

**S/SO/2013/12**  
**MICROBIOLOGY**

**Roll No.**

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Candidate should write his/her Roll No. in the box above. ↑

**BOOKLET NO.**

**12263**

**Total No. of Questions : 150**

**Time : 2 Hours]**

**No. of Printed Pages : 32**

**[Total Marks : 300**

**INSTRUCTIONS FOR CANDIDATES**

1. *All* questions are compulsory.
2. *All* questions carry equal marks.
3. The question paper contains **150** questions. The examinee should verify that the requisite number of questions are printed in the question paper, otherwise he should ask for another question paper.
4. The cover page indicates the number of printed pages in the question paper. The examinee should verify that the requisite number of pages are attached in the question paper otherwise he should ask for another question paper.
5. Read carefully the instructions given on the answer-sheet supplied and indicate your answers accordingly.
6. Kindly make necessary entries on the answer-sheet only at the places indicated and nowhere else.
7. Examinees should specially pay attention that **2** marks will be awarded for correct answer.
8. Examinees should do all rough work on the space meant for rough work on the last page of the question paper and nowhere else, not even on the answer-sheet.

1. Which of the following is *not* a cellular microbe ?
  - (A) Mycoplasma
  - (B) *E.coli*
  - (C) Nostoc
  - (D) T<sub>4</sub> Bacteriophage
  
2. Out of the following, who constructed the Primary Microscope ?
  - (A) Leeuwenhoek
  - (B) Louis Pasteur
  - (C) Robert Koch
  - (D) O. Brefeld
  
3. Role of microbes in N<sub>2</sub> fixation was established by :
  - (A) Winogradsky and Beijerinck
  - (B) Pasteur and Zenner
  - (C) Koch and Iwanowsky
  - (D) None of the above
  
4. Microorganisms using light as energy and CO<sub>2</sub> as carbon source are known as :
  - (A) Chemoautotrophs
  - (B) Photoautotrophs
  - (C) Photoheterotrophs
  - (D) Chemoheterotrophs

5. Bacterial growth is measured in terms of :
- (A) Cell mass (B) Cell number  
(C) Cell constituent (D) All of these
6. In generalized growth curve maximum growth of bacteria is observed in :
- (A) Lag phase (B) Exponential phase  
(C) Stationary phase (D) None of these
7. Which of the following bacteria is among the extreme halophiles ?
- (A) *Staphylococcus aureus*  
(B) *Micrococcus helodenitrificans*  
(C) *Halobacterium salinarium*  
(D) *Salmonella oranienburg*
8. The capsomere in a virus is made up of :
- (A) Fat (B) Carbohydrate  
(C) DNA (D) Protein

9. Tobacco mosaic virus was first obtained in crystalline form by :
- (A) D. Iwanowsky (B) F. Twort  
(C) W. Stanley (D) M. Beijerinck
10. What type of nucleic acid is found in  $T_4$  Bacteriophage ?
- (A) Linear *ds*DNA (B) Circular *ss*DNA  
(C) Circular *ds*DNA (D) Linear *ds*RNA
11. Aflatoxin is produced by :
- (A) Bacteria (B) Mycoplasma  
(C) Virus (D) Fungi
12. The causal organism of the chickenpox is a :
- (A) Rickettsia (B) Chlamydia  
(C) Mycobacteria (D) Virus
13. Which of the following is known as Brewer's friend ?
- (A) Saccharomyces (B) Lactobacillus  
(C) Rhizopus (D) None of these

14. In the root nodules of pulses the common bacterial symbiont is :
- (A) Agrobacterium                      (B) Rhizobium
- (C) Clostridium                         (D) Azotobacter
15. Bergey's manual of systematic Bacteriology is written in :
- (A) 2 volumes                              (B) 6 volumes
- (C) 4 volumes                              (D) 3 volumes
16. Cell wall of eubacteria is made up of :
- (A) Peptidoglycan and muramic acid
- (B) Cellulose
- (C) Lipoproteins
- (D) None of the above
17. Which type of flagellation in bacteria is non-polar one ?
- (A) Monotrichous                         (B) Lophotrichous
- (C) Peritrichous                         (D) Amphitrichous

18. Most common mode of multiplication in Bacteria is :
- (A) Endospore formation                      (B) Binary fission  
(C) Conidia formation                      (D) Cyst formation
19. Mycorrhiza is a symbiotic association between :
- (A) Algae and Fungi                      (B) Algae and Bacteria  
(C) Fungi and Root                      (D) None of these
20. Which of the following culture media *do not* have Agar-Agar ?
- (A) Solid media                      (B) Semisolid media  
(C) Selective solid media                      (D) Liquid broth
21. Mycovirus infects :
- (A) Insects                      (B) Fungi  
(C) Bacteria                      (D) Cyanobacteria
22. Which of the following is a cyanobacteria ?
- (A) *E.coli*                      (B) Salmonella  
(C) Anabaena                      (D) Pseudomonas

23. Engulfment of a particulate matter by the cell is known as :
- (A) Phagocytosis (B) Penocytosis  
(C) Mitosis (D) None of these
24. Who postulated the Germ theory of disease ?
- (A) Tyndall (B) John Snow  
(C) Robert Koch (D) Leeuwenhoek
25. Which of the following is oxygenic cyanobacteria ?
- (A) Spirulina (B) Shigella  
(C) Rhizobium (D) Klebsiella
26. Find out the purple non-sulfur bacteria out of the following :
- (A) Thiocystis (B) Rhodospirillum  
(C) Nitrobacter (D) Macromonas
27. The light Harvesting photosystems in purple bacteria ranges in between the wavelength of :
- (A) 680-700 nm (B) 300-400 nm  
(C) 800-870 nm (D) None of these

28. Net yield of ATP during Glycolysis is :
- (A) 2 (B) 4  
(C) 8 (D) 10
29. EMP pathway is *not* found in :
- (A) Arthrobacter (B) Azotobacter  
(C) *E.coli* (D) Thiobacillus
30. In which bacterium Entner-Doudoroff pathway of Glucose breakdown is found :
- (A) Xanthomonas (B) Arthrobacter  
(C) *Escherichia coli* (D) Azotobacter
31. Most methanogens grow well with :
- (A) O<sub>2</sub> (B) O<sub>3</sub>  
(C) CO<sub>2</sub> (D) CO
32. Which of the following methanogens is Gram negative ?
- (A) Methanobacterium (B) Methanocarcina  
(C) Methanobravibacter (D) Methanococcus



33. Which bacterium has a flexible cell wall composed of protein and traces of Glucosamine ?
- (A) Methanococcus (B) Azotobacter  
(C) *E.coli* (D) None of these
34. The bacteria which grow at high temperature and low pH are known as :
- (A) Acidophiles (B) Halophiles  
(C) Thermophiles (D) Thermoacidophiles
35. *Sulfolobus* rapidly oxidizes :
- (A)  $H_2S$  (B)  $SO_2$   
(C)  $Cl_2$  (D) None of these
36. *Thermoplasma* is a :
- (A) Facultative aerobe (B) Facultative anaerobes  
(C) Obligate aerobe (D) None of these

37. What element is used as terminal electron acceptor by thermoproteus ?
- (A) Cu (B) Fe  
(C) S (D) Mg
38. Desulfurococcus grow at the temperature in between :
- (A) 75°—95°C (B) 0°—16°C  
(C) 10°—20°C (D) None of these
39. Which of the following is a monosaccharide ?
- (A) Glucose (B) Sucrose  
(C) Maltose (D) None of these
40. A common polysaccharide found in the plant cell wall is :
- (A) Glycogen (B) Cellulose  
(C) Starch (D) Glucose
41. A heptose sugar contains :
- (A) 6 carbon (B) 7 carbon  
(C) 5 carbon (D) 4 carbon

42. Out of the following which is *not* a pentose sugar ?
- (A) Ribose (B) Ribulose  
(C) Xylulose (D) Glyceraldehyde
43. Glycogen is a polysaccharide of :
- (A) Cellulose (B) Starch  
(C) Glucose (D) None of these
44. Which of the following is a heteropolysaccharide ?
- (A) Pectin (B) Starch  
(C) Glycogen (D) Cellulose
45. Starch gives blue colour with :
- (A) Fehling's Solution (B) Benedict Reagent  
(C) Tollens Reagent (D) Iodine Solution
46. Which of the following is an  $\alpha$  amino acid ?
- (A) Succinic Acid (B) Fumaric Acid  
(C) Alanine (D) Malic Acid

47. A polypeptide is made up of :
- (A) Units of organic acids                      (B) Units of amino acids  
(C) Units of fatty acids                        (D) None of these
48. Lock and Key hypothesis of enzyme action was given by :
- (A) Kuhne    (B) Emil Fischer  
(C) Sumner    (D) Kirchhoff
49. Which enzyme digest fats ?
- (A) Lipase    (B) Zymase  
(C) Invertase                                        (D) None of these
50. Apoenzyme is a :
- (A) Fat    (B) Carbohydrate  
(C) Protein    (D) None of these
51. Natural Resistance against the infection is known as :
- (A) Acquired immunity                              (B) Susceptibility  
(C) Innate immunity                                (D) None of these

52. Which of the under-mentioned cells are involved in Immune system ?
- (A) Phagocytic cell (B) Leucocytes  
(C) Lymphocytes (D) All of them
53. Immunity can be acquired artificially by .....
- (A) Vaccination  
(B) Antibodies  
(C) Placental Antibodies IgG and IgA  
(D) All of the above
54. Smallpox vaccine is prepared from :
- (A) Vaccinia virus (B) Bacillus bacteria  
(C) Mycoplasma (D) Cyanobacteria
55. Inactivated toxins are used as vaccines and known as :
- (A) Toxoids (B) Live vaccines  
(C) Killed vaccines (D) None of these
56. Which of the following vaccines are administered intramuscularly ?
- (A) Whooping cough vaccine (B) DPT  
(C) Tetanus toxoid (D) All of these

57. An agent which stimulates the production of antibodies or substance for immune response is :
- (A) Anticodon (B) Antigen  
(C) Antidot (D) None of these
58. The specific surface on antigen where antibodies are fixed known as :
- (A) Isotopes (B) Heterotopes  
(C) Epitopes (D) None of these
59. Immunoglobulin-G has a structure of :
- (A) Y-type (B) L-type  
(C) H-type (D) Z-type
60. Which category of lymphocyte cells generate the immune response ?
- (A) B-cells (B) T-cells  
(C) N.K. cells (D) All of these
61. In vertebrates the lymphocytes are produced from :
- (A) Stem cells of bone marrow (B) Cells of Lymph  
(C) Cells of Blood (D) None of these

62. Macrophages generated from haemopoetic stem cell is :
- (A) Multikaryotic (B) Dikaryotic  
(C) Monokaryotic (D) None of these
63. Chemically the Immunoglobulins are :
- (A) Glycoprotein (B) Lipoprotein  
(C) Thioprotein (D) None of these
64. How many classes of immunoglobulins have been recognized ?
- (A) 4 (B) 3  
(C) 5 (D) 8
65. The molecule of immunoglobulin is made up of :
- (A) Only light polypeptide chain  
(B) Only heavy polypeptide chain  
(C) Both, light and heavy polypeptide chains  
(D) None of the above
66. Which type of immunoglobulin is having highest value in mg/100 ml. of blood serum ?
- (A) IgG (B) IgA  
(C) IgM (D) IgD

67. In vitro reactions of antibodies and antigens are termed as :
- (A) Biological reactions                      (B) Serological reactions  
(C) Inorganic reactions                      (D) None of these
68. Which of the following bacterium is Gram -ve and causal organism of Diarrhea ?
- (A) *Bacillus anthracis*                      (B) *Clostridium tetani*  
(C) *Salmonella typhimurium*                      (D) *Mycobacterium leprae*
69. Which of the following diseases is caused by Gram positive bacteria ?
- (A) Diphtheria                      (B) Leprosy  
(C) Tetanus                      (D) All of these
70. Amebic dysentery is caused by a :
- (A) Chlamydea                      (B) Rickettsia  
(C) Protozoa                      (D) Mycoplasma
71. Bacterial and viral diseases can be spreaded through :
- (A) Water                      (B) Air  
(C) Contact                      (D) All of these



72. Typhoid fever is caused by :
- (A) Salmonella (B) Escherichia  
(C) Amoeba (D) Blastomyces
73. Mycosis is caused by :
- (A) Aspergillus (B) Candida  
(C) Mucor (D) All of these
74. Measles, mumps and Rubella is caused by a :
- (A) Fungal agent (B) Viral agent  
(C) Bacterial agent (D) None of these
75. Hepatitis is a :
- (A) Heart Disease (B) Liver Disease  
(C) Renal Disease (D) Skin Disease
76. DNA is found in :
- (A) Nucleus (B) Mitochondria  
(C) Chloroplast (D) All of these
77. Which amino base is *not* found in RNA ?
- (A) Uracil (B) Guanine  
(C) Cytocene (D) Thymine

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78. Double helix model of DNA was proposed by :
- (A) Meselson and Stahl (B) Watson and Crick  
(C) M. Nirenberg (D) Fischer and Haldan
79. In one Triplet codon how much amino bases are found ?
- (A) 2 (B) 6  
(C) 3 (D) 4
80. DNA is replicated at the time of :
- (A) 'S' phase of Interphase (B) 'G1' phase of Interphase  
(C) 'G2' phase of Interphase (D) None of these
81. The capacity of self-duplication is found in :
- (A) Ribose sugar (B) Deoxyribose sugar  
(C) DNA (D) None of these
82. Most evidenced method of DNA replication is :
- (A) Dispersive method (B) Conservative method  
(C) Semiconservative method (D) Condensation method
83. Which mechanism of gene transfer is found in bacteria ?
- (A) Conjugation (B) Transduction  
(C) Transformation (D) All of these

84. Who demonstrated the phenomenon of transformation in pneumococcus ?
- (A) F. Griffith (B) Lederberg and Tatum  
(C) C.M. Macleod (D) None of these
85. Transfer of F. plasmid during conjugation takes place between :
- (A) Donor and Donor cell (B) Recipient and Receptient cell  
(C) Donor and Recipient cell (D) None of these
86. Transductional genetic transfer in bacteria involves a/an :
- (A) Bacteriophage (B) Cyanobacteria  
(C) Insect (D) None of these
87. Which of the following phages does *not* cause lysogeny ?
- (A) T<sub>2</sub> phage (B) P<sub>1</sub> phage  
(C) Lambda phage (D) None of these
88. Viroids are :
- (A) Double Stranded RNA (B) Single Stranded RNA  
(C) Single Stranded DNA (D) None of these

89. During lysis of bacterial cell wall which compound is hydrolysed ?
- (A) Peptidoglycan (B) Cellulose  
(C) Chitin (D) Pectin
90. Joining of DNA fragments is known as :
- (A) Condensation (B) Suppression  
(C) Ligation (D) Restriction
91. The process of *mRNA* synthesis by DNA template is known as :
- (A) Transformation (B) Transduction  
(C) Translation (D) Transcription
92. Which of the following is used as scissor in recombinant gene technology ?
- (A) Ligases (B) Restriction endonucleases  
(C) Insertases (D) Gyrase
93. Plasmid with a fragment of COS DNA is known as :
- (A) Phasmid (B) Phragmid  
(C) Cosmid (D) None of these
94. Gene responsible for the synthesis of nitrogenase enzyme is :
- (A) *Ti* Gene (B) *Nif* Gene  
(C) *Nut* Gene (D) None of these

95. Gene cloning involves the steps :
- (A) Isolation of gene
  - (B) Insertion of gene in a vector
  - (C) Transfer of recombinant gene in multiplying cell
  - (D) All of the above
96. Recombinant gene technology is useful in the development of :
- (A) Industrial enzymes
  - (B) Pharmacology
  - (C) GMO development
  - (D) All of these
97. Plasmids are also known as :
- (A) Episome
  - (B) Nucleosome
  - (C) Chromosome
  - (D) None of these
98. Out of the following which cosmid is used for gene cloning ?
- (A) PJ 37
  - (B) PJC 8
  - (C) PJB 8
  - (D) PJA 7
99. In *E.coli* Nif gene is transferred from :
- (A) *Salmonella*
  - (B) *Agrobacterium*
  - (C) *Klebsiella pneumoniae*
  - (D) None of these

100. Some DNA sequences are capable of changing their positions and known as :
- (A) Preons (B) Recons  
(C) Mutons (D) Transposons
101. Which of the following is *not* a zooplankton ?
- (A) Ceriodaphnia (B) Navicula  
(C) Cyclops (D) Brachionus
102. Which of the following is *not* a cyanobacteria ?
- (A) Oscillatoria (B) Anabaena  
(C) Nostoc (D) Hydrodictyon
103. In ocean, low temperature tolerating microbes are known as :
- (A) Heliophilic (B) Barophilic  
(C) Psychrophilic (D) None of these
104. Accumulation of microbial cells on polymeric matrix is known as :
- (A) Biofilm (B) Biochip  
(C) Biosurfactants (D) None of these
105. The amount of oxygen required by microbes of sewage to stabilize organic matter is known as :
- (A) COD (B) DO  
(C) BOD (D) None of these

106. Sewage treatment involves :

- (A) Physical treatment (B) Biological treatment  
(C) Chemical disinfection (D) All of these

107. As per WHO Standards coliform count of any sample of 100 ml water is :

- (A) 100 (B) 75  
(C) 200 (D) 0 (zero)

108. Water can be disinfected by :

- (A)  $\text{NH}_3$  (B)  $\text{SO}_2$   
(C)  $\text{Cl}_2$  (D) None of these

109. Botulism is caused by :

- (A) *C. botulinum* (B) *C. perfringens*  
(C) *E.coli* (D) *S. aureus*

110. Which organism produce aflatoxin ?

- (A) Salmonella (B) Clostridium  
(C) Aspergillus (D) Shigella

111. Food poisoning by microbes causes :

- (A) Paralysis (B) Vomiting  
(C) Diarrhoea (D) All of these



112. Cholera in human beings is caused by :
- (A) *Streptococcus pyogenes* (B) *E.coli*  
(C) *Shigella* (D) *Vibrio*
113. Poisonous compound produced by fungi are known as :
- (A) Phycotoxin (B) Shigatoxin  
(C) Mycotoxin (D) Cytotoxin
114. What are the common contaminants of the air ?
- (A) Spores (B) Conidia  
(C) Chlamydo spores (D) All of these
115. Which of the following is an air-borne disease ?
- (A) Tuberculosis (B) Hepatitis  
(C) Polio (D) Enteric fever
116. White rust of crucifer is an air-borne disease of :
- (A) Plant (B) Animal  
(C) Human beings (D) None of these
117. Which of the following microbes is a phosphate biofertilizer ?
- (A) *Pseudomonas* (B) *Rhizobium*  
(C) *Nitrosomonas* (D) *Azotobacter*

118. Which of the following is a symbiont of Azolla ?
- (A) Scytonema (B) Lyngbya  
(C) Anabaena (D) Oscillatoria
119. Out of the following which organism is used in making of cheese ?
- (A) *Streptococcus lactis* (B) *Penicillium candidum*  
(C) *S. cremoris* (D) All of these
120. Chloramphenicol antibiotic is produced by :
- (A) *Streptomyces griseus* (B) *S. venezuelae*  
(C) *S. erythreus* (D) None of these
121. Penicillin is produced by a :
- (A) Bacteria (B) Virus  
(C) Fungi (D) Algae
122. Which of the following is *not* a dairy product ?
- (A) Yoghurt (B) Curd  
(C) Cream (D) Toast

123. Ethanol and  $\text{CO}_2$  is produced from sugars by :
- (A) Fusarium (B) Salmonella  
(C) Alternaria (D) Saccharomyces
124. Antibiotic acts on :
- (A) Wall of pathogen (B) Cell membrane of pathogen  
(C) Inhibition of protein synthesis (D) All of these
125. Brewing industry is based on :
- (A) Pasteurization (B) Jerovization  
(C) Fermentation and distillation (D) None of these
126. Most popular method of isolation of pure culture is :
- (A) Pour plate method (B) Spread plate method  
(C) Streak plate method (D) None of these
127. Methods used for preservation of pure culture :
- (A) Drying in vacuum (B) Lyophilization  
(C) Saline suspension (D) All of these

128. Steam sterilization of media is done in :
- (A) Laminar air flow (B) Hot air oven  
(C) Incubator (D) Autoclave
129. In saccharomyces which enzymes are responsible for fermentation ?
- (A) Invertase, Zymase (B) Lipase, Protease  
(C) Diastase, Maltase (D) Catalase, Pectinase
130. Rectified spirit is :
- (A) 50% Ethanol (B) 30% Ethanol  
(C) 95.5% Ethanol (D) None of these
131. Coffey's Still equipment is a :
- (A) Fermenter (B) Centrifuge  
(C) Distillation unit (D) Electronic Balance
132. For the continuous culture which type of bioreactor is used ?
- (A) Open type (B) Closed type  
(C) Closed stirred tank (D) None of these

133. Large bioreactors are used at :
- (A) Domestic scale (B) Industrial scale  
(C) Academic laboratory scale (D) None of these
134. Screening of microorganism which are able to produce growth factors is known as :
- (A) Crystallography (B) Auxenography  
(C) Radiography (D) None of these
135. The inoculum cells can be separated from the medium by :
- (A) Centrifugation  
(B) Sedimentation  
(C) Purification by single cell culture  
(D) All of the above
136. By which test microbial limit of milk is judged ?
- (A) Fat test (B) Widal test  
(C) MBR test (D) None of these
137. Yoghurt is also termed as :
- (A) Sour milk (B) Ordinary curd  
(C) Bulgarian milk (D) Swiss milk

138. The milk is rendered safe by high temperature exposure for short time, the process is known as :

- (A) Purification (B) Putrifaction  
(C) Pasteurization (D) Fermentation

139. Which of the following is a good food preservative ?

- (A) Potassium metabisulphate (B) Magnesium carbonate  
(C) Formadehyde (D) None of these

140. Annular plate and diaphragm is found in :

- (A) Dissecting microscope (B) Sterioscopic microscope  
(C) Phase-contrast microscope (D) None of these

141. Electromagnetic lenses are used in :

- (A) Fluorescence microscope (B) Electron microscope  
(C) Compound microscope (D) None of these

142. Spectrocolorimeter is based on :

- (A) Beer-Lambert's Law (B) Newton's Law  
(C) Dalton's Law (D) None of these

143. Which of the following is single cell protein ?
- (A) Spirulina (B) Yeast  
(C) Scendesmus (D) All of these
144. Sauerkraut is a fermented food prepared from :
- (A) Pineapple (B) Cabbage  
(C) Olives (D) Cucumbers
145. In thin layer chromatography :
- (A) Glass plate and silica gel is used  
(B) Wattman paper is used  
(C) Solvent column is used  
(D) None of the above
146. Chromatography involves :
- (A) Loading of sample on stationary phase  
(B) Separation by moving phase  
(C) Elution of the separated component  
(D) All of the above

147. In which of the chromatography mobile phase is liquid and stationary phase is solid ?
- (A) TLC
  - (B) Paper chromatography
  - (C) Gel filtration chromatography
  - (D) All of the above
148. Wide range of wavelength can be used in :
- (A) Nephelometer
  - (B) Spectrophotometer
  - (C) Lavibond comparator
  - (D) Colorimeter with four filters
149. Bacterial cell mass is measured in terms of :
- (A) Absorbancy
  - (B) Intensity of light falling on suspension
  - (C) Optical darkness
  - (D) None of the above
150. Vitamin B<sub>12</sub> is produced from :
- (A) *Pseudomonas denitrificans*
  - (B) *Bacillus coagulans*
  - (C) *Propionibacterium freudenreichii*
  - (D) All of the above