

**UNIVERSITY OF CALICUT**  
**MODEL QUESTION PAPER - 2019**  
**Common Entrance Examination for Admission to**  
**M. Sc. Applied Plant Science / M. Sc. Biotechnology / M. Sc. Applied Zoology 2019**

**Instructions to Candidates**

- I. For candidates with a single option of Applied Plant Science alone  
Part A + B – 1 hour 45 minutes
  - II. For candidates with a single option of Biotechnology alone  
Part A + C – 1 hour 45 minutes
  - III. For candidates with a single option of Applied Zoology alone  
Part A + D – 1 hour 45 minutes
  - IV. For candidates with both options of Applied Plant Science / Applied Zoology and option of Biotechnology.  
First 1 hour 45 minutes attempt Part A + B or Part A + D as per their option  
Next 1 hour 15 minutes attempt Part C alone
  - V. Students will not be permitted to take the question papers after the examination
- .....

**PART A - COMMON PAPER**

**Max Marks 25**

Attempt all 25 questions. All questions carry 1 mark each. 1/3 mark will be deducted for each wrong answer.

1. Find the odd one
  - a) Glycosylation
  - b) Proteolysis
  - c) Splicing
  - d) Phosphorylation
  
2. Secondary lymphoid organ
  - a) Bone marrow
  - b) Lymph node
  - c) Thymus
  - d) Bursa of fabricius
  
3. VDRL is a diagnostic test for ..... infection.
  - a) Salmonella
  - b) Syphilis
  - c) Human Pappiloma Virus
  - d) Candida
  
4. Competitive inhibitors will have ..... to that of normal reaction without the inhibitor.
  - a) Same Km Value
  - b) Same Vmax value
  - c) Same Km and same V max Values
  - d) Different Km and same V max Values
  
5. The primary function of baffles in the fermentor is
  - a) Prevent vortex formation
  - b) For increase the volumetric air flow in the fermenter
  - c) Increase the feed rate of media
  - d) Prevent the form formation

6. Rotating biological contactors are used in
  - a) Aerobic water treatment process
  - b) Alcoholic fermentation process
  - c) Cheese making
  - d) In penicillin production
  
7. Technique used for the structural studies of protein
  - a) Electrophoresis
  - b) X-ray crystallography
  - c) Ultra centrifugation
  - d) Peptide fingerprinting
  
8. The KDEL sequence found on luminal proteins of the ER is responsible for
  - a) Translocation of proteins into the ER lumen
  - b) Recognition by signal peptidase of the signal sequence
  - c) Retrieval of ER luminal proteins from the golgi
  - d) Insertion of proteins into the membrane of ER
  
9. The following process requires cholesterol except:
  - a) Steroid hormone synthesis
  - b) Thyroid hormone synthesis
  - c) Membrane fluidity
  - d) Synthesis of bile
  
10. Which of the following enzyme is activated to facilitate the uptake of triglycerols in adipose tissues by insulin enhancement?
  - a) Lipoprotein lipase
  - b) Catalase
  - c) Esterase
  - d) Hormone-sensitive lipase
  
11. Which of the following RNA serves in the regulatory functions including splicing and gene silencing?
  - a) mRNA
  - b) tRNA
  - c) small RNA
  - d) rRNA
  
12. Which of the following is NOT the positive regulator of Lac operon
  - a) Lactose
  - b) Allolactose
  - c) cAMP
  - d) Glucose
  
13. Which of the virus is commonly attributed to the initiation of cervical carcinoma?
  - a) HPV
  - b) EBV
  - c) HSV
  - d) HBV

14. In an experiment, IQ scores are approximately normally distributed with a mean of 100 and standard deviation of 15, the proportion of people with IQs above 130 is
- 95%
  - 2.5%
  - 15%
  - 5%
15. Ribosome biosynthesis takes place in
- Cytoplasm
  - Nucleolus
  - Mitochondria
  - None of these
16.  $F_0-F_1$  particles are present in
- Endoplasmic reticulum
  - Golgi complex
  - Mitochondria
  - None of these
17. The technique used to separate DNA fragments is
- Northern blotting
  - Southern blotting
  - Eastern blotting
  - Western blotting
18. Which level of protein structure is represented by the alpha-helix and beta-sheet?
- Primary
  - Secondary
  - Tertiary
  - Quaternary
19. Which of the following vitamins has cobalt as a constituent?
- Vitamin B<sub>1</sub>
  - Vitamin B<sub>2</sub>
  - Vitamin B<sub>6</sub>
  - Vitamin B<sub>12</sub>
20. Which among the following is a protein sequence data base?
- PIR
  - EMBL
  - DDBJ
  - Gen bank
21. Concentration of a solution equal to the number of gram equivalents of the solute per liter of the solution is
- Normality
  - Molarity
  - Molality
  - None of these

22. The voluntary program used to label green computing is
- a) Energy star
  - b) Energy bar
  - c) Energy Premium
  - d) Energy Basic
23. Monosomy is associated with
- a) Down syndrome
  - b) Turner syndrome
  - c) Retinoblastoma
  - d) Leukemia
24. Practice of taking someone else's work or ideas and using as one's own is
- a) Fraudism
  - b) Plagiarism
  - c) Pilfering
  - d) None of these
25. Which among the following is an imino acid
- a) Glycine
  - b) Proline
  - c) Arginine
  - d) Glutamine

## PART B – APPLIED PLANT SCIENCE

**Time: 1½ Hour**

**Max Marks 75**

Attempt all 75 questions. All questions carry 1 mark each. 1 mark will be deducted for 3 wrong answers.

26. Cyanophyceae is separated from algae because it is

- a) Eukaryotic
- b) Unicellular
- c) Prokaryotic
- d) Filamentous

27. Plants which are not differentiated into roots, stem and leaves are grouped under

- a) Gymnosperms
- b) Pteridophytes
- c) Thallophytes
- d) Spermatophytes

28. Sargasso sea is named after an algae *Sargassum* which is a

- a) Green algae
- b) Brown algae
- c) Red algae
- d) Blue green algae

29. Liverworts belong to

- a) Gymnosperms
- b) Pteridophytes
- c) Bryophyte
- d) Algae

30. Which group of plant constitute the lower bryophytes

- a) Liverworts
- b) Mosses
- c) Anthocerotales
- d) Jungermaniales

31. A specialised organ of the sporophyte for attachment to the gametophyte is called

- a) Stalk
- b) Foot
- c) Apophysis
- d) Root

32. Which is known as Horsetails?

- a) *Equisetum*
- b) *Psilotum*
- c) *Pteris*
- d) *Adiantum*

33. Spore bearing leaf is called

- a) sorus
- b) indusium
- c) ramentum
- d) sporophyll

34. Circinate vernation is found in

- a) cycas
- b) fern
- c) both a and b
- d) none of these

35. The needles of *Pinus* and leaves of *Cycas* are similar, because both show

- a) Hydrophytic features
- b) Xerophytic features
- c) Psammophytic features
- d) None of these

36. Gymnosperm differ from angiosperm

- a) having seeds
- b) having fruits
- c) having naked ovules
- d) none of these

37. Coralloid roots are found in

- a) *Cycas*
- b) *Pinus*
- c) *Dryopteris*
- d) *Lycopodium*

38. Puffball belongs to the genera

- a) *Nidularia*
- b) *Lycoperdon*
- c) *Cyathus*
- d) *Aspergillus*

39. Cell containing many nuclei are called:

- a) Coenocyte
- b) Hyphae
- c) Mycelium
- d) Sporophore

40. Damping off is caused by:

- a) *Albugo*
- b) *Pythium*
- c) *Penicillium*
- d) *Plamodiophora*

41. The fungal partner in lichen is called mycobiont whereas algal partner is called

- a) glycobiont
- b) algobiont
- c) phycobiont
- d) often referred as algal partner

42. The study of lichens is called

- a) phycology
- b) mycology
- c) lichology
- d) lichenology

43. Usnea is a

- a) foliose lichen
- b) fruticose lichen
- c) crustose lichen
- d) filamentous lichen

44. Coffee rust is caused by

- a) *Pucciniagraminis*
- b) *Cephaleuros coffeae*
- c) *Helminthosporium coffeae*
- d) *Hemileia vastatrix*

45. Name the organism that causes quick wilt of black pepper.

- a) *Phytophthora*
- b) *Alternaria*
- c) *Pyricularia*
- d) *Plasmopara*

46. Foot rot of papaya is caused by:

- a) *Pythium debaryanum*
- b) *Pythium aphanidermatum*
- c) *Peronospora parasitica*
- d) *Albugo candida*

47. Collenchyma are characterized by the presence of

- a) elongated cells with deposits of cellulose and pectin all over the wall
- b) isodiametric cells with deposits of cellulose and pectin at the corners
- c) elongated cells with thickening at the corners
- d) isodiametric cells with thickening all over the wall

48. The waxy substance associated with the wall of cork cells is

- a) Cutin
- b) Lignin
- c) Hemicellulose
- d) Suberin

49. Vascular cambium produces
- (a) primary xylem and primary phloem
  - (b) secondary xylem and secondary phloem
  - (c) primary xylem and secondary phloem
  - (d) secondary xylem and primary phloem
50. Opening of pollen sac is termed
- a) Archesporium
  - b) Stomium
  - c) Tapetum
  - d) None of these
51. Double fertilization is characteristic of
- a) Gymnosperms
  - b) Angiosperms
  - c) Monocots
  - d) Bryophytes
52. Porogamy is
- a) Fertilization in which pollen tube enters the ovule through integument
  - b) Fertilization without pollen grain
  - c) Fertilization in which pollen tube enters the ovule through chalaza
  - d) Fertilization in which pollen tube enters the ovule through micropyle
53. Pollination is best defined as
- a) Germination of pollen grains
  - b) Visiting flowers by insects
  - c) Transfer of pollen from anther to stigma
  - d) Growth of pollen tube in ovule
54. The exine of a pollen grain is made of
- a) Pectin and cellulose
  - b) sporopollenin
  - c) pollenkit
  - d) lignocellulose
55. Wind pollinated plants differ from insect pollinated plants in having
- a) small petals and sticky pollen
  - b) small coloured petals and heavy pollen
  - c) Coloured petal and large pollens
  - d) No petals and light pollen
56. International Rice Research Institute is located at
- a) Philippines
  - b) London
  - c) Newyork
  - d) Canada

57. The rice variety PTB-10 is obtained from
- Selection
  - Hybridisation
  - Introduction
  - Mutation breeding
58. The irrigation technique mimicking rain is
- Surface irrigation
  - Drip irrigation
  - Sprinkler irrigation
  - None of these
59. Organisms inhabiting a common environment belong to the same
- Community
  - Species
  - Genus
  - Population
60. MAB stands for
- Man and Biosphere
  - Man, antibiotics and bacteria
  - Man and biotic community
  - Mayer, Anderson and Bisby
61. Green House effect is caused by:
- CO
  - CO<sub>2</sub>
  - H<sub>2</sub>
  - CFC
62. The bacteria involved in symbiotic nitrogen fixation are:
- Clostridium
  - Rhizobium
  - Nitromonas
  - None
63. A biological community together with the associated abiotic environment is:
- Biomes
  - population
  - community
  - Ecosystem
64. The number of individuals of species in a unit area is called:
- Abundance
  - Density
  - Frequency
  - Cover

65. Which of the following species of trees were suited for building ships and railways?

- a) Sal and Semur
- b) Teak and Mahogany
- c) Rosewood and Sal
- d) Teak and Sal

66. Jeevani is

- a) Carminative
- b) Name of an ethnomedicine
- c) a weed
- d) an oil seed crop

67. Branch of ethnobotany dealing with mushrooms is

- a) Ethnofungal Science
- b) Ethnofungal Biology
- c) Ethnomycology
- d) None of these

68. Beetrot is a

- a) Napiform root
- b) Fusiform root
- c) Conical root
- d) Adventitious root

69. Avicennia is an example for

- a) Taproot modification
- b) Aerial root modification
- c) Stilt root
- d) Pneumatophores

70. In *Ficus* the inflorescence is termed as

- a) Hypanthodium
- b) Cyathium
- c) Capitulum
- d) Verticillaster

71. Syngenesious anthers and epipetalous stamens are found in

- a) Liliaceae
- b) Malvaceae
- c) Solanaceae
- d) Asteraceae

72. TBGRI is in

- a) Kerala
- b) Tamilnadu
- c) Karnataka
- d) Andhra Pradesh

73. Linnaeus is credited with introducing:

- a) The concept of inheritance
- b) Law of limiting factor
- c) Theory of heredity
- d) Binomial nomenclature

74. Number of sepals in family Fabaceae is:

- a) 3
- b) 4
- c) 5
- d) 6

75. Fruit in the family Poaceae is:

- a) Capsule
- b) Caryopsis
- c) Regina
- d) Carcerulus

76. Jute is obtained from

- a) *Corchorus*
- b) *Cannabis*
- c) *Linum*
- d) *Crotalaria*

77. The plant for the source of the drug, Quinine is

- a) *Cinchona*
- b) *Ephedra*
- c) *Atropa*
- d) None of these

78. Which is known as finger millet?

- a) *Hordeum vulgare*
- b) *Eleusine coracana*
- c) *Avena sativa*
- d) None of these

79. Branch of science that deals with finding the age of wood is

- a) Dendrobiology
- b) Dendrochronology
- c) Phytochronology
- d) None of these

80. Famous Indian Palaeontologist is

- a) M. O. P. Iyengar
- b) Birbal Sahni
- c) B. P. Pandey
- d) None of these

81. A fossil Gymnosperm is

- a) Rhynia
- b) Calamites
- c) Williamsonia
- d) Lepidodendron

82. Which of the following statements is NOT correct?

- a) Stomata are present in mosses and hornworts but absent in liverworts.
- b) Only the lycophytes have microphylls and almost all other vascular plants have megaphylls.
- c) Monocot pollen grains have three opening where as eudicot pollen grains have one opening
- d) Monocot have fibrous root system whereas eudicots have taproot.

83. Carnoy's solution is a mixture of

- a) Chromic acid & glacial acetic acid
- b) Et OH, glacial acetic acid & formalin
- c) Et OH, glacial acetic acid & chloroform
- d) Et OH, acetic acid & distilled water

84. The sectioning of woody plant materials is made through

- a) Rotary microtome
- b) Sledge microtome
- c) Cryotome
- d) Rocking microtome

85. Consider the following statements: Hybrid plants can show

- a) Sterility
- b) Mosaicism
- c) Crossing over
- d) Vigour

86. Gamma garden is used for

- a) Growing plantlet produced by tissue culture
- b) Eradicating pathogens from infecting plants
- c) Growing genetically engineered plants on trail basis
- d) Mutation breeding for crop improvement

87. Which among the following is the principal pigment in photosynthesis

- a) Chlorophyll a
- b) Chlorophyll b
- c) Carotene
- d) Xanthophyll

88. Which among the following exhibit seismonastic movement

- a) *Enterolobium saman*
- b) *Phaseolus vulgaris*
- c) *Mimosa pudica*
- d) None of these

89. One of the methods of breaking dormancy is
- Mechanical scarification
  - Vernalization
  - Etiolation
  - Phosphorylation
90. The most abundant protein in the biosphere is
- Collagen
  - Rubisco
  - r-protein
  - None of the above
91. Which hormone is involved in stomatal closure
- Abscisic acid
  - IAA
  - GA3
  - Ethylene
92. Which among the following is the transport form of sugar?
- Glucose
  - Sucrose
  - Lactose
  - Fructose
93. The nodule forming bacteria are:
- Azotobacter
  - Nitrobacter
  - Clostridium
  - Rhizobium
94. The property of *Taq* polymerase that makes it suitable for PCR is
- Low molecular weight
  - Solubility in water
  - Heat stability
  - Easy availability
95. Restriction endonucleases react with DNA by
- cleaving at recognition sequences
  - removing methyl groups from DNA
  - denaturing the entire DNA
  - adding methyl groups to DNA
96. A fluorescent dye that is used to localize DNA in gel electrophoresis is
- Acridine orange
  - Fluorescein isothiocyanate
  - Rhodamine B
  - Ethydium bromide

97. Which among the following is a rooting hormone?

- a) Zeatin
- b) IAA
- c) GA
- d) ABA

98. Which one of the following compounds is used in protoplast fusion

- a) Sorbitol
- b) Polyethylene glycol
- c) Dinitrophenol
- d) Mannitol

99. Mitochondrial genome encodes tRNAs, \_\_\_\_\_ and polypeptides involved in \_\_\_\_\_

- a) mRNAs, oxidative phosphorylation
- b) rRNAs, oxidative phosphorylation
- c) rRNAs, reductive phosphorylation
- d) mRNAs, reductive phosphorylation

100. For Chlorella, which method is used for DNA uptake?

- a) Electroporation
- b) Direct uptake of naked DNA
- c) Conjugation
- d) Chemically induced uptake by protoplast

## PART C - BIOTECHNOLOGY

Time: 1½ Hour

Max Marks 75

Attempt **all** 75 questions. All questions carry **1** mark each. **1/3** mark will be deducted for each wrong answer.

26. In electrophoretic separation of biomolecules is based on  
(A) Electrical charge (B) Mass of the molecule  
(C) Both A and B (D) S value of substance
27. Pick out the odd one :  
(A) UAG. (B) UGA.  
(C) UAA. (D) AUG.
28. Pick out the odd one :  
(A) Lysosome. (B) Liposome.  
(C) Peroxisome. (D) Glyoxysome.
29. ATP synthase is present in :  
(A) Cytoplasm. (B) Nucleus.  
(C) Mitochondria. (D) Plasma membrane.
30. Which of these is used for genetic mapping ?  
(A) Conjugation. (B) Transduction.  
(C) Hfr. (D) All of these.
31. Lambda phage  
(A) Is a lytic phage (B) Is a lysogenic phage  
(C) Can form both turbid plaque and clear plaque (D) have all the above properties
32. In an autoclave, at 15 pounds per square inch, water boils at :  
(A) 100 °C. (B) 110 °C.  
(C) 121 °C. (D) 160 °C.
33. Ribosomes are produced in the  
(A) Cytoplasm. (B) ER.  
(C) Golgi complex. (D) Nucleolus.
34. The number of cell types found in the human body is about :  
(A) 50. (B) 100.  
(C) 200. (D) 500.
35. Two allelic genes are located on :  
(A) The same chromosome. (B) Two homologous chromosomes.  
(C) Two non-homologous chromosomes. (D) Any two chromosomes.
36. Pick out the wrong statement :  
(A) 50S subunit contains 5S rRNA. (B) 60S subunit contains 5S rRNA.  
(C) 50S subunit contains 5.8S rRNA. (D) 60S subunit contains 5.8S rRNA.
37. Apical Meristem culture is used for  
(A) Generating haploid plants  
(B) Generating embryo culture  
(C) Anther culture  
(D) Generate virus free plants.

38. Cancers arising from epithelial cells are called :  
 (A) Sarcoma. (B) Carcinoma.  
 (C) Myeloma. (D) Adenoma.
39. Bioremediation includes :  
 (A) Biotransformation. (B) Biodegradation.  
 (C) Mineralization . (D) All of the above.
40. If an enzyme is saturated with substrate, the most effective way to obtain an even faster yield of products would be :  
 (A) Add more of the enzyme. (B) Add more of the substrate.  
 (C) Add an allosteric inhibitor. (D) Add a non competitive inhibitor.
41. Enzymes are classified into :  
 (A) Five groups. (B) Six groups.  
 (C) Eight groups. (D) Seven groups.
42. Primase is  
 (A) A DNA polymerase. (B) Reverse transcriptase  
 (C) An RNA polymerase. (D) None of the above.
43. Core histones contain  
 (A) H1, H2, H3 and H4. (B) H1, H2A, H2B, and H2C.  
 (C) H2A, H2B, H3, and H4. (D) H2A, H3A, H4A and H4B.
44. Which of the following is not a secondary lymphoid tissue ?  
 (A) Lymph node. (B) Spleen.  
 (C) Tonsils. (D) Thymus.
45. Vector derived the following is used for single strand DNA generation ?  
 (A) pBR 322. (B) pUC 18.  
 (D) pUC 19. (C) pM13.
46. Apical dominance in plants are produced by  
 (A) Gibberellins (B) Auxin  
 (C) Cytokinin (D) Ethylene
47. Common food poisoning microbes are :  
 (A) *Clostridium and Salmonella.* (B) *E. coli and Salmonella.*  
 (B) *Clostridium and E. coli.* (D) *Clostridium and Streptococcus*
48. Leaves appear green because they :  
 (A) Absorb green light. (B) Reflect green light.  
 (C) Absorb and reflect green light. (D) None of these.
49. Deamination of cytosine generates :  
 (A) Thymine. (B) Guanine.  
 (C) Adenine. (D) Uracil.
50. Well known attenuation controlled operon is  
 (A) Tryptophan, (B) Galactose  
 (C) Arabinose (D) X-gal

51. Chaperones are proteins which help in :  
 (A) Protein degradation. (B) Protein folding.  
 (C) Protein misfolding. (D) Protein synthesis
52. Northern blotting is concerned with one of the following :  
 (A) Proteins. (B) DNA.  
 (C) RNA. (D) Lipids
53. DNA fingerprinting is based on :  
 (A) Satellite DNA (B) Single copy genes.  
 (C) Moderately repeated sequences. (D) rDNA.
54. Automated DNA sequencing is based on the same principle as that involved in  
 (A) Maxam and Gilbert's method. (B) Sanger's method.  
 (C) Chemical sequencing. (D) None of these.
38. Down's syndrome occurs due to :  
 (A) Non-disjunction of chromosomes. (B) Sex-linked inheritance.  
 (C) Linkage of genes. (D) Chromosomal aberration
55. Lac operon is :  
 (A) Negatively controlled. (B) Positively controlled.  
 (C) Under both positive and negative types of control. (D) None of these.
56. Which of the following names is associated with PCR ?  
 (A) E.Southern. (B) Cary B Mullis.  
 (C) Cesar Milstein. (D) Leyland H
57. Test cross involves :  
 (A) Crossing between two dominant genotypes.  
 (B) Crossing between two recessive genotypes.  
 (C) Crossing the F1 hybrid with a double recessive genotype.  
 (D) Crossing between two F1 hybrids.
58. Crossing over occurs in :  
 (A) Zygotene. (B) Pachytene.  
 (C) Diplotene. (D) Metaphase
59. Down syndrome is :  
 (A) Autosomal. (B) Sex linked.  
 (C) Viral. (D) Bacterial
60. Which of the following is a metabolic disorder?  
 (A) Sickle cell anemia. (B) Phenylketonuria.  
 (C) Thalassemia. (D) Jaundice
61. Limit of resolution of human eye is :  
 (A) 0.1 mm. (B) 0.018 A °  
 (C) 5 mm. (D) 1 mm.
62. The light and heavy chains of an IgG molecule are held to each other by  
 (A) Covalent bonds. (B) Non-covalent bonds.  
 (C) Both. (D) Neither.

63. Which of the following is a water soluble vitamin ?  
 (A) Vitamin E. (B) Vitamin K.  
 (C) Vitamin A. (D) Vitamin B.
64. The resolving power of light microscope is :  
 (A) 0.2 (B) 1.1.  
 (C) 10 (C) 20
65. Which of the following is the actual replicase in E. coli ?  
 (A) DNA Pol. (B) DNA Pol II.  
 (C) DNA Pol III. (D) None of these
66. Liposomes are :  
 (A) Found in the cytoplasm. (B) Present in the plant cells.  
 (C) Present in the animal cells. (D) Artificial synthetic vesicles.
67. Which is the correct order of events ?  
 (A) Leptotene — zygotene — pachytene — diplotene.  
 (B) Diplotene — zygotene — pachytene — Leptotene.  
 (C) Leptotene — zygotene - diplotene - pachytene.  
 (D) Leptotene — pachytene - zygotene — diplotene.
68. Name associated with cell membrane structure :  
 (A) Robertson. (B) Danielli.  
 (C) Singer. (D) All of these.
69. Filariasis is caused by :  
 (A) Taenia solium. (B) Fasciola hepatica.  
 (C) Ascaris lumbricoides. (D) Wuchereria bancrofti.
70. Names associated with pBR322 :  
 (A) Boyer and Robert. (B) Roger and Brown.  
 (C) Bolivar and Rodriguez. (D) Berger and Russell.
71. If starch containing substrates are used for ethanol production, yeast strain can't be used directly because :  
 (A) It doesn't contain amylases to hydrolyze starch.  
 (B) Starch is not a suitable substrate for the production of ethanol.  
 (C) It is converted to pentose sugar.  
 (D) None of the above.
72. What are different substrates used for ethanol production ?  
 (A) Starch containing substrate.  
 (B) Juices from sugarcane or molasses or sugar beet.  
 (C) Waste product from wood or processed wood.  
 (D) All of the above
73. Ethanol is produced by :  
 (A) Continuous fermentation. (B) Batch fermentation.  
 (C) Both (A) and (B). (D) None of these.

74. *Bacillus thuringiensis* is associated with :  
(A) Polio vaccines. (B) Cry proteins.  
(C) Tissue culture. (D) Nitrogen fixation.
75. Which of the following techniques was carried out first historically ?  
(A) DNA sequencing. (B) RNA sequencing .  
(C) Protein sequencing. (D) Genome sequencing.
76. Prions contain :  
(A) DNA. (B) RNA.  
(C) Protein. (D) DNA + protein.
77. Naturally occurring DNA exhibits :  
(A) Negative supercoiling. (B) Positive supercoiling.  
(C) No supercoiling. (D) None of these.
78. Which of the following does not require staining for observation of cells ?  
(A) Electron microscopy. (B) Confocal microscopy.  
(C) Phase-contrast microscopy. (D) All of the above.
79. Which of the following names is associated with Reverse Transcriptase ?  
(A) Watson and Crick.  
(B) Nirenberg and Khurana.  
(C) Paul Berg and Stanley cohen.  
(D) Temin and Baltimore.
80. Which form of DNA is normally found in cells  
(A) A-DNA (B) B-DNA (C) C-DNA (D) Z-DNA
81. Which of the following is associated with blue-white selection of recombinant clones ?  
(A) IPTG. (B) X-gal.  
(C) Beta-galactosidase. (D) All of these.
82. Cos sites of cosmids is derived from the phage :  
(A) M13. (B) T4.  
(C) Lambda. (D) All of these.
83. Transpositional DNA recombination involves :  
(A) Homologous recombination.  
(B) NHEJ recombination.  
(C) Site-specific recombination.  
(D) None of these.
84. Klenow fragment is part of :  
(A) RNA polymerase.  
(B) DNA ligase  
(C) Restriction endonuclease.  
(D) DNA polymerase
85. First human gene therapy is associated with :  
(A) Cystic fibrosis. (B) GFP.  
(C) Adenosine deaminase. (D) Alzheimers

86. Cyclins proteins are  
 (A) Regulatory (B) Enzymatic  
 (C) Membrane bound (D) Extracellular
87. Dilution rate  $D$  in a continuous fermentation process is calculated by flow rate  $F$  and Volume of the fermentor  $V$  using the formulae  
 (A)  $D = F$  (B)  $D = F/V$  (C)  $D = V/F$  (D)  $D = V$
88. Baffles are used in fermentor to  
 (A) Prevent forming (B) Aerate  
 (C) Prevent Vortex formation (D) Measure pH of the media
89. Efficiency of enzyme for its catalytic action can be better represented by  
 (A)  $K_m$  (B)  $K_m/V_{max}$  (C)  $V_{max}$  (D)  $V_{max}/K_m$
90. Activation of complement pathway happens by  
 (A) Classical pathway (B) Alternative pathway  
 (C) Lectin pathway (D) All the above
91. Primary Immune response is of -----type  
 (A) IgG (B) IgM (C) IgD (D) IgE
92. Sour taste of vinegar is due to  
 (A) Citric acid (B) Tartaric acid (C) Acetic acid (D) Lactic acid
93. Chlorophyll contains  
 (A) Fe (B) Mg (C) Mn (D) K
94. Widal test is a  
 (A) Precipitation test (B) Agglutination test  
 (C) Flocculation test (D) ELISA test
95. Long stretches of DNA can be separated by  
 (A) MALDI-TOF (B) FACS  
 (C) Pulse field gel electrophoresis (D) DNA Autoradiogram
96. Endogenous antigens are generally presented by  
 (A) Class I MHC (B) Class II MHC  
 (C) Class III MHC (D) Class IV MHC
97. Find the odd one  
 (A) Cellulose (B) Chitin  
 (C) Peptidoglycan (D) Starch
98. Ornithin and citruline for urea cycle are derivative from  
 (A) Cysteine (B) Lysine  
 (C) Arginine (D) Glutamic acid
99. Acid fast staining is done for  
 (A) E. Coli (B) Mycobacterium leprae  
 (C) Streptococcus pneumonia (D) Staphylococcus aureus
100. Fluidised bed reactor can also considered as  
 (A) CSTR (B) Packed bed reactor  
 (C) Air lift fermentors (D) Batch reactor

**PART D – APPLIED ZOOLOGY**

**Time: 1½ Hour**

**Max Marks 75**

Attempt **all** 75 questions. All questions carry **1** mark each. **1 mark** will be deducted for 3 wrong answers.

26. Lampreys and Hag-fishes are included under
- Agantha
  - gnathostomata
  - Craniata
  - both a & b
27. The order Anura or Salientia includes
- Salamanders & Newts
  - Frogs & toads
  - Frogs & Newts
  - Caecilians & Frogs
28. Parental care is shown by
- Catla
  - Ophiocephalus
  - Hippocampus
  - all of these
29. Lateral line sense organs are
- Thermoreceptors
  - Olfactoreceptors
  - Rheoreceptors
  - All of these
30. Which of the following is commonly called the “Flying fish”?
- Cypsilurus*
  - Scomber*
  - Belone*
  - Hemirhamphus*
31. In Frog, teeth are present
- On the upper jaw
  - On the lower jaw
  - On both the upper and lower jaws
  - On the upper jaw and on the vomers.
32. Signaling through cell surface receptors is mediated through
- ATP
  - cAMP
  - Cell surface membrane
  - G-protein
33. Five major types of histones are
- H1, H2a, H2b, H3 and H4
  - H1, H2, H3, H4 and H5
  - H1a, H1b, H2a, H2b, H3
  - None of the above

34. Chromosomes are made up of
- Proteins only
  - DNA
  - RNA, DNA and proteins
  - Nucleic acids only
35. Recently, new form of DNA discovered inside living human cells is called
- i-motif
  - A-DNA
  - B-DNA
  - Z-DNA
36. A nucleoid consists of:
- Histone and RNA
  - A single double stranded DNA
  - Histone and non-histone proteins
  - A single stranded DNA
37. Lampbrush chromosomes are visible during
- Prophase
  - Interphase
  - Mitotic metaphase
  - Meiotic prophase
38. Execution of apoptosis in *Caenorhabditis elegans* occurs by the activation of:
- Caspases
  - ced-3,4 and 9 genes
  - FasL death ligand
  - nuc-1 gene
39. Which of the following is considered as an exception to cell theory?
- Protists
  - Algae
  - Virus
  - Fungi
40. Longest cell in human body is:
- Heart muscle cells
  - Nerve cells
  - Leg muscle cells
  - Bone cells
41. The suffix 'S' in ribosome unit indicates:
- Size
  - Solubility
  - Surface area
  - Sedimentation coefficient
42. Example for graphical presentation of data –
- Frequency polygon
  - Bar diagram
  - Lorenz curve
  - Pie chart

43. F-test is:
- Goodness of fit
  - Non-parametric test
  - Parametric test
  - Measure of dispersion
44. Which of the following is parametric test?
- Chi-square test
  - ANOVA
  - Wilcoxon test
  - Kruskal-Wallis
45. Sperm maturation in man mainly occurs in
- Epididymis
  - Vasa differentia
  - Vasa efferentia
  - rete testis
46. Head caps of the sperm is contributed by the
- Golgi complex
  - mitochondria
  - ribosomes
  - nucleolus
47. Variations during mutations or meiotic recombinations are
- Random and directionless
  - Random and directional
  - Random and small
  - Random, small and directional
48. Sum total of all the allelic frequency in a population maintaining hardy- Weinberg equilibrium is expressed as
- $p+2pq+q^2= 1$
  - $p+2pq+q= 1$
  - $p^2+2pq+q^2= 1$
  - $p^2+pPq+q= 1$
49. Viviparity is considered to be more evolved because
- The young ones are left on their own
  - The young ones are protected by a thick shell
  - The young ones are protected inside mother's body and are looked after they are born leading to more chances of survival.
  - The embryo takes a long time to develop.
50. International Day for the Preservation of the Ozone Layer 2018 is on
- 5th June
  - 12 th November
  - 16th September
  - 3rd March

51. Which of the following is not a measure of dispersion?
- Range
  - Variance
  - Harmonic mean
  - Standard deviation
52. Second meiotic division of egg is completed when,
- Sperm enters egg
  - Soon after first meiotic division
  - During formation of sperm
  - After formation of archenteron
53. The hormone secreted only during later phase of pregnancy by ovary
- Estrogen
  - Relaxin
  - Oxytocin
  - Progesterone
54. Rio Earth summit was held in the year:
- 1994
  - 1982
  - 1992
  - 2004
55. BOD of a river water will be very high when the water:
- is clean
  - is highly polluted
  - contain algae
  - contain many dissolved minerals
56. The portion of the placenta contributed by the embryo is the \_\_\_\_\_.
- Chorion
  - Allantois
  - Amnion
  - yolk sac
57. Which hormone prevents a second pregnancy during gestation?
- FSH
  - LH
  - Progesterone
  - HCG
58. In which of the following situations there is risk of the child contracting erythroblastosis foetalis.
- Mother Rh positive & foetus Rh positive
  - Mother Rh positive & foetus Rh negative
  - Mother Rh negative and foetus Rh positive
  - Mother Rh negative & foetus Rh negative
59. The gene that regulates normal morphogenesis during development is
- FMR-1 GENE
  - Homeobox Gene
  - P-16
  - PTEN

60. A person whose father is colour blind marries a lady whose mother is daughter of a colour blind man. Their children will be
- All sons colour blind
  - Some sons normal and some colour blind
  - All colour blind
  - all daughters normal
61. Langerhans' cells are found in:
- Lymph
  - Lymph nodes
  - Periarteriolar lymphoid sheaths
  - Skin
62. If the sequence for the codon for an amino acid is 3' UCG 5', what is the sequence for the anticodon found in the corresponding t RNA.
- 3' UCG 5'
  - 5'AGC 3'
  - 5'UCG 3'
  - 3'AGC 5'
63. Which of the following components of DNA replication involve multiple RNA primers?
- Unwinding DNA double helix
  - Leading-strand DNA synthesis
  - Lagging-strand DNA synthesis
  - Telomere synthesis
64. Carbon monoxide poisoning is due to the formation of
- Carbamino haemoglobin
  - Methane
  - Carbonic acid
  - Carboxy haemoglobin
65. Which one of the following pairs is incorrectly matched?
- Glucagon -beta cells (source)
  - Insulin – diabetes mellitus (disease)
  - Somatostatin – delta cells (source)
  - Corpus luteum –relaxin (secretion)
66. Hemolin is
- An antibody produced by sponges
  - An antibody produced by Annelids
  - A member of the immunoglobulin superfamily
  - A cytotoxic molecule produced by nematodes
67. During oxidative phosphorylation in mitochondria synthesis of ATP occurs due to
- Oxidation of glucose by glycolysis
  - Electrochemical proton gradient
  - Oxidation of NADH to NAD
  - Oxidation of pyruvate to acetyl Co-A

68. C-value paradox refers to the presence of:
- More DNA than needed for coding
  - Less number of t-RNA than needed for polypeptide formation
  - Larger number of ribosomes than needed for polypeptide synthesis
  - Less number of RNA polymerase than needed for RNA synthesis
69. The enzymes involved in interconversion of relaxed and super coiled forms of DNA molecules are called:
- DNA ligases
  - Topoisomerases
  - Polymerases
  - Exonucleases
70. DNA foot printing technique is usually used to identify:
- The sites of DNA where DNA binding proteins attach
  - The segment of DNA which code for a specific protein
  - The binding site of RNA polymerase to its promoter region,
  - The site for termination of transcription processes
71. Which one of the following is tightly bound to the cell membrane?
- c-AMP
  - Adenylate cyclase
  - Ribonuclease
  - ATP
72. The common bile duct in human is formed by the joining of
- Pancreatic duct and Bile duct
  - Cystic duct and Hepatic duct
  - Cystic duct and Pancreatic duct
  - Hepatic duct and Pancreatic duct
73. The number of salivary glands present in human beings is
- 5 pairs
  - 4 pairs
  - 3 pairs
  - 2 pairs
74. The pneumotaxic centre that can moderate the function of respiratory rhythm centre is located in
- Dorsal side of medulla
  - Ventral side of medulla
  - Aortic arch and carotid artery
  - Pons
75. Which of the following gases makes the most stable combination with the haemoglobin of RBCs?
- CO<sub>2</sub>
  - CO
  - O<sub>2</sub>
  - N
76. Which of the following is the start codon
- AUG
  - UAA
  - UCA
  - AAU

77. Which of the following sugar is found in DNA
- Ribose
  - Deoxy Ribose
  - Glucose
  - Thymine
78. The end product of glycolysis under anaerobic condition is
- Pyruvic acid
  - Lactic acid
  - Succinic acid
  - Citric acid
79. The linkage that connects the monomers in a protein is
- Peptide linkage
  - Glycosidic linkage
  - Disulphide bridge
  - None of these
80. Which of the following is a non-reducing sugar
- Glucose
  - Sucrose
  - Galactose
  - Maltose
81. Protein part of an enzyme is called
- Apoenzyme
  - Holoenzyme
  - Prosthetic group
  - All of these
82. Restriction endonucleases are used in
- Cutting DNA
  - Ligating DNA
  - Hybridizing DNA
  - Both a) and b)
83. Triglycerides on boiling with NaOH yields
- Soap
  - Glycerol
  - both a) and b)
  - fatty acids
84. TCA cycle operates in
- cytoplasm
  - Mitochondria
  - both a) and b)
  - plasma
85. Which of the following is a water soluble Vitamin
- Vitamin A
  - Vitamin K
  - Biotin
  - Vitamin E

86. Birds are advanced when compared to reptiles because they:
- Are endothermic
  - Excrete uric acid
  - An amniote egg
  - Have a degenerated ovary in the females
87. Name the bird that migrates from the north pole to the south pole and back?
- Penguin
  - Swallow
  - Crane
  - Arctic tern
88. Setae and parapodia are the locomotor organs of
- Flatworms
  - Round worms
  - Annelida
  - Ctenophore
89. Habitat of filarial worm is
- blood
  - Liver
  - Lymph
  - Kidney
90. Western blots are primarily used to detect:
- Protein
  - Carbohydrate.
  - DNA
  - RNA.
91. Humus is defined as
- Physical texture of soil
  - Chemical composition of soil
  - Decomposed organic matter in soil
  - None of these
92. The greenhouse effect is due to:
- Impermeability of long wavelength radiations through  $\text{CO}_2$  of the atmosphere
  - Penetrability of low wavelength radiations through ozone layer
  - Penetrability of low wavelength radiations through  $\text{CO}_2$
  - Impermeability of long wavelength
93. Habituation is a
- Increased response to a stimulus when it is repeated
  - Decrease in response to a stimulus when it is repeated
  - Sudden appearance of a response to a stimulus
  - None of the above
94. Circadian rhythms follow a
- 48 hour cycle
  - Solar cycle
  - 24 hour cycle
  - Lunar cycle

95. B. F. Skinner was well known for studying this mode of learning
- imprinting
  - operant conditioning
  - Fixed action patterns
  - Habituation
96. The complementarity determining regions of antibody molecule is
- Are restricted to light chains.
  - Are in the constant part of the Ig molecule
  - Bind to Fc receptors.
  - Are concerned in antigen recognition.
97. Which one of the following components of DNA replication involves multiple RNA primers?
- Unwinding DNA double helix
  - Leading-strand DNA synthesis
  - Lagging-strand DNA synthesis
  - Telomere synthesis
98. A benefit of animals living in a group include which of the following?
- Protection against predators
  - Finding and procuring food
  - Helping to raise offspring
  - All of the above
99. Approximately, 50% of total world species are present on
- Tropical rain forest
  - Temperate rain forest
  - Temperate deciduous forest
  - Coral reefs
100. Ex situ conservation includes
- Zoo
  - Botanic garden
  - Germplasm bank
  - All of the above