

ENTRANCE EXAMINATION-2010
M.Sc. Molecular Microbiology
01-06-2010

Time: 2 hours

Maximum Marks: 100

HALL TICKET NO.

INSTRUCTIONS

Please read carefully before answering the questions:

1. Enter your Hall Ticket number both on the top of this page and on the OMR answer sheet.
2. Answers are to be marked only on the **OMR answer sheet** following the instructions provided there upon.
3. Hand over both the question paper booklet and OMR answer sheet at the end of examination.
4. The question paper contains **100** questions (**Part-A: Question Nos. 1-25** and **Part-B: Question Nos. 26-100**) of multiple choice typed in **22** pages, including this page. One **OMR answer sheet** is provided separately. **Please check.**
5. The marks obtained in **Part-A** will be used for resolving the tie cases.
6. Each question carries one mark.
7. There is **negative marking** for wrong answers, in **PARTS A and B**. For each wrong answer, 0.33 of a mark will be deducted.
8. Calculators and mobile phones are not allowed.

PART-A

1. Recently during the month of April, there was a radioactive element Cobalt-60 release that resulted in the death of few people in Delhi. Now the question is, Cobalt-60 is a/an
 - A. alpha emitter
 - B. beta emitter
 - C. gamma emitter
 - D. multiple radiation emitter

2. During different Microbiology and Molecular Biology related experiments, several reagents/solutions are required at different concentrations. One research scholar has converted some of the lab reagents/solution's concentration from higher metric unit to lower metric unit for his convenience. Identify the corresponding and EQUAL concentration of reagent/solution between **Column A** (L, M, N and O) and **Column B** (1, 2, 3, 4, 5 and 6).

Column A

- L. 10 mg/ml
 M. 0.1 mg/ μ l
 N. 100 μ g/ml
 O. 0.1 ng/ μ l

Column B

1. 100 pg/ μ l
 2. 100 ng/ μ l
 3. 100 mg/ μ l
 4. 10^4 pg/ μ l
 5. 10^4 ng/ μ l
 6. 10^5 ng/ μ l

- A. L-5; M-6; N-1; O-4
 - B. L-5; M-6; N-2; O-1
 - C. L-4; M-5; N-1; O-4
 - D. L-5; M-6; N-3; O-1
3. Identify the mismatch
 - A. Weil's disease-*Leptospira interrogans*
 - B. Salmonellosis-*Salmonella* spp.
 - C. Q fever-*Coxiella burnetii*
 - D. Psittacosis-*Pasteurella multocida*

 4. Identify the correct match for whole cell absorption of chlorophylls
 - A. Chlorophyll a : 745-760 nm
 - B. Bacteriochlorophyll a : 850-910 nm
 - C. Bacteriochlorophyll b : 725-745 nm
 - D. Bacteriochlorophyll c : 715-725 nm

5. NCBI (www.ncbi.nlm.nih.gov) is one of the most frequently used biological database which provides several information about biological sciences, biomedical research, genomic information and other DNA, RNA, protein sequence related tools. NCBI stands for
- National Center for Biotechnology Information
 - National Center for Biological Information
 - Nucleotide and Cell Based Information
 - National library of medicine which provides Common Biological sciences Information
6. A dominant allele 'C' must be present in order for any pigment to be developed in mice. The kind of pigment produced depends upon another locus such that '-B' produces black and 'bb' produces brown color. Individuals with epistatic genotype 'cc' are incapable of making pigment and are called albinos. If all the albino F₂ mice are allowed to mate at random, what genotypic ratio is obtained in the progeny?
- 1/4 BBcc: 1/2 Bbcc: 1/4 bbcc
 - 1/4 bbCC: 1/2 bbCc: 1/4 bbbb
 - 1/2 BBcc: 1/2 BBCc
 - 1/2 Ccbb: 1/2 CCbb

7. Match the best combination of the following chemicals (L, M, N and O) in **Column A** with their common name in **Column B** (1, 2, 3, 4 and 5)

Column A

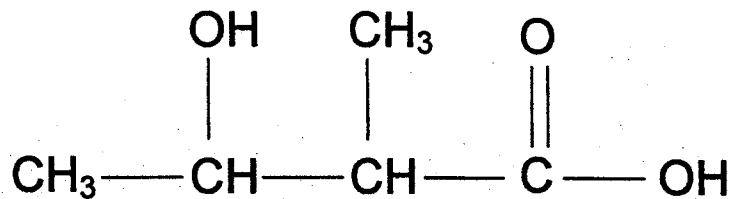
- L. 1, 2-Dihydroxyanthraquinone
 M. Formaldehyde
 N. Bicyclic terpene ketone
 O. Polyamide

Column B

1. Camphor
 2. Formalin
 3. Nylon-6,6
 4. Alizarin
 5. Thiophene

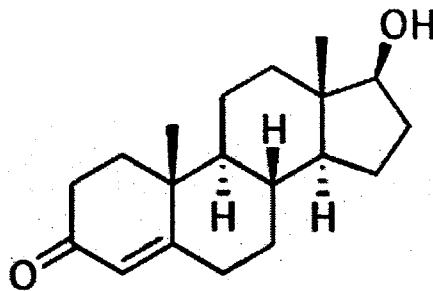
- L-4; M-2; N-1; O-3
 - L-1; M-2; N-5; O-3
 - L-4; M-2; N-5; O-3
 - L-3; M-2; N-4; O-1
8. This is a plant, accidentally exported to India with American wheat products and is predominantly found in India and is called as a "Congress weed"
- Parthenium hysterophorus*
 - Cannabis marihuana*
 - Pongamia glabra*
 - Poenchettia pulcherima*

9. What is the IUPAC name of the following organic compound?



- A. 2-Hydroxy-3-methyl-4-butanoic acid
- B. 2,3-Dimethyl-3-hydroxy-1-propanoic acid
- C. 1,2-Dimethyl-1-hydroxy-3-propanoic acid
- D. 3-Hydroxy-2-methyl-butanoic acid

10. The structure presented below is a



- A. Steroid
- B. Androstenol
- C. Progesterone
- D. Testosterone

11. Which of the following is called as "earth star fungus"?

- A. *Myriostoma coliforme*
- B. *Phallus impudicus*
- C. *Lysurus mokusin*
- D. *Aleuria aurantia*

12. Which of the following is NOT a dietary antioxidant?

- A. Lipoic acid
- B. Vitamin K
- C. Beta Carotene
- D. Vitamin E

13. Gangrene, psychotic delusions, nervous spasms, abortion, and convulsions occur due to a toxic condition in humans and animals. Identify the microorganism that produces such toxins

- A. *Vibrio cholerae*
- B. *Claviceps purpurea*
- C. *Clostridium botulinum*
- D. *Amanita phalloides*

14. DDT is an effective insecticide particularly for mosquitos, flies and crops pests. DDT is prepared

- A. by chlorinating toluene in the presence of FeCl_3 on iodine as catalyst
- B. by passing dry chlorine through benzene using ferric chloride as a catalyst at about 60°C
- C. by the action of phosphorous pentachloride or thionyl chloride on benzyl alcohol
- D. by the condensation of chlorobenzene with chloral in presence of sulphuric acid

15. Match the best combination of the following compounds (L, M, N and O) in **Column A** with their chemical formulae in **Column B** (1, 2, 3, 4, 5, and 6)

Column A

- L. Chloropicrin
- M. Phosgene
- N. Laughing gas
- O. Freon

Column B

- 1. N_2O_2
- 2. COCl_2
- 3. MnO_2
- 4. CCl_3NO_2
- 5. CCl_2F_2
- 6. N_2O

- A. L-5; M-3; N-1; O-4
- B. L-4; M-2; N-6; O-5
- C. L-4; M-2; N-1; O-5
- D. L-5; M-2; N-6; O-4

16. Percentage composition of an organic substance as determined by an analysis was: Carbon = 14.5; Hydrogen = 1.8; Chlorine = 64.46; Oxygen = 19.24. Based upon these data, which one of the following will be its empirical formulae?

- A. $\text{CH}_2\text{Cl}_2\text{O}$
- B. $\text{C}_2\text{HCl}_3\text{O}_2$
- C. $\text{C}_2\text{H}_3\text{Cl}_3\text{O}_2$
- D. $\text{C}_2\text{H}_2\text{Cl}_2\text{O}$

17. "Crassulacean acid metabolism" is seen in this kind of plants

- A. Halophytes
- B. Hydrophytes
- C. Xerophytes
- D. Epiphytes

18. One of the carnivorous plant given below uses a "fly paper trap" mechanism to capture the preys

- A. *Utricularia vulgaris*
- B. *Darlingtonia californica*
- C. *Drosera capensis*
- D. *Dionaea muscipula*

19. What is the name of the specialized sensory organ found in snakes?

- A. Herpolsheimer's organ
- B. Van Andel's organ
- C. Jacobson's organ
- D. Bissell's organ

20. Identify the correct match

- A. Ascomycota-Club fungi
- B. Basidiomycota-Sac fungi
- C. Deuteromycota-Fungi imperfecti
- D. Zygomycota-Club fungi

21. Identify the human immunoglobulins from left **Column** (L, M, N and O) with their most closely related functions in the right **Column** (1, 2, 3 and 4)

Immunoglobulin

Functions

- | | |
|--------|---|
| L. IgA | 1. Sensitize human mast cells |
| M. IgE | 2. Passes from mother to fetus through placenta |
| N. IgG | 3. Exocrine secretion |
| O. IgM | 4. First antibody class produced in a primary response to antigen and 1 st antibody to be synthesized by neonate |

- A. L-4; M-1; N-2; O-3
- B. L-3; M-1; N-2; O-4
- C. L-3; M-2; N-4; O-1
- D. L-4; M-3; N-2; O-1

22. The benefit of measuring the *initial* rate of reaction V_0 is that at the beginning of a reaction:

- A. changes in $[S]$ are negligible, so $[S]$ can be treated as a constant
- B. changes in K_m are negligible, so K_m can be treated as a constant
- C. $V_0 = V_{\max}$
- D. varying $[S]$ has no effect on V_0

23. The following data were obtained in a study of an enzyme known to follow Michaelis-Menten kinetics:

V_0 ($\mu\text{mol}/\text{min}$)	Substrate added (mmol/L)
217	0.8
325	2
433	4
488	6
647	1,000

The K_m for this enzyme is approximately:

- A. 1 mM
- B. 2 μM
- C. 2 mM
- D. 4 mM

24. An antibiotic should inhibit or kill the pathogen while harming host as little as possible. In this context, an antibiotic should focus on a microbial target not found in mammalian cells. By this standard, which of the following antibiotic agent would be expected to be most toxic to humans?

- A. Cephalosporin
- B. Mitomycin
- C. Penicillin
- D. Bacitracin

25. Identify the mismatch

- A. *Escherichia*-MR+; VP-; Indole+
- B. *Enterobacter*-MR-; VP+; Indole-
- C. *Klebsiella pneumoniae*-MR-; VP+; Indole-
- D. *Escherichia*-MR-; VP+; Indole+

PART-B

26. *Monotropa* (Indian pipe plant) is
- A. a plant that has nodules formed by an actinomycete
 - B. a plant that has nodules formed by *Rhizobium*
 - C. a non-photosynthetic plant that obtains its carbohydrates by mycorrhizal fungi
 - D. a non-photosynthetic plant that obtains its amino acids by mycorrhizal fungi
27. Actinorhizal plants
- A. have higher content of actin than other plants
 - B. lack actin filaments
 - C. may have nitrogen-fixing root nodules formed by *Rhizobium*
 - D. include the red alder and *Casuarina*
28. Mycorrhizal roots contain symbiotic organism(s) which help primarily in the process of
- A. lateral (branch) root formation
 - B. nitrogen fixation
 - C. uptake of phosphorus and water
 - D. nodule formation
29. The most common phycobiont in lichens is
- A. red alga
 - B. brown alga
 - C. blue-green alga
 - D. green alga
30. A fungus parasiting another fungus is called
- A. epiphyte
 - B. epibiotic
 - C. parasite
 - D. mycoparasite
31. The "living fossil" *Ginko biloba* is
- A. Angiosperm
 - B. Gymnosperm
 - C. Pteridophyte
 - D. Moss

32. The organism *spirogyra* is so named because of the nature of
- A. Chloroplast
 - B. Cell wall
 - C. Plasma membrane
 - D. Pyrenoid
33. "Pneumatophores" are associated with
- A. Xerophytes
 - B. Mangrooves
 - C. Lithophytes
 - D. Hydrophytes
34. In which of the following groups would you place a plant which produces seeds but lacks flowers?
- A. Angiosperm
 - B. Pteridophytes
 - C. Bryophytes
 - D. Gymnosperm
35. How many ATP and reducing equivalents required to synthesize one molecule of hexose by Calvin cycle in C_3 plants?
- A. 3 ATP and 2 NADPH
 - B. 12 ATP and 18 NADPH
 - C. 18 ATP and 12 NADPH
 - D. 36 ATP and 18 NADPH
36. The core of nucleosome structure is due to
- A. non-histone proteins
 - B. Histone H2A, H2B, H3 and H4
 - C. Histone H2A, H2B, H3A, H3B and H4
 - D. Nucleoid proteins
37. *Sargassum* is a genus of brown macroalga in the order Fucales which comes in the class of
- A. Rhodophyceae
 - B. Phaeophyceae
 - C. Raphidophyceae
 - D. Chrysophyceae

38. People generally enjoy picking mushrooms when they see them in the wild. However, there are quite a number of very dangerous wild mushrooms, for example some in the genus called Amanita. Which of the following is **NOT** a distinguishing characteristic of the genus Amanita?
- A. blue-colored rings
 - B. cup at its base
 - C. White gills
 - D. Ring-stem
39. The synthesis of starch and sucrose in plants uses _____ as the substrate, rather than _____, which is used in the synthesis of glycogen in animal cells.
- A. ADP-fructose; UDP-glucose
 - B. ADP-glucose; UDP-glucose
 - C. fructose 1-phosphate; glucose 1-phosphate
 - D. UDP-glucose; ADP-glucose
40. In a cell, the number of chromosomes is 24 after first meiosis. The number of chromosomes in its daughter cells after completion of meiosis will be
- A. 24
 - B. 12
 - C. 48
 - D. 06
41. What part of lipid molecule is in the middle of a lipid bilayer of the cell membrane?
- A. Glycerol
 - B. Phosphate group
 - C. Fatty acid
 - D. Amino Acid
42. Cells can be described as having a "cytoskeleton" of internal structures that contribute to the shape, organization and movement of the cell. All of the following are part of the "cytoskeleton" except
- A. the cell wall
 - B. microtubules
 - C. actin filaments
 - D. intermediate filaments

43. Which of the following pairs of genera are members of the zygomycetes class and can be seen on microscopic examination to possess rhizoids?

- A. *Rhizopus* and *Absidia*
- B. *Rhizopus* and *Mucor*
- C. *Cladosporium* and *Rhizopus*
- D. *Cladosporium* and *Absidia*

44. The phenomenon of exudation of water from the leaves during cool nights is called

- A. transpiration
- B. translocation
- C. guttation
- D. secretion

45. Schizogony and schizont stage in the life history of malaria parasite occur in

- A. RBCs and liver of man
- B. salivary gland of male anopheles
- C. salivary gland of female anopheles
- D. stomach of female anopheles

46. Cartilage is produced by

- A. osteoblast
- B. chondrocytes
- C. melanoblasts
- D. fibrocytes

47. Most hormones, particularly those released by the hypothalamus and pituitary, fall into which of the following chemical class

- A. Amines
- B. Glycoproteins
- C. Peptide hormones
- D. Steroids

48. A gene inherited from a female is not expressed in either male or female offspring, but the same gene is expressed in both male and female offspring if inherited from a male. This phenomenon is an illustration of gene

- A. recombination
- B. repression
- C. deletion
- D. imprinting

49. Which of the following hormone controls the mood, appetite and sleep?
- A. Calcitonin
 - B. Erythropoietin
 - C. Serotonin
 - D. Gastrin
50. Which of the following cellular activity is **NOT** promoted by insulin?
- A. the storage of glycogen by the liver
 - B. the storage of glycogen by muscles
 - C. the storage of fats by adipose tissue (fat cells)
 - D. the creation of glucose from amino acids
51. The organism *Enterobius vermicularis* belongs to order
- A. Kinetoplastidae
 - B. Oxyurida
 - C. Strigeidida
 - D. Ascaridida
52. Which of the following processes leads to formation of polytene chromosomes in salivary gland chromosomes of *Drosophila*?
- A. Repeated replication without separation of chromatids
 - B. Repeated replication followed by separation of chromatids
 - C. Nondisjunction of chromatids during meiosis
 - D. Nondisjunction of chromatids during mitosis
53. The mode of action of a steroid hormone involves:
- A. binding to a cell membrane receptor
 - B. activation of protein kinases
 - C. binding to calmodulin
 - D. modifying gene transcription
54. Which of the following most closely resembles the mammals, sharing with them several derived features of the skull and teeth?
- A. Pelycosaurs
 - B. Trihelodontids
 - C. Cynodonts
 - D. Polyphyodonts

55. Highly developed organisms are made up of many different cell types. In order for the organism to function properly, the cells must work together. This is accomplished by various types of chemicals that act as messengers to the cells. Each chemical messenger has a specific effect on its target cell. This is called signal transduction. Hormones are good examples of chemical messengers. Steroid hormones such as estrogen are non-polar and can thus diffuse across the cell membrane. However, polar hormones cannot. For their message to enter the cell these polar hormones must
- A. form a micelle
 - B. bind to receptors on the cell surface
 - C. bind to G proteins
 - D. be chemically altered
56. Giardia is
- A. a plant that has nodules formed by an actinomycete
 - B. a non-photosynthetic plant that acquires its carbohydrates by mycorrhizal fungi
 - C. an eukaryote that lacks mitochondria and causes Beaver fever
 - D. a prokaryote that contain both DNA and RNA and causes Beaver fever
57. During acute, non-specific inflammation, the first leucocytes to arrive at the site of tissue damage are
- A. monocytes
 - B. lymphocytes
 - C. macrophages
 - D. neutrophils
58. A person does not normally produce antibodies or activated T cells to self antigen due to the presence of
- A. haptens
 - B. immunoglobulins
 - C. human leucocyte antigen
 - D. non-self antigen
59. Which of the following drug is used as antihelminthic for the treatment of ascariasis? This drug causes flaccid paralysis of ascaris by blocking acetylcholine at the myoneural junction.
- A. Piperazine
 - B. Diloxanide
 - C. Mefloquine
 - D. Flucytosine

60. Which of the following interleukins enhances the type I hypersensitivity reaction
- A. IL-1
 - B. IL-2
 - C. IL-3
 - D. IL-4
61. Who proposed the theory stating that cell emerges from the pre-existing cells by cell division
- A. Ernst Ruska
 - B. Rudolph Virchow
 - C. Robert Hooke
 - D. Robert Brown
62. The RNA virus having DNA as an intermediate in its life cycle is
- A. Human immunodeficiency virus (HIV)
 - B. Hepatitis C virus (HCV)
 - C. Hepatitis B virus (HBV)
 - D. None
63. The hinge region of an Immunoglobulin IgG heavy chain is located
- A. between V_H and C_{H1}
 - B. between C_{H2} and C_{H3}
 - C. between C_{H1} and C_{H2}
 - D. within the Fc fragment
64. When ethylene is treated with sulphur monochloride, a toxic product is obtained, which is
- A. Tear gas
 - B. Thiophene
 - C. Mustard Gas
 - D. Dimethyl sulphoxide (DMSO)
65. When an unsymmetrical reagent adds to an unsymmetrical double bond the positive part of the reagent becomes attached to the double bonded carbon atom which bears the greatest number of H-atoms. This rule is popularly known as
- A. Huckel rule
 - B. Saytzeff rule
 - C. Fischer rule
 - D. Markovnikov rule

66. When benzene diazonium salt solution is treated with cuprous chloride, cuprous bromide, or cuprous cyanide, the product is chlorobenzene, bromobenzene or benzonitrile. These reactions are popularly known as
- Gatterman's reaction
 - Schiemann's reaction
 - Sandmeyer's reaction
 - Wurtz-Fitting reaction
67. Agarose gel electrophoresis is very common experiment in molecular biology. This agarose is linear polysaccharide which comprises alternating units of
- D-galactose and 3,6-anhydrogalactose
 - glucose and maltose
 - β -D-fructose and α -D-fructose
 - lactose and amylopectin
68. Mitochondrial ATP synthesis does not require
- a $[H^+]$ gradient
 - a membrane potential
 - an intact inner mitochondrial membrane
 - an electron gradient
69. Which of the following gas evolved in Bhopal gas tragedy of 1984?
- Carbon monoxide and Chloroform
 - Phosgene and Cyanamide
 - Methyl isocyanate
 - Ethyl isocyanate
70. Aromatic amino acids are synthesized from which of the following precursors?
- Phosphoenol pyruvate, 3-phosphohydroxypyruvate
 - Erythrose 4-phosphate, phosphoenol pyruvate
 - Erythrose 4-phosphate, 3-phosphohydroxypyruvate
 - Two molecules of phosphoenol pyruvate
71. Which of the following enzyme is NOT the part glycolysis cycle?
- Hexokinase
 - Enolase
 - Acotinase
 - Phosphoglycerate Kinase

72. Biomolecules such as DNA, RNA, proteins and carbohydrates are made up of covalently bound constituent elements. These biomolecules are able to reversibly interact with other biomolecules by means of weaker non-covalent bonds. Which of the following statements correctly characterizes a form of non-covalent bonding?
- A. A hydrogen bond is formed between temporary dipoles
 - B. An ionic bond is formed between fully charged atoms or molecules
 - C. Bonds that form between non-polar groups are called van der Waals interactions.
 - D. A hydrophobic bond forms between temporary dipoles
73. The pH of a solution is the negative logarithm of the concentration of H^+ ions. With this in mind, which of the following solution has the greatest concentration of H^+ ions?
- A. A solution with pH=1
 - B. A solution with pH=7
 - C. A solution with pH=2
 - D. A solution with pH=10
74. If glucose labeled with ^{14}C in C-1 were fed to yeast carrying out the ethanol fermentation, where would the ^{14}C label be in the products?
- A. In C-1 of ethanol only
 - B. In C-2 (methyl group) of ethanol only
 - C. In C-2 of ethanol and CO_2
 - D. In CO_2 only
75. Phosphoric acid is tribasic, with pK_a 's of 2.14, 6.86, and 12.4. The ionic form that predominates at pH 3.2 is
- A. H_3PO_4
 - B. $H_2PO_4^-$
 - C. HPO_4^{2-}
 - D. PO_4^{3-}
76. Compounds that generate nitrous acid (such as nitrites, nitrates, and nitrosamines) change DNA molecules by
- A. breakage of phosphodiester bonds
 - B. deamination of bases
 - C. depurination
 - D. formation of thymine dimers

77. During isolation and purification of genomic DNA from an organism, a proper ratio of phenol:chloroform:isoamyl alcohol is used. If proper ratio and care is not taken into consideration then chloroform may undergo oxidation in the presence of light and air and the compound formed will be
- dichloromethane
 - chloroform
 - vinyl chloride
 - phosgene
78. A D-amino acid would interrupt an α helix made of L-amino acids. Another naturally occurring hindrance to the formation of an α helix is the presence of
- a negatively charged Arg residue
 - a nonpolar residue near the carboxyl terminus
 - a positively charged Lys residue
 - a Pro residue
79. For the following reaction:
- $$[\text{FAD}] + 2 \text{ Cyt c (Fe}^{2+}) + 2\text{H}^+ \longrightarrow [\text{FADH}_2] + 2 \text{ Cyt c (Fe}^{3+})$$
- the electron donor is _____; the reduced product is _____.
- 2 Cyt c (Fe²⁺); [FADH₂]
 - [FAD]; [FADH₂]
 - 2 Cyt c (Fe²⁺); 2 Cyt c (Fe³⁺)
 - [FAD]; 2 Cyt c (Fe³⁺)
80. A gram negative coccoid Proteobacterium, found in the ocean sediments of the continental shelf of Namibia was regarded as the largest bacterium ever discovered, generally 100-300 μm wide, but sometime up to 750 μm . This is
- Thiomargarita namibiensis*
 - Clostridium botulinum*
 - Treponema pallidum*
 - Haemophilus influenza*
81. Leuconostocs lack catalase and cytochromes and carry out heterolactic fermentation by converting glucose to lactate and ethanol or acetic acid by means of this pathway:
- Glycolytic pathway
 - Phosphoketolase pathway
 - Pentose phosphate pathway
 - Gluconeogenesis

82. The largest plant virus reported as of today
- A. Tobacco Mosaic Virus
 - B. Tobacco Etch Virus
 - C. Citrus Tristeza Virus
 - D. Cucumber Mosaic Virus
83. Methylotrophs are bacteria which
- A. utilize ethanol
 - B. utilize methanol
 - C. produce methane
 - D. produce methanol
84. Lysine iron agar (LIA) is used to differentiate bacteria that
- A. can either deaminate or decarboxylate lysine
 - B. transaminate lysine
 - C. can either deaminate or transaminate lysine
 - D. can either transaminate or transcarboxylate lysine
85. For any color to be developed in the aleurone layer of corn kernels, the dominant alleles at two loci plus the recessive condition at the third locus (A-R-ii) must be present. Any other genotypes will produce colorless aleurone. What phenotypic ratio of colored: colorless would be expected in the progeny from matings between parental plants of genotype AaRrIi?
- A. 8 colored: 56 colorless
 - B. 9 colored: 55 colorless
 - C. 58 colored: 6 colorless
 - D. 52 colored : 12 colorless
86. What would be the approximate number of microorganisms present on this earth?
- A. 5×10^{10}
 - B. 5×10^{20}
 - C. 5×10^{30}
 - D. 5×10^{40}
87. Which of the following single nucleotide mutation in a mRNA codon is most likely to be a silent mutation?
- A. 5'CAU 3' → CUU
 - B. 5' UUU 3' → UUC
 - C. 5' AGA 3' → CGA
 - D. 5' UAU 3' → UAG

88. If thymine makes up 20% of the bases in a DNA molecule, what will be the percentage of cytosine in the same DNA molecule?
- A. 20%
 - B. 30%
 - C. 60%
 - D. 80%
89. Studies based on rRNA comparison suggested that Protista was not a coherent taxonomic unit and that it should be divided into three or more kingdoms, that lead to the wide spread feeling that Whittaker's five kingdom classification was too simple with reference to the microorganisms. Identify the scientist, among the following, whose contributions were highly relevant for this major milestone in classification of microbes.
- A. Robert Koch
 - B. Louis Pasteur
 - C. Carl Woese
 - D. Hargobind Khurana
90. Enrichment culture technique and the use of selective media, which have been of great importance in microbiology, were begun by these scientists:
- A. Robert Koch and Louis Pasteur
 - B. Richrad Petri and Walther Hesse
 - C. Sergei Wingradsky and Martinus Beijerinck
 - D. John Tyndall and Ferdinand Kohn
91. High frequency gene transfer of chromosomal genes can be achieved in *E. coli* in the following mating
- A. Hfr X F⁻
 - B. Hfr X Hfr
 - C. F⁺ X F⁻
 - D. F⁺ X F⁺
92. A diploid plant has genotype AaBBccDd at 4 gene loci. In the population, there is one dominant and one recessive allele for each loci. How many different types of gametes will this individual produce?
- A. 2
 - B. 4
 - C. 8
 - D. 16

93. Bacterial membranes are similar to eukaryotic membranes in that many of their amphipathic lipids are phospholipids, but they usually differ from eukaryotic membranes in lacking sterols such as cholesterol; they have sterol-like molecules which might have significantly contributed to the formation of petroleum. Select the compound(s) from among the following:

- A. Ergosterols
- B. Hopanoids
- C. Phytanols
- D. Squalenes

94. In *Drosophila*, the yellow (body color) gene is located 2 cM away from the white (eye color) gene locus. In female heterozygous for both recessive gene loci, what fraction of the gametes would be expected to have undergone a crossover between these genes?

- A. 0.02
- B. 0.2
- C. 0.01
- D. 0.1

95. Cyanobacteria, myxobacteria, cytophagas, and some mycoplasmas have a different type of motility with no visible external structures associated with this kind of motility that is popularly known as

- A. Chemotactic motility
- B. Gliding motility
- C. Cork screw motility
- D. Phototactic motility

96. Identify the causative agent from **Column B** (1, 2, 3, 4, 5 and 6) for the following diseases from **Column A** (L, M, N and O)

Column A

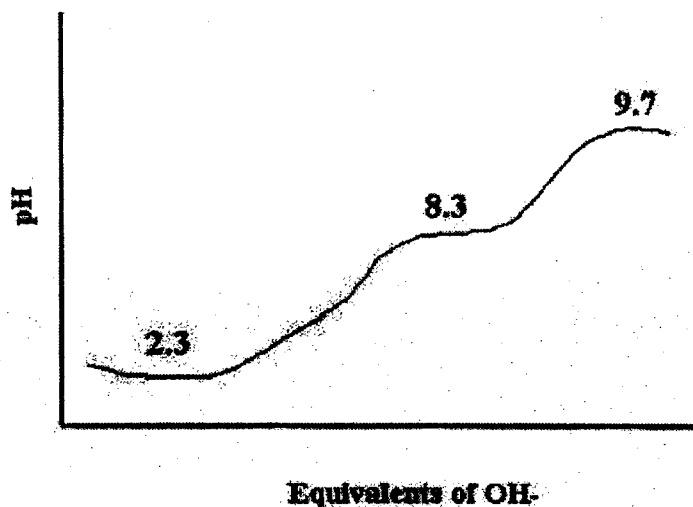
- L. Toxic Shock Syndrome
- M. Gas gangrene
- N. Kuru
- O. Leprosy

Column B

- 1. *Clostridium perfringens*
- 2. *Mycobacterium leprae*
- 3. Prions
- 4. *Trypanosoma gambiense*
- 5. *Leishmania donovani*
- 6. *Staphylococcus aureus*

- A. L-6; M-1; N-3; O-4
- B. L-6; M-1; N-3; O-5
- C. L-6; M-3; N-2; O-5
- D. L-3; M-1; N-2; O-5

97. Some amino acids have ionizable side chains. Which amino acid would have this titration curve ?



- A. Tyrosine
- B. Aspartate
- C. Cysteine
- D. Glycine

98. Sex-linked recessive alleles are usually carried on:

- A. The part of the X chromosome homologous with Y chromosome
- B. The part of the X chromosome non-homologous with Y chromosome
- C. The part of the Y chromosome homologous with X chromosome
- D. Autosomes but expressed in hemizygous or homozygous state

99. Identify the following antibiotics from **Column A** (L, M, N and O) and their mode of action from **Column B** (1, 2, 3, 4 and 5)

Column A

- L. Cephalosporin
- M. Nistatin
- N. Bleomycin
- O. Artemisinin

Column B

- 1. Antibacterial
- 2. Antimalarial
- 3. Antiviral
- 4. Antifungus
- 5. Anticancer and antitumor

- A. L-5; M-4; N-1; O-2
- B. L-1; M-4; N-3; O-2
- C. L-5; M-3; N-1; O-4
- D. L-1; M-4; N-5; O-2

100. Gram positive bacteria have
- A. thick, homogeneous layers of peptidoglycan and teichoic acids
 - B. thin, heterogeneous layers of peptidoglycan, teichoic acids and lipopolysaccharides
 - C. thin, peptidoglycan layer surrounded by a complex outer membrane containing lipopolysaccharides
 - D. thick, homogeneous layers of peptidoglycan and lipopolysaccharides

