

ALAGAPPA UNIVERSITY
ENTRANCE EXAMINATION – JUNE 2009

REG.NO.	SUBJECT	DURATION
	M. Sc., BIOTECHNOLOGY	TWO HOURS

EXAM CENTRE	MAXIMUM MARKS
	100

SIGNATURE OF THE INVIGILATORS

1.

2.

INSTRUCTIONS TO CANDIDATES

**Candidates must read carefully the following instructions
before attempting to answer any question**

- (i) Correct answer will carry 1 mark each.**
- (ii) The question paper consists of 100 Objective Type Questions. Answer ALL the 100 questions in Unit I to Unit V on the OMR sheet provided for this purpose. Use HB pencil or Ballpoint pen for shading.**
- (iii) Simple calculators and Log Tables can be used.**
- (iv) The last two pages can be used for rough work.**
- (v) Write the Registration Number in the space provided for the purpose.**

UNIT I: BIOCHEMISTRY AND INSTRUMENTATION

1. Enzyme involved in degradation of fibrin clots

- a. Plasminogen
- b. Plasmin
- c. Thrombin
- d. None of the above

2. Which of the following is a metalloprotein?

- a. Insulin
- b. Hemoglobin
- c. Albumin
- d. Immunoglobulin

3. Which of the following is a marker enzyme for detection of myocardial infarction?

- a. Lipase
- b. Amylase
- c. Creatine Kinase
- d. Alkaline phosphatase

4. The free energy change in a reaction is designated as

- a. ΔG
- b. ΔG^\ddagger
- c. ΔG_B
- d. ΔG_p

5. In citric acid cycle, the intermediate oxaloacetic acid acts as a precursor for the synthesis of which one of the following amino acids

- a. Serine
- b. Tyrosine
- c. Glycine
- d. Aspartate

6. The component in muscle tissue that contains the ATPase activity required for contraction is

- a. Actin
- b. Myosin
- c. Sarcoplasmic reticulum
- d. Motor end plate

7. The formation of covalent bonds between deoxyribose of one DNA fragment and phosphate of another DNA fragment (i.e., phosphodiester bonds) is facilitated by

- a. Kinase
- b. Alkaline phosphatase
- c. Ligase
- d. DNA phosphodiesterase

8. Catalytic antibodies are termed as

- a. Apoenzyme
- b. Holoenzyme
- c. Abzymes
- d. Ribozymes

9. Which amino acid is never found in α helical structure
- a. Proline
 - b. Serine
 - c. Glutamic acid
 - d. Glutamine
10. Which of the following techniques separates molecules based on size?
- a. Gel filtration
 - b. Partition chromatography
 - c. Ion-exchange chromatography
 - d. Affinity chromatography
11. α -D glucopyranose and β D-Glucopyranose are
- a. Anomers
 - b. Epimers
 - c. Enantiomers
 - e. Tautomers
12. Weak intermolecular force that exist between polar molecules of permanent polarity
- a. Kesom force
 - b. Debye force
 - c. London force
 - d. Ion-dipole interaction force
13. The centrifugation technique used for isolation of subcellular organelle from tissue homogenate is
- a. Differential centrifugation
 - b. Rate zonal centrifugation
 - c. Isopycnic centrifugation
 - d. Continuous centrifugation
14. Triple stranded collagen helix is stabilized by
- a. Lysine
 - b. Glycine
 - c. Hydroxy proline
 - d. Cysteine
15. Half life period of ^{32}P
- a. 14.3 days
 - b. 60 days
 - c. 165 days
 - d. 45 days
16. Disulfide bond in a protein can be effectively reduced by
- a. Urea
 - b. β mercaptoethanol
 - c. Ethidium bromide
 - d. SDS
17. Electrophoretic technique used for separation of protein based on molecular weight and charge
- a. Two dimensional gel electrophoresis
 - b. SDS-PAGE
 - c. Agarose gel electrophoresis
 - d. Isoelectric focusing

18. Radioactive decay of $^{22}\text{Na}_{11}$ to $^{22}\text{Ne}_{10}$ emits

- a. Helium
- b. Positrons
- c. X-rays
- d. Negatrons

19. The following amino acid has aliphatic and nonpolar R group

- a. Tyrosine
- b. Histidine
- c. Glutamate
- d. Leucine

20. The microscopic technique used to generate high resolution images of shape of object is

- a. SEM
- b. TEM
- c. Confocal microscope
- d. Phase contrast

UNIT II: MICROBIOLOGY AND IMMUNOLOGY

21. The term animalcules was coined by

- a) Robert Koch
- b) Louis Pastuer
- c) Antony van Leeuwenhoek
- d) Richard Petri

22. In fluid mosaic model of cell membrane system the integral protein constitutes about

- a) 20-30%
- b) 70 -80%
- c) 60-80%
- d) 30-60%

23. Lipopolysaccharides (LPS) of Gram negative bacteria lack one of the following

- a) Lipid A
- b) O antigen
- c) Core polysaccharide
- d) Teichoic acid

24. The optimal temperature for Mesophiles growth is between

- a) 0°C -15°C
- b) 55°C - 65°C
- c) 20°C -45°C
- d) 80°C -100°C

25. Which one of the following is not coming under moist heat sterilization

- a) Autoclave
- b) Tyndallization
- c) Hot air oven
- d) Pasteurization

26. acetyl – CoA is the substrate for

- a) Citric acid cycle
- b) β oxidation pathway
- c) Embden-Meyerhof pathway
- d) Enter-Doudoroff pathway

27. What was the first bacterium shown to cause human disease?
- a) Anthrax
 - b) Mycobacterium
 - c) Diphtheria
 - d) Streptococcus
28. Addition of blood to a culture medium only allows the hemolytic bacteria that grow on the plate to be picked out. This is an example of a
- a) Enriched media
 - b) Complex media.
 - c) Selective media
 - d) Differential media
29. Which of the following is the best definition of generation time?
- a) The length of time it takes for lag phase.
 - b) The length of time it takes for a population of cells to double
 - c) The maximum rate of doubling divided by the initial count.
 - d) The time it takes for nuclear division.
30. The final step in gene expression is protein synthesis, or
- a) translation
 - b) transcription
 - c) replication
 - d) transduction
31. Which form of RNA acts as a blueprint for polypeptide biosynthesis by the ribosome?
- a) mRNA
 - b) tRNA
 - c) rRNA
 - d) SiRNA
32. Which bacterial genome was the first to be completely sequenced?
- a) *E. coli*
 - b) *Streptococcus pneumoniae*
 - c) *Haemophilus influenzae*
 - d) *Staphylococcus aureus*
33. Holes produced in bacterial “lawns” by viruses are called
- a) Clearance
 - b) Plaques
 - c) Patches
 - d) Lysis
34. Which family has received most interest in their development as a biological control agent against insects?
- a) *Reoviridae*
 - b) *Baculoviridae*
 - c) *Iridoviridae*
 - d) *Rhabdoviridae*
35. *Helicobacter pylori* is responsible for
- a) gastroenteritis.
 - b) cholera.
 - c) bacterial dysentery.
 - d) peptic ulcer disease

36. Which disease has been referred to as the great pox?
- a) Small pox
 - b) Chicken pox
 - c) Avian pox
 - d) Syphilis
37. A hospital acquired infection is
- a) nosocomial.
 - b) genial.
 - c) familial.
 - d) viral.
38. All of the following species are considered coliforms except
- a) *Enterobacter aerogenes*
 - b) *Klebsiella pneumoniae*.
 - c) *Salmonella typhi*.
 - d) *Escherichia coli*
39. _____ is the process in which organic matter is decomposed to release simpler, inorganic compounds.
- a) Ammonification
 - b) Mineralization
 - c) Nitrogen fixation
 - d) Nitrification
40. "Superbug" was a name coined for organisms engineered for
- a) antibiotic production
 - b) probiotic production.
 - c) hydrocarbon degradation
 - d) enzyme production

UNIT III CELL BIOLOGY & PHYSIOLOGY

41. The phospholipid bilayer in the membrane is made up of which two molecules
- a) hydrophobic tail and hydrophilic head
 - b) hydrophobic tail and hydrophobic head
 - c) hydrophilic tail and hydrophilic head
 - d) hydrophilic tail and hydrophobic head
42. Which of these is not a phase in the cell cycle
- a) meiosis
 - b) mitosis
 - c) interphase
 - d) cytokinesis
43. When a sodium channel opens and sodium rushes into a myocyte (heart cell), the cell membrane becomes
- a) polarized
 - b) depolarized
 - c) paralyzed
 - d) polymerized

44. The endoplasmic reticulum is an extension of which of these membranes
- a) cell membrane
 - b) outer nuclear membrane
 - c) inner nuclear membrane
 - d) plasma membrane
45. Which of the following is not found in a bacterial cell
- a) DNA
 - b) Cell membrane
 - c) golgi apparatus
 - d) ribosomes
46. What part of the cell serves to process, package and export proteins
- a) Mitochondria
 - b) endoplasmic reticulum
 - c) nucleolus
 - d) golgi apparatus
47. Mitotic cell division is initiated in the
- a) mitotic spindle
 - b) centromere
 - c) centriole
 - d) nucleus
48. Which of these biologists suggested that all animal tissues are composed of cells
- a) Theodore Schwann
 - b) Rudolf Virchow
 - c) Mathias Scheiden
 - d) Robert Hooke
49. Cyclosis is best described as
- a) the cycling of various cell processes
 - b) the method by which the cell engulfs food
 - c) the process a cell uses to reproduce
 - d) the movement of the cells cytoplasm
50. The function of nucleolus is to
- a) physically contain the nucleus
 - b) destroy poisons threatening the nucleus
 - c) synthesize DNA
 - d) produce ribosome
51. The haploid plantlets after using colchicines can produce fertile homogenous lines, which give elite genotype, are known as
- a) Double haploid lines
 - b) Single haploid lines
 - c) Single diploid lines
 - d) double diploid lines

52. Propagation of valuable economic plants through tissue culture is based on the principle of

- a) Callus
- b) Embryoids
- c) Totipotency
- d) None

53. The Department of Biotechnology (DBT, Govt. of India) established large facilities for tissue culture propagation for forest tree species at

- a) NEERI
- b) CECRI
- c) NCL
- d) NLC

54. The method used to avoid evaporation of the media while observing protoplast is called

- a) Multi Drop Array (MDA)
- b) Hanging Drop Cultures (HDC)
- c) Agar Embedded Culture (AEC)
- d) None

55. Plant variant obtained from tissue culture is called

- a) Multiclones
- b) Soma clones
- c) Embryo clones
- d) Haploid clones

56. The *vir* region of the Ti plasmid contains the genes required for the transfer of

- a) R- DNA
- b) T- DNA
- c) g- DNA
- d) c- DNA

57. Which one of the metal ion is not used in poly-cation mediated DNA uptake by protoplast

- a) Zn²⁺
- b) Cs⁺
- c) K⁺
- d) Cu⁺

58. Hairy-root growths in a wide range of dicotyledonous plant species caused by

- a) *Agrobacterium tumefaciens*
- b) *Agrobacterium rhizogenes*
- c) *Bacillus megaterium*
- d) *Azospirillum lipoferum*

59. Which non-toxic reporter gene that has been successfully used to monitor gene expression in plants

- a) Oxidase
- b) Luciferase
- c) Sulphydryl protease
- d) Pectinase

60. The most commonly used selection marker in monocots is

- a) Neomycin (NPT II)
- b) Hygromycin (hpt)
- c) Kanamycin
- d) Phosphinothricin

UNIT IV: MOLECULAR GENETICS AND rDNA TECHNOLOGY

61. Transfer of genes between bacteria facilitated by bacteriophages are known as
- a) Conjugation
 - b) Transfection
 - c) Transduction
 - d) Transformation
62. The T_m of *Escherichia coli* and *Pseudomonas aeruginosa* DNA are 72°C and 79°C respectively. This means
- a) *P. aeruginosa* has higher number of base pairs
 - b) Stability of *E. coli* genome is lesser than that of *P. aeruginosa*
 - c) *E. coli* genome has higher AT and GC content
 - d) *P. aeruginosa* genome has higher GC content
63. Cloning of an entire genome in the form of randomly cloned fragments is called
- a) colony hybridization
 - b) genome library
 - c) Recombinant DNA
 - d) cDNA clone.
64. This nucleic acid has a recognition site that allows it to bind to a specific amino acid
- a) DNA
 - b) mRNA
 - c) tRNA
 - d) rRNA
65. Which one is not true about Klenow fragment from the following
- a) It has 3'-5' exonuclease activity
 - b) It has only 5'-3' exonuclease activity
 - c) It has 5'-3' polymerase activity
 - d) It is a DNA polymerase
66. Which one of the following is not a non-sense codon
- a) UAG
 - b) UAC
 - c) UGA
 - d) UAA
67. The insert size of BAC vector is
- a) $\leq 300\text{ kb}$
 - b) $\geq 300\text{ kb}$
 - c) $\leq 3000\text{ kb}$
 - d) $\geq 3000\text{ kb}$
68. You are given a solution containing both nucleic acid and proteins. The absorbance ratio at 280 and 260 nm of that solution is 0.9:1.8. This implies
- a) Concentration of nucleic acid is higher than proteins
 - b) DNA and RNA absorbs strongly at 280nm
 - c) Concentration of protein is higher than nucleic acid
 - d) None of the above are correct.

69. BamHI is an example for

- a) Type I restriction enzyme
- b) Type II restriction enzyme
- c) Type III restriction enzyme
- d) All the above

70. The enzyme which catalyses attachment of Okazaki fragments by phosphodiester bonds in a DNA is called

- a) Topoisomerase
- b) Gyrase
- c) Ligase
- d) Helicase

71. Find out the rRNA components which is a part of both prokaryotes and eukaryotes

- a) 5 S
- b) 5.8 S
- c) 16 S
- d) 18 S

72. Short sequences of DNA that are used in the amplification of DNA in PCR are known as

- a) tandem repeats
- b) palindromes
- c) unique sequences
- d) primers

73. During gel electrophoresis uniform negative charge to proteins is conferred by

- a) β - mercaptoethanol
- b) SDS
- c) Bromophenol blue
- d) Dithiothreitol

74. Which of the following is a replacement Vector

- a) λ Dash II
- b) λ ZAP
- c) Cosmid
- d) Fosmid

75. Ampicillin resistance is the property of

- a) Tn3 elements
- b) Tn5 elements
- c) Tn7 elements
- d) IS4 elements.

76. The experiment in which it was shown that DNA is the genetic material in bacteriophage is the

- a) Franklin – Wilkins experiment
- b) Hershey - Chase Experiment
- c) Meselson – Stahl Experiment
- d) Delburk - Luria Experiment.

77. The genome size of *E.coli* is

- a) 4.64 Mb
- b) 0.58 Mb
- c) 97Mb
- d) 1.83Mb.

78. Sickle cell anaemia is due to

- a) Missense mutation
- b) Frame shift mutation
- c) Substitution
- d) Deletion

79. Which one of the following temperature will be used in an arbitrarily primed PCR?

- a) 55° C
- b) 72° C
- c) 37° C
- d) 95° C

80. Which of the following is a base intercalating mutagen

- a) Guanidine
- b) Thymidine
- c) Acridine
- d) Xanthene

UNIT V –ECOLOGY & EVOLUTION

81. A type I survivorship curve is characteristic with the rapid increase in mortality in old age.

This type of curve is

- a) typical in many invertebrates that produce large number of offspring
- b) typical of humans and other large mammals
- c) almost never found in nature
- d) typical of all species of birds

82. The presence of all the following tend to increase species diversity except

- a) competitive exclusion
- b) keystone predators
- c) patchy environments
- d) moderate disturbances

83. The sum total of an organisms interaction with the biotic and abiotic resources of its environment is called its

- a) habitat
- b) logistic growth
- c) biotic potential
- d) ecological niche

84. What is the fundamental difference between matter and energy?

- a) matter is cycled through ecosystem; energy is not
- b) energy is cycled through ecosystem; matter is not
- c) energy can be converted to matter; matter cannot be converted in to energy
- d) matter can be converted to energy; energy cannot be converted in to matter

85. Which of these ecosystems has the lowest net primary production per square meter?

- a) a salt marsh
- b) an open ocean
- c) an coral reef
- d) grass land

86. Biodiversity hotspots are recognized on the basis of
- The proximity to national parks and resource
 - The number of endemic species they contain
 - The degree to which the included species are threatened with extinction
 - b and c only
87. A keystone is one that
- Preys heavily on a particular species
 - Is especially vulnerable to extinction
 - Is restricted to small geographic area
 - Strongly influences the structure and functioning of its ecological community
88. Of the three types of ecological pyramids which pyramid gives the best overall picture of the functional nature of communities
- Pyramid of numbers
 - Pyramid of energy
 - Pyramid of biomass
 - Both a and c
89. The amount of chemical energy in consumer's food that is converted to their own new biomass during a given time period is called
- Biomass
 - Standing crop
 - Primary production
 - Secondary production
90. Food chains are usually short mainly because
- Only a single herbivore species feeds on each plant species
 - Local extinction of a species cause the extinction of other species in its food chain
 - Most of the energy in a trophic level is lost as it passes to the next higher level
 - Predators are less diverse and less abundant than prey
91. A taxonomic system based only on the traits that reflect a order in a time in which branches or rows in a phylogenetic tree is called
- Phylogeny
 - Cladistics
 - Classical evolutionary taxonomy
 - Phenetics
92. Of the following species concepts, which one emphasizes reproductive isolation as a major cause of speciation
- Biological species concept
 - Evolutionary species concept
 - Morphological species concept
 - Phylogenetic species concept
93. When populations of a plant species are located adjacent to one another because of abrupt changes in soil conditions, they are called
- Allopolyploid
 - Autopolyploid
 - Sympatric
 - Parapatric

94. The Darwinian fitness of an organism is a measure of
- Its ability, relative to others in population, to pass a gene to next generation
 - The number of offsprings it produces
 - Its lifespan
 - Its physical vigor
95. The best test of the relatedness of two species is in the similarity of their
- Anatomy
 - DNA and proteins
 - Development
 - Courtship behaviors
96. According to Lamarck, a giraffe has a long neck because
- A creator designed in that way
 - Catastrophs eliminated short necked forms
 - Its ancestors stretched their neck to get food
 - Ancestral giraffe with slightly longer neck than others got more food and left more survival offsprings
97. Genetic drift occurs when a few individual of species colonize an island, this particular phenomenon is known as
- Bottleneck effect
 - The founder effect
 - Assortative mating
 - Random mating
98. Which of the following is not an example of co-evolution?
- Adaptation flowers and its exclusive pollinators
 - Passion-flower vines and the butterfly *Heliconius*
 - A parasite that is specific for one host
 - Aposematic coloration of monarch butterflies and predators that learn to eat them
99. Biogenetic law was discovered by
- Darwin
 - George Gaylord Simpson
 - Ernst Haeckel
 - Gavin de Veer
100. Many related species evolving from a single ancestral species is called
- Parallel evolution
 - Adaptive radiation
 - Co-evolution
 - Divergent evolution

ALAGAPPA UNIVERSITY

M. Sc., Biotechnology

Entrance Examination – June 2009

Key to Objective Type Questions

1 (b)	2 (b)	3 (c)	4 (a)
5 (d)	6 (b)	7 (d)	8 (c)
9 (a)	10 (a)	11 (a)	12 (a)
13 (a)	14 (c)	15 (a)	16 (b)
17 (a)	18 (b)	19 (d)	20 (a)
21 (c)	22 (b)	23 (d)	24 (c)
25 (c)	26 (a)	27 (a)	28 (d)
29 (b)	30 (a)	31 (a)	32 (c)
33 (b)	34 (b)	35 (d)	36 (d)
37 (a)	38 (c)	39 (b)	40 (c)
41 (a)	42 (a)	43 (b)	44 (b)
45 (c)	46 (d)	47 (c)	48 (a)
49 (d)	50 (d)	51 (a)	52 (c)
53 (c)	54 (b)	55 (b)	56 (b)
57 (d)	58 (b)	59 (b)	60 (b)
61 (c)	62 (d)	63 (b)	64 (c)
65 (b)	66 (b)	67 (a)	68 (a)
69 (b)	70 (c)	71 (a)	72 (d)
73 (b)	74 (a)	75 (a)	76 (b)
77 (a)	78 (c)	79 (c)	80 (c)
81 (b)	82 (a)	83 (d)	84 (a)
85 (b)	86 (c)	87 (d)	88 (b)
89 (d)	90 (c)	91 (a)	92 (a)
93 (d)	94 (a)	95 (b)	96 (c)
97 (b)	98 (d)	99 (c)	100 (b)