

**ENTRANCE EXAMINATION FOR ADMISSION, MAY 2013.**

**M.Sc. (MICROBIOLOGY)**

**COURSE CODE : 308**

Register Number :

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*Signature of the Invigilator  
(with date)*

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**COURSE CODE : 308**

**Time : 2 Hours**

**Max : 400 Marks**

*Instructions to Candidates :*

1. Write your Register Number within the box provided on the top of this page and fill in the page 1 of the answer sheet using pen.
2. Do not write your name anywhere in this booklet or answer sheet. Violation of this entails disqualification.
3. Read each question carefully and shade the relevant answer (A) or (B) or (C) or (D) or (E) in the relevant box of the ANSWER SHEET using HB pencil.
4. Avoid blind guessing. A wrong answer will fetch you -1 mark and the correct answer will fetch 4 marks.
5. Do not write anything in the question paper. Use the white sheets attached at the end for rough works.
6. Do not open the question paper until the start signal is given.
7. Do not attempt to answer after stop signal is given. Any such attempt will disqualify your candidature.
8. On stop signal, keep the question paper and the answer sheet on your table and wait for the invigilator to collect them.
9. Use of Calculators, Tables, etc. are prohibited.

1. Bacterial cells can be made "Competent" by treatment with
  - (A) Nutrient agar
  - (B) Water
  - (C) Calcium Chloride
  - (D) None of the above
2. Mutations which occur in body cells which do not go on to form gametes can be classified as:
  - (A) Auxotrophic mutations
  - (B) Somatic mutations
  - (C) Morphological mutations
  - (D) Temperature sensitive mutations
3. Genetic recombination occurs by
  - (A) Transformation
  - (B) Conjugation
  - (C) Transduction
  - (D) All of the above
4. Mitotic recombination has been extensively studied in
  - (A) *E. coli*
  - (B) *Streptococcus pneumoniae*
  - (C) *Neurospora crassa*
  - (D) None
5. The word "transformation" in biology means:
  - (A) The change of a normal healthy eukaryotic cell into a cancerous cell,
  - (B) Genetic change of a cell as a consequence of naked DNA uptake
  - (C) Both (A) and (B)
  - (D) None of the above
6. "Germplasm theory" was proposed by
  - (A) Gregor Johann Mendel
  - (B) Jean Baptiste Lamarck
  - (C) August Weismann
  - (D) None of the above
7. The following are caused by defect in the mitochondrial DNA:
  - (A) Leigh disease
  - (B) Klienfelter's syndrome
  - (C) Myotonic dystrophy
  - (D) Leber congenital amaurosis
8. Why is sickle cell disease so called?
  - (A) because it makes people sick
  - (B) its named after a special type of white blood cell
  - (C) pH changes in the blood cells make them collapse into a sickle shape
  - (D) because its caused by an infectious microorganism that has sickle shaped cells

9. Which of the following is a form of sexual reproduction?
- (A) Budding (B) Fission  
(C) Hermaphroditism (D) Regeneration
10. The genetic disease cystic fibrosis is caused by a defective allele that
- (A) produces a dysfunctional enzyme that fails to break down brain lipids.  
(B) causes hemoglobin molecules to collapse.  
(C) produces a defective chlorine-channel membrane transport protein.  
(D) produces a neurotoxin
11. F<sup>+</sup> cells possess
- (A) F-pili (B) S-pili (C) O-pili (D) All the above
12. An Hfr strain of *E. coli* contains:
- (A) A vector of yeast or bacterial origin which is used to make many copies of a particular DNA sequence  
(B) A bacterial chromosome with a human gene inserted  
(C) A bacterial chromosome with the F factor inserted  
(D) A human chromosome with a transposable element inserted
13. Plasmid vectors for cloning
- (A) can generally accommodate larger inserts than phage vectors can.  
(B) grow within bacteria, and are present in bacterial colonies on an agar plate.  
(C) can accommodate inserts of over 10000 kilobases.  
(D) Burst bacteria and form plaques on a "lawn" of bacteria.
14. A positive result in the lipase test indicates that bacteria can
- (A) change the pH of the medium (B) Absorb tributyrin.  
(C) Absorb Spirit Blue (D) Break down tributyrin
15. Simple tandem repeat polymorphisms in humans are most useful for:
- (A) Solving criminal and paternity cases  
(B) Reconstructing the relationships of humans and chimps.  
(C) Transferring disease resistance factors into bone marrow cells  
(D) Estimating matches for blood transfusions

16. Large quantities of useful products can be produced through genetic engineering involving:
- (A) Bacteria containing recombinant plasmids
  - (B) Yeast carrying foreign genes
  - (C) Transgenic plants
  - (D) All of the above
17. Mitochondrial DNA is advantageous for evolutionary studies because:
- (A) It is inherited only through the female parent and thus evolves in a way that allows trees of relationship to be easily constructed.
  - (B) It is inserted into the X chromosome.
  - (C) It first appeared in humans and is not found in other animals.
  - (D) It evolves more slowly than the genes in the nucleus.
18. *Arabidopsis* is advantageous for plant genetic research because:
- (A) It is commercially important as a food crop
  - (B) It is an endangered species
  - (C) It is the closest to humans of any existing plant
  - (D) It is a small plant with a small genome size which can be raised inexpensively.
19. In the intron, a mutation at the 5' splice site affects the binding of which small nuclear ribonucleoprotein particle?
- (A) U1                      (B) U2                      (C) U4                      (D) U6
20. Before any kind of post-translational processing occurs, all polypeptides begin with the amino acid
- (A) leucine.                      (B) glycine.  
(C) methionine.                      (D) Tyrosine
21. Which of the following list of transcription features, applies only to prokaryotes?
- (A) Pribnow box, rho factor, core enzyme, -35 region
  - (B) TATA box, primary transcript, RNA polymerase III, transcription factors
  - (C) Pribnow box, transcription unit, rho factor, RNA polymerase III,
  - (D) TATA box, rho factor, core enzyme, -35 region

22. A sequence of 3 bases in DNA has the sequence CGT. What is the corresponding tRNA anticodon for this sequence?  
 (A) CGT (B) ACG (C) GCA (D) GUC
23. In an inducible operon, the genes are  
 (A) always expressed.  
 (B) usually not expressed unless a signal turns them "on".  
 (C) usually expressed unless a signal turns them "off".  
 (D) never expressed.
24. In *E. coli*, the effector molecule that results in induction of the *lac* operon is  
 (A) allolactose. (B) catabolite activator protein.  
 (C) cyclic AMP. (D)  $\beta$ -galactosidase.
25. The *TRP* operon is under \_\_\_\_\_ control.  
 (A) Positive (B) Negative  
 (C) both positive and negative (D) neither positive or negative
26. The black-colored lesions of skin are formed in following diseases except  
 (A) Anthrax (B) Leishmaniasis  
 (C) Necrotizing fasciitis (D) Gas gangrene
27. Subacute sclerosing panencephalitis (SSPE) is complication caused by infection with  
 (A) HSV-1 (B) Chickenpox virus  
 (C) Influenza virus (D) Measles virus
28. The movement of mucus from lungs to pharynx is due to  
 (A) Epiglottal flow (B) A ciliary escalator  
 (C) sneezing (D) pharyngeal reflex
29. The phase of whooping cough in which the characteristic "whoop" is obvious is the..... ?  
 (A) Paroxysmal phase (B) Catarrhal phase  
 (C) Death phase (D) Incubation phase
30. Which of the following virus undergoes antigenic shift?  
 (A) Influenza B (B) Influenza A  
 (C) Parainfluenza (D) *Haemophilus influenza*

31. At what age does the thymus reach its maximal size?
- (A) During the first year of life
  - (B) Teenage years (puberty)
  - (C) Between 40 and 50 years of age
  - (D) After 70 years of age
32. The mechanism that permits immunoglobulins to be synthesized in either a membrane-bound or secreted form is
- (A) allelic exclusion
  - (B) codominant expression
  - (C) the one-turn/two-turn joining rule
  - (D) differential RNA processing
33. Kappa and lambda light-chain genes
- (A) are located on the same chromosome
  - (B) associate with only one type of heavy chain
  - (C) can be expressed by the same B cell
  - (D) none of the above
34. Which of the following does not participate in the formation of antigen-antibody complexes?
- (A) Hydrophobic bonds
  - (B) Covalent bonds
  - (C) Electrostatic interactions
  - (D) Hydrogen bonds
  - (E) Van der Waals forces
35. Indicate which of the following type of cells express Intermediate affinity IL-2 receptor?
- (A) Resting T cells
  - (B) CD8<sup>+</sup> T cells
  - (C) Activated B cells
  - (D) Activated CD4<sup>+</sup>
36. Which of the following serum proteins is common for classical and alternate pathway of complement activation?
- (A) C3
  - (B) C4
  - (C) C2
  - (D) C9

37. Expression of which of the following molecules prevents the destruction of normal cells by NK cells
- (A) IL-2 Receptor (B) MHC-II  
(C) MHC-I (D) CD-2
38. Which of the following are required to carry out the PCR?
- (A) Short oligonucleotide primers  
(B) Thermostable DNA polymerase  
(C) Antibodies directed against the encoded protein  
(D) A method for heating and cooling the reaction mixture periodically
39. An antigen that overstimulates the immune system by bonding nonspecifically to MHC on antigen-presenting cells is termed as:
- (A) Nonspecific antigen (B) Toxic shock syndrome  
(C) Superantigen (D) Super necrotic
40. A transplant between individuals of different animal species is termed a(n):
- (A) Allograft (B) Enterograft  
(C) Endograft (D) Xenograft
41. Which of the following assays or devices depend on easily detectable "tagged" antibodies?
- (A) Fluorescence-activated cell sorter (FACS)  
(B) Enzyme-linked immunosorbent assay (ELISA)  
(C) Western blot  
(D) All of the above
42. Which of the following is NOT an example of Type IV cell-mediated hypersensitivity disorder?
- (A) Anaphylactic shock (B) Contact dermatitis  
(C) Tuberculin hypersensitivity (D) Granulomatous hypersensitivity
43. Which of the following is NOT a characteristic of impetigo?
- (A) Can be caused by *Staphylococcus aureus*  
(B) Can be caused by *Streptococcus pyogenes*  
(C) Is highly contagious  
(D) Can be caused by pseudomonads

44. The leading cause of preventable blindness in the world is caused by:
- (A) *Chlamydia trachomatis*
  - (B) *Haemophilus influenzae*
  - (C) *Streptococcus pneumoniae*
  - (D) *Neisseria gonorrhoeae*
45. Ringworm infections by *Tinea spp.* cause infections of the groin, nails, scalp, and beard. The term "ringworm":
- (A) Refers to the small circular worms that cause these infections
  - (B) Refers to all disease-causing fungi
  - (C) Is misleading and gets its name from the shape of the ringlike lesions produced in *Tinea spp.* infections
  - (D) Is misleading and gets its name from the small circular shaped fungi
46. In which form of DNA, the number of base pairs per helical turn is 10.5
- (A) A
  - (B) Z
  - (C) X
  - (D) B
47. Reverse transcriptase had both ribonuclease and polymerase activities. Ribonuclease activity is required for
- (A) The synthesis of new RNA strand
  - (B) The degradation of RNA strand
  - (C) The synthesis of new DNA strand
  - (D) The degradation of DNA strand
48.  $\alpha$  amanitin inhibits
- (A) Only RNA polymerase I
  - (B) Only RNA polymerase II
  - (C) Only RNA polymerase III
  - (D) All RNA polymerases
49. Restriction endonuclease cleaves DNA molecule at specific recognition sites on circular DNA molecule. After complete digestion, how many fragments would be produced upon reaction with this enzyme
- (A) 6
  - (B) 3
  - (C) 4
  - (D) 5
50. On exposure to desiccation, which of the following bacteria are least likely to experience rapid water loss?
- (A) Isolated rods
  - (B) Rods in chain
  - (C) Cocci in chain
  - (D) Cocci in cluster



51. Enzymes responsible for alcoholic fermentation
- (A) Ketolase (B) Zymase  
(C) Peroxidase (D) Oxidase
52. Which type of spores are produced sexually?
- (A) Conidia (B) Sporangiospores  
(C) Ascospores (D) None of these
53. Bacterial transformation was discovered by
- (A) Ederberg and Tatum (B) Beadle and Tatum  
(C) Griffith (D) None of these
54. Hybridoma technique was first discovered by
- (A) Kohler and Milstein (B) Robert Koch  
(C) 'D' Herelle (D) Land Steiner
55. Rancidity in spoiled foods is due to
- (A) Lipolytic organisms (B) Proteolytic organisms  
(C) Toxigenic microbes (D) Saccharolytic microbes
56. Koplic spots observed in the mucous membrane is characteristic feature of the disease
- (A) Rubella (B) Measles  
(C) Mumps (D) Influenza
57. Autolysis is done by
- (A) Mitochondria (B) Lysosomes  
(C) Golgi bodies (D) Peroxisomes
58. Sexual reproduction of algae is carried by
- (A) Isogamy (B) Anisogamy  
(C) Oogamy (D) All the above
59. Nitrite is converted into nitrate by the bacteria
- (A) Nitrosomonas (B) Nitrosocytes  
(C) Nitrobacter (D) Azatobacter

60. Phycobiont is  
 (A) The algal part in Lichens  
 (B) The fungal part in Lichens  
 (C) Laustoria formation  
 (D) None of these
61. Opsonin is the  
 (A) Cellwall component  
 (B) Plasma component  
 (C) Serum component  
 (D) Cytoplasm component
62. Mc Fadyean's reaction is used to detect  
 (A) Bacillus anthracis  
 (B) Brucella  
 (C) Corynaebacterium  
 (D) None of these
63. Streptolysin O is inactivated by  
 (A) CO<sub>2</sub>  
 (B) Nitrogen  
 (C) Oxygen  
 (D) Serum
64. Which of the following induces dimerisation of thymine?  
 (A) X-rays  
 (B) U.V. rays  
 (C) α-rays  
 (D) None of these
65. Phenol co-efficient indicates  
 (A) Efficiency of a disinfectant  
 (B) Dilution of a disinfectant  
 (C) Purity of a disinfectant  
 (D) Quantity of a disinfectant
66. Wilson and Blair bismuth sulphite medium is used for the growth  
 (A) Salmonella typhi  
 (B) Shigella dysenteriae  
 (C) Vibrio cholerae  
 (D) E. coli
67. The formation spindle fibres in the process of cell division is prevented by  
 (A) Corchicine  
 (B) ATP  
 (C) Hydrazine  
 (D) All of these
68. Cell cycle regulated by  
 (A) Cyclins  
 (B) Cdks  
 (C) Cyclins and Cdks  
 (D) None of these

69. Radical shifts can be prevented by adding  
 (A) Acids (B) Alkali  
 (C) Buffer (D) None of these
70. Poly A tail is frequently found in  
 (A) Histone in RNA (B) Bacterial RNA  
 (C) eukaryotic RNA (D) tRNA
71. Which of the following is an example of RNA virus?  
 (A) SV 40 (B) T4 phage  
 (C) Tobacco mosaic virus (D) Adeno virus
72. A mechanism that can cause a gene to move from one linkage group to another is  
 (A) Translocation (B) Inversion  
 (C) Crossing over (D) Duplication
73. Western blotting is a technique used in the determination of  
 (A) DNA (B) RNA  
 (C) Protein (D) Polysaccharides
74. Double standard RNA is seen in  
 (A) Reo virus (B) Rhabdo virus  
 (C) Parvo virus (D) Retro virus
75. The no. of hydrogen bonds existing between Guanine and Cytosine are  
 (A) 5 (B) 2 (C) 3 (D) None of these
76. Which of the following is true?  
 (A) IgM fixes complement (B) IgG does not cross placenta  
 (C) IgA binds mast cells (D) IgE binds phagocytes
77. Which Immunoglobulin can cross the placenta?  
 (A) IgG (B) IgA (C) IgD (D) IgE
78. The immunoglobulin which is produced first by the fetus in response to infection is  
 (A) IgG (B) IgA (C) IgM (D) IgD

79. Which of the following is true about multiple myeloma?
- (A) The antibodies produced are normal.
  - (B) It is a disease of monocytes.
  - (C) Immunoglobulins chains are either kappa or lambda chain.
  - (D) Both kappa and lambda chain are seen together.
80. The commonest immunoglobulin deficiency is of
- (A) IgA
  - (B) IgD
  - (C) IgG
  - (D) IgM
81. Which of the following is not a mediator of anaphylaxis?
- (A) 5-hydroxy tryptamine
  - (B) Heparin
  - (C) Platelet activating factors
  - (D) Anaphylatoxins
82. Besides vaccine against tuberculosis, BCG is also used in
- (A) Acute leukemia
  - (B) Remission of malignant melanoma
  - (C) Intradermal recurrence of breast cancer
  - (D) All of the above
83. The reaction of soluble antigen with antibody is known as
- (A) Agglutination
  - (B) Precipitation
  - (C) Flocculation
  - (D) Complement fixation
84. Rossette formation with sheep RBSs indicate functioning of
- (A) T cells
  - (B) B cells
  - (C) Neutrophils
  - (D) Monocytes
85. MHC restriction applies to
- (A) Donor selection in tissue transplantation
  - (B) Antigen presentation by macrophages to T cells
  - (C) Feedback inhibition of antibody synthesis
  - (D) Histocompatibility typing
86. Primary immune response is mediated by
- (A) IgA
  - (B) IgD
  - (C) IgG
  - (D) IgM

87. Monoclonal antibodies are used in
- (A) Immunotherapy
  - (B) Immunological identification of cells and tissues
  - (C) Radioimmuno-Imaging
  - (D) All of the above
88. The function of an adjuvant in a vaccine is
- (A) Distribution
  - (B) Absorption
  - (C) Antigenicity
  - (D) Metabolism
89. Interleukin-1 primarily acts on
- (A) Lymphocytes
  - (B) Macrophages
  - (C) Neutrophils
  - (D) Erythrocytes
90. Eleck's gel precipitation test is for
- (A) Gonococcus
  - (B) Diphtheria
  - (C) Hemophilus
  - (D) Anthrax
91. Which of the following is the most immunogenic in typhoid?
- (A) O antigen
  - (B) H antigen
  - (C) Vi antigen
  - (D) Somatic antigen
92. Which of the following is true about the Widal reaction?
- (A) Antibody to H Ag appears first and persists
  - (B) Antibody to O Ag appears first and persists
  - (C) Antibody to H and O Ag appear simultaneously and persist
  - (D) None of the above
93. Darting motility is shown by
- (A) Proteus
  - (B) Serratia
  - (C) Vibrio
  - (D) E coli
94. Hemophilus needs
- (A) X factor
  - (B) V factor
  - (C) X and V factor
  - (D) None of the above

95. Which of the following is true about the VDRL test?
- (A) Non specific (B) Slide flocculation test  
(C) Best followed for drug therapy (D) All of the above
96. The primary site of multiplication of rickettsial organism is in the
- (A) Parenchymal cells of the liver  
(B) Endothelial cell of the small vessels  
(C) Media of arteries  
(D) Adventitia of all blood vessels
97. Heterophile antibodies are found in
- (A) Epidemic typhus (B) Infectious mononucleosis  
(C) Endemic typhus (D) Rickettsial Pox
98. Thermo resistant bacteria are important in the preservation of foods by
- (A) Freezing (B) Canning  
(C) Chemicals (D) Irradiation
99. The fungus used in the industrial production of citric acid:
- (A) Rhizopus Oryzac (B) Fusarium moniliformae  
(C) Rhizopus nigricans (D) Aspergillus nigricans
100. Penicilin is commercially produced by
- (A) P.notatum (B) P.chrysogenum  
(C) P.citrinum (D) P.roquefortii
-