \\ | \\ \text{H} \end{array}$$
 - $$\begin{array}{c} \text{CHO} \\ | \\ \text{HO}-\text{C}-\text{H} \\ | \\ \text{CH}_2\text{OH} \end{array}$$
 - $$\begin{array}{c} \text{CHO} \\ | \\ \text{HOCH}_2-\text{C}-\text{OH} \\ | \\ \text{H} \end{array}$$
 - $$\begin{array}{c} \text{CHO} \\ | \\ \text{HOCH}_2-\text{C}-\text{CH}_2\text{OH} \\ | \\ \text{H} \end{array}$$
89. Alkanes can be prepared by
- Cannizzaro reaction
 - Clemmensen reduction
 - Claisen condensation
 - Stobbe condensation

90. The negative part of the addendum adds on the carbon atom that is joined to the least number of hydrogen atoms. This is known as
- Hund's rule
 - Aufbau principle
 - Woodward-Hoffman selection rule
 - Markovnikoff's rule
91. Allenes are
- Hydrocarbons with cumulated double bonds
 - Hydrocarbons with isolated double bond
 - Hydrocarbons with no double bond
 - Hydrocarbons with isolated triple bond
92. Calcium carbide on reaction with water yields
- Ethene
 - Ethyne
 - Propyne
 - Ethane
93. Salicylaldehyde can be prepared by
- Reimer-Tiemann reaction
 - Diels-Alder reaction
 - Dieckman condensation
 - Benzoin condensation
94. Which is an example of aromatic amino acid?
- Tyrosine
 - Alanine
 - Glycine
 - Cytosine
95. Pyrrolidine ring is present in
- Histidine
 - Adenine
 - Thymine
 - Proline
96. Which is an example of nucleoside?
- Adenine
 - Thymine
 - Cytidine
 - Cytosine
97. Which of the following compound will give Diel's hydrocarbon when distilled with selenium?
- Glucose
 - Fructose
 - Cholesterol
 - Alanine
98. The soil particles with particle size less than 0.002 mm are called as
- Coarse sand
 - Fine sand
 - Slit
 - Clay
99. The conformation that the polypeptide chain assumes is called
- Primary structure
 - Secondary structure
 - Tertiary structure
 - Quaternary structure
100. Which is an example of pyrrolidine-pyridine group of alkaloids?
- Ephedrine
 - Nicotine
 - Quinine
 - Morphine
101. Quercetin belongs to the class of
- Plant pigments
 - Alkaloids
 - Steroids
 - Proteins
102. The important nitrogen fixing organism found in root nodules of leguminous plant is
- Fusarium*
 - Rhizobium*
 - Rhizoctonia*
 - Pythium*
103. A solution of DDT having concentration of 4000 PPM means
- 2g DDT in 500 mL of solvent
 - 4g DDT in 100 mL of solvent
 - 1g DDT in 400 mL of solvent
 - 40 mg in 100 mL of solvent
104. One of the product obtained by thermal decomposition of almost all terpenoids is
- Alanine
 - Tetrazole
 - Isoprene
 - Thymine
105. Extracts of pesticide residues are always contaminated with co-extractives. The process of removal of these contaminants before analysis is known as
- Extraction
 - Sampling
 - Clean up
 - Quantification
106. Citral is the most important member of the
- Acyclic monoterpenoids
 - Monocyclic monoterpenoids
 - Bicyclic monoterpenoids
 - Acyclic sesquiterpenoids
107. Abscisic acid (a plant hormone) is a
- Sesquiterpenoid
 - Diterpenoid
 - Polyterpenoid
 - Monoterpenoid

108. UV-visible spectroscopy of organic compounds is usually concerned with which electronic transitions?
- $n \rightarrow \sigma^*$
 - $n \rightarrow \pi^*$
 - $\pi \rightarrow \pi^*$
 - Both b) & c)
109. An example of a surfactant is
- NaCl
 - Sucrose
 - Sodium dodecyl benzene sulphonate
 - Sodium acetate
110. Which of the following statements about tetramethyl silane is incorrect?
- It produces a single peak at $\delta=10$
 - It is inert
 - It is volatile
 - It is used to provide a reference against which other peaks are measured
111. Glucose and mannose are
- Istotops
 - Conformers
 - Epimers
 - Anomers
112. Which one of the following statements about the mass spectrum of CH_3Br is correct?
- The last two peaks are of equal size and occur at m/z values of 94 and 96
 - The last two peaks have abundances in the ratio 3:1 and occur at m/z values of 94 and 96
 - There is just one peak for the molecular ion with m/z value of 94
 - There is just one peak for the molecular ion with m/z value of 96
113. Which of the following pesticide can be obtained by reaction of ethylene with bromine?
- Ziram
 - Methyl parathion
 - Monocrotophos
 - EDB
114. If pressure is applied to the following equilibrium
 $\text{liquid} \rightleftharpoons \text{vapors}$
the boiling point of liquid
- will increase
 - will decrease
 - may increase or decrease
 - will not change
115. For a process or reaction to proceed spontaneously in the forward direction at constant temperature and pressure, the change in Gibb's free energy is
- Negative
 - Positive
 - Equal to zero
 - Both a) & b)
116. The concentration of a 0.01% (by weight) pesticide solution can also be expressed as
- 1.0 ppb
 - 100 PPM
 - 10 PPT
 - 1.0%
117. The IUPAC name, 1-naphthyl methyl carbamate can be assigned to
- EDB
 - Aluminium phosphide
 - Carbofuran
 - Carbaryl
118. Zinc sulfate and ethylene bis(dithio carbamate) sodium salt are used in preparation of
- Warfarin
 - Zineb
 - Bordeaux mixture
 - Captan
119. The active ingredient in the nematicide, nemagon, is
- 1,2-Dibromoethane
 - 1,2-Dibromo-3-chloro propane
 - Carbofuran
 - Fenamiphos
120. Which of the following has highest chlorine content?
- Carbon tetrachloride
 - DDT
 - Chloral hydrate
 - BHC
121. A group which deactivates the benzene ring towards electrophilic substitution but directs the incoming group towards o- and p-position is
- $-\text{NH}_2$
 - $-\text{C}_2\text{H}_5$
 - $-\text{NO}_2$
 - $-\text{Cl}$
122. The best method to separate the mixture of ortho and para nitrophenol (1:1) is
- Crystallization
 - Vacuum distillation
 - Steam distillation
 - Vapourisation

123. Which one of the following chemicals is the most widespread pollutant in the environment?

- Polychlorinated biphenyls
- Chlorinated benzodioxins
- DDT
- Tetraethyl lead

124. When a cold and compressed gas is allowed to expand through a small orifice, temperature generally falls. This phenomenon is called as

- Linde's effect
- Claud's effect
- Joule Thomson effect
- Debye and Grugue effect

125. Williamson's synthesis of ethers is an example of

- Nucleophilic substitution
- Nucleophilic addition
- Electrophilic substitution
- Electrophilic addition

126. Schiff's bases are formed when aniline reacts with

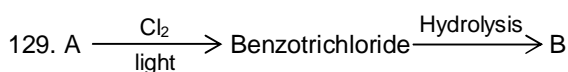
- Aromatic aldehyde
- Aryl ketones
- Aryl halides
- Aryl alcohols

127. Which of the following nematodes is responsible for root-knot disease of vegetable crops?

- Heterodera angustus*
- Rhadopholus similis*
- Meloidogyne incognita*
- Ditylenchus angustus*

128. What is the IUPAC name of the phenolic part of the carbamate insecticide carbofuran?

- 2,3-dihydro-2, 2-dimethyl benzofuran-7-ol
- 2,2-dimethyl benzofuran-7-ol
- 2-methyl benzofuran-7-ol
- 2-chloro-4,5-dimethylphenyl *N*-methyl carbamate



A and B in the above reaction are

- C_6H_6 . $\text{C}_6\text{H}_5\text{CHO}$
- $\text{C}_6\text{H}_5\text{CH}_3$. $\text{C}_6\text{H}_5\text{CHO}$
- $\text{C}_6\text{H}_5\text{CH}_3$. $\text{C}_6\text{H}_5\text{COOH}$
- C_6H_6 . $\text{C}_6\text{H}_5\text{COOH}$

130. Acid component of the synthetic pyrethroid fluvalinate is

- 2[2-chloro-4-trifluoromethylanilino]-3-methyl butyric acid
- 2[4-chlorophenyl]-3-methyl butyric acid
- 3[2-chloro-3,3,3-trifluoro vinyl]-2,2-dimethyl cyclo-propane carboxylic acid
- 3[2,2-dichlorovinyl]-2,2-dimethyl cyclopropane carboxylic acid

Matching type questions (No. 131 to 140); all questions carry equal marks. Choose the correct answer (a, b, c, d or e) for each sub-question (i, ii, iii, iv and v) and enter your choice in the circle (by shading with a pencil) on the OMR - answer sheet as per the instructions given on the answer sheet.

131.

- | | |
|---------------|-----------------|
| i) Ricinine | a) Terpenoid |
| ii) Sucrose | b) Alkaloid |
| iii) Lycopene | c) Carbohydrate |
| iv) Insulin | d) Pigment |
| v) Limonene | e) Protein |

132.

- | | |
|---|----------------|
| i) CH_3COOH | a) Alcohol |
| ii) $\text{C}_2\text{H}_5\text{OC}_2\text{H}_5$ | b) Acid |
| iii) C_4H_{10} | c) Hydrocarbon |
| iv) $\text{CH}_3\text{CH}_2\text{OH}$ | d) ketone |
| v) CH_3COCH_3 | e) Ether |

133.

- | | |
|----------|------------------------------|
| i) Bt | a) Pesticide residues |
| ii) EC | b) Chromatographic technique |
| iii) ADI | c) Biopesticide |
| iv) HPLC | d) Spectroscopic technique |
| v) NMR | e) Pesticide formulation |

134.

- | | |
|--------------------|-------------------|
| i) UV | a) Chemical shift |
| ii) NMR | b) NPD |
| iii) IR | c) Red shift |
| iv) Chromatography | d) Rocking |
| v) GC | e) Rf |

- 135.
- | | |
|---|------------------------------|
| i) In any system, no two electrons can have same set of four quantum numbers | a) Hofmann rule |
| ii) Maximum number of unpaired electron is assured while filling up atomic orbitals | b) Pauli exclusion principle |
| iii) To be aromatic, a molecule must have $(4n+2) \pi$ electrons | c) Hund's rule |
| iv) Formation of least substituted alkene by elimination of hydrogen from carbon having maximum number of hydrogen | d) Saytzeff's rule |
| v) Formation of most substituted alkene by elimination of hydrogen from β -carbon having least number of hydrogen | e) Huckel rule |
- 136.
- | | |
|----------------------------|---------------------------|
| i) Aldol condensation | a) Caprolatum |
| ii) Kolbe electrolysis | b) Pyridine |
| iii) Beckman rearrangement | c) β -ketoesters |
| iv) Chichibabin reaction | d) β -hydroxyketone |
| v) Dieckmann condensation | e) Alkane |
- 137.
- | | |
|---------------------------------|------------------|
| i) Constituent of nucleic acids | a) Azadirachtin |
| ii) Amino acid | b) Monocrotophos |
| iii) Tetrano-triterpenoid | c) Diuron |
| iv) Organophosphorous compound | d) Cysteine |
| v) Urea derivative | e) Phosphorous |
- 138.
- | | |
|----------------------------|---------------------|
| i) Chloroacetanilide | a) Captan |
| ii) Coumarin | b) Bordeaux mixture |
| iii) Tetrahydrophthalimide | c) Ethofenprox |
| iv) Copper compound | d) Butachlor |
| v) Non-ester pyrethroid | e) Warfarin |
- 139.
- | | |
|--|-------------------------|
| i) <i>Pongamia glabra</i> | a) δ -endotoxin |
| ii) <i>Bacillus thuringiensis</i> | b) Jasmolin |
| iii) <i>Aspergillus flavus</i> | c) Karanjin |
| iv) <i>Chrysanthemum emerarifolium</i> | d) α -terthienyl |
| v) <i>Tagetes erecta</i> (Marigold) | e) Aflatoxin |
- 140.
- | | |
|--------------|---|
| i) Alanine | a) $\text{NH}_2\text{-CH-COOH}$

CH_2OH |
| ii) Cysteine | b) $\text{H}_2\text{N-CH-COOH}$

$\text{CH}_2\text{-(CH}_2\text{)-NH}_2$ |
| iii) Serine | c) $\text{H}_2\text{N-CH-COOH}$

$\text{H}_3\text{C-CH-OH}$ |
| iv) Lysine | d) $\text{H}_2\text{N-CH-COOH}$

CH_3 |
| v) Threonine | e) $\text{H}_2\text{N-CH-COOH}$

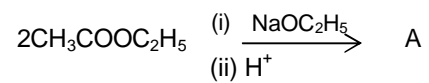
CH_2SH |

Short questions (No. 141 to 146); each question carries FIVE marks. Write answers, including computation / mathematical calculations if any, in the space provided for each question on the question paper itself.

141. Discuss the reaction of hexose with phenyl hydrazine.

142. (a) How will you distinguish between the following compounds on the basis of their proton NMR spectrum? Sketch the structure of each molecule.
(i) 1,3-dibromopropan-2-one, (ii) 2,3-dibromopropanal
(b) How will you synthesize diuron starting from 3,4-dichloroaniline.

143. What is the product of following reaction? Show the mechanism of the reaction.



144. What are the factors which need to be analyzed for selecting most appropriate agrochemical formulation for a given application?

145. Why is it necessary to validate the analytical method used for estimation of pesticide residue? Discuss various steps involved in method validation.

146. Write reactions for following conversions:

(a) Pentose → hexose

(b) Aldose → ketose