

JL-119

January-2021

B.Sc., Sem.-V

306 : Microbiology

[Max. Marks : 140]

Time : 2 Hours]

- Instructions :** (1) Answer any 70 questions out of 100 questions.
(2) Each question is of 2 marks.

1. Lac operon was proposed by
- (A) Jacob and Monod ✓
(B) Beadle and Tatum
(C) Watson and Crick
(D) Griffith
(E) Arber and Smith
2. In Lac-operon, the gene product of *LacZ* gene is
- (A) galactoside permease.
(B) β -galactoside transacetylase.
(C) β -galactoside transferase.
(D) β -galactosidase.
(E) allolactose
3. The correct option regarding the lac operon from the following is
- (A) Lac operon is switched on in the absence of lactose.
(B) Lac repressor binds to the lac promoter.
(C) β -galactosidase is the only enzyme produced in large quantities when lac operon is turned on.
(D) Lac operon is an example of both positive and negative regulation.
(E) Lac operon is an example of only negative regulation.
4. The sequence of the structural genes in the lac operon is
- (A) *lacA-lacZ-lacY*
(B) *lacZ-lacY-lacA*
(C) *lacZ-lacA-lacY*
(D) *lacA-lacY-lacZ* ✓
(E) *lacY-lacA-lacZ*

5. Lac-mutant are
- (A) morphological mutants. (B) drug resistant mutants.
 (C) phage resistant mutant. (D) constitutive mutant.
 (E) biochemical mutants.
6. Medium used for the detection of lac-mutant is
- (A) nutrient broth. (B) nutrient agar.
 (C) MacConkey's lactose bile broth. (D) MacConkey's agar.
 (E) All of these
7. Ultraviolet radiation damages DNA by
- (A) deamination of nucleotides. (B) deletion of nucleotides.
 (C) promoting pyrimidine dimer formation. (D) insertion of nucleotides.
 (E) alkylation of purines.
8. A permanent, heritable change in the nucleotide sequence of the genetic material is called
- (A) a transcription. (B) a transposon.
 (C) a mutation. (D) a translation.
 (E) a morphogenesis
9. Wavelength of an ultraviolet radiation most effectively absorbed by DNA is
- (A) 160 nm. (B) 260 nm.
 (C) 360 nm. (D) 460 nm.
 (E) none of these
10. _____ is pigment produced by *Serratia marcescens*.
- (A) Prodigiosin (B) Pyocyanin
 (C) Pyoverdine (D) Phycoerythrin
 (E) Carotenoid
11. Pigment by *Serratia marcescens* is produced when cells are grown at
- (A) 05-10 °C temperature. (B) 20-25 °C temperature
 (C) 37-40 °C temperature. (D) 40-45 °C temperature.
 (E) None of these.

12. This is not a mechanism for repairing damaged or altered DNA.
- (A) Excision repair (B) Recombinational repair
(C) Double helix repair (D) Mismatch repair
(E) Photoreactivation repair
13. Gradient plate technique was discovered by _____.
- (A) Cohen and Boyer (B) Kary Mullis
(C) H. Khorana (D) Ochowa and Kornberg
(E) Szybalski and Bryson
14. The streptomycin resistance is developed by
- (A) alteration of the single amino acid in the S12 protein of the 30s ribosomal subunit.
(B) alteration of the single amino acid in the S12 protein of the 50s ribosomal subunit.
(C) alteration of the single amino acid in the S15 protein of the 30s ribosomal subunit.
(D) alteration of the single amino acid in the S15 protein of the 50s ribosomal subunit.
(E) none of these.
15. Gradient plate technique is usually used for the isolation of
- (A) pigment-less mutants. (B) antibiotic resistant mutants.
(C) auxotrophic mutants. (D) temperature-sensitive mutants
(E) phage resistant mutants
16. Streptomycin belongs to
- (A) cephalosporins. (B) glycopeptides.
(C) aminoglycosides. (D) macrolides.
(E) Fluoroquinolones
17. MIC of the test organism is 60 $\mu\text{g/ml}$. The concentration of antibiotic required for 20 ml medium to isolate antibiotic resistant mutant by Gradient plate technique is
- (A) less than 600 μg . (B) 600 μg .
(C) 1000 μg . (D) less than 1200 μg .
(E) more than 1200 μg .

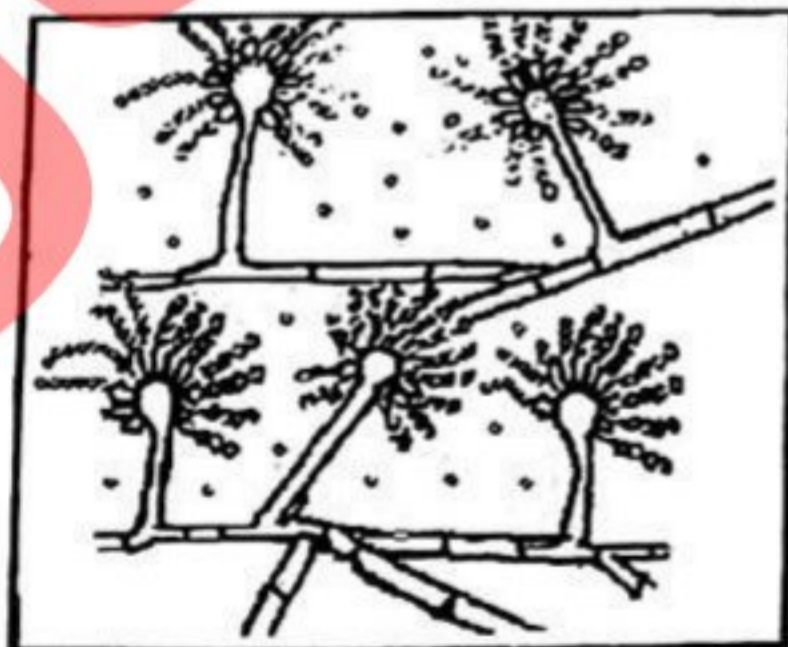
18. Microorganisms does not develop antibiotic resistance by
- (A) limiting uptake of a drug.
 - (B) modification of a drug.
 - (C) rapid multiplication.
 - (D) inactivation of a drug.
 - (E) modification of the target.
19. The formula used for the determination of glucose by Cole's method is
- (A) $(2.012 + 0.35X)$ mg/X ml.
 - (B) $(20.12 + 0.035X)$ mg/Xml.
 - (C) $(2.012 + 0.035X)$ mg/Xml.
 - (D) $(20.12 + 0.0035X)$ mg/Xml.
 - (E) $(2.012 + 0.0035X)$ mg/X ml.
20. In the determination of glucose by Cole's method following quantities of reagents are used
- (A) 5.0 ml of 1% $K_3Fe(CN)_6$ and 5.0 ml of 2.5 N NaOH.
 - (B) 10 ml of 1% $K_3Fe(CN)_6$ and 5.0 ml of 2.5 N NaOH.
 - (C) 10 ml of 1% $K_3Fe(CN)_6$ and 10 ml of 2.5 N NaOH.
 - (D) 20 ml of 1% $K_3Fe(CN)_6$ and 5.0 ml of 2.5 N NaOH.
 - (E) 20 ml of 1% $K_3Fe(CN)_6$ and 10 ml of 2.5 N NaOH.
21. The range of estimation of glucose by Cole's method is
- (A) 1 to 4 gm%
 - (B) 1 to 6 gm%
 - (C) 1 to 8 gm%
 - (D) 1 to 10 gm%
 - (E) 1 to 12 gm%
22. The indicator used in the determination of glucose by Cole's method is
- (A) methyl red.
 - (B) phenol red.
 - (C) neutral red.
 - (D) methylene blue.
 - (E) thymol blue.
23. In the determination of glucose by Cole's method, the amount of $K_3Fe(CN)_6$ converted to $K_4Fe(CN)_6$ depends on
- (A) pH of the solution.
 - (B) temperature of the solution.
 - (C) the amount of NaOH in the solution.
 - (D) the amount of sugar in the solution.
 - (E) the amount of $K_4Fe(CN)_6$ in the solution.

24. A reducing sugar is having
(A) free phosphate group.
(C) free chloride group.
(E) All of these
~~(B)~~ free aldehyde group.
(D) free cyanide group.
25. According to Beer's law, absorbance of any solution is proportional to
(A) pH of the solution.
(C) amount of the solution in the cuvette.
(E) all of these.
~~(B)~~ concentration of the substance.
(D) wavelength.
26. Concentration of glucose in the standard solution used in Nelson-Somogyi's method is
(A) 10 $\mu\text{g/ml}$.
(C) 100 $\mu\text{g/ml}$.
(E) 100 mg/ml .
(B) 10 to 100 $\mu\text{g/ml}$.
(D) 10 mg/ml .
27. Alkaline copper tartrate reagent used in Nelson-Somogyi's method contains
(A) $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$.
(C) Sodium potassium tartrate.
(E) All of these.
(B) Anhydrous Na_2CO_3 .
(D) Anhydrous Na_2SO_4 .
28. In Nelson-Somogyi's method, cuprous oxide reacts with _____ to produce blue coloured complex
~~(A)~~ Arsenomolybdate
(C) sodium potassium tartrate
(E) Glucose
(B) Na_2CO_3
(D) H_2SO_4
29. In Nelson-Somogyi's method, the intensity of blue colour is measured in colorimeter at
(A) 490 nm.
(C) 620 nm.
(E) None of these
~~(B)~~ 520 nm.
(D) 750 nm.
30. In Nelson-Somogyi's method, the test tubes containing sugar solution are incubated _____ after addition of alkaline copper tartrate reagent.
(A) at 10 $^\circ\text{C}$ temperature.
(C) at 37 $^\circ\text{C}$ temperature.
(E) None of these
~~(B)~~ at room temperature.
(D) in boiling water bath.

31. The following is not true for Nelson-Somogyi's method.
- (A) The method can estimate 10 μg /ml of sugar.
 - (B) The results obtained by the method are reproducible.
 - (C) The method can also be used for the qualitative analysis of sugars.
 - (D) The method is used to estimate reducing sugar.
 - (E) Sodium sulphate is included in the reaction mixture to minimize the entry of atmospheric oxygen into the solution.
32. The range of estimation of protein by Folin's method is
- (A) 05-50 $\mu\text{g}/\text{ml}$.
 - (B) 10-50 $\mu\text{g}/\text{ml}$.
 - (C) 10-100 $\mu\text{g}/\text{ml}$.
 - (D) 20-200 $\mu\text{g}/\text{ml}$.
 - (E) 50 - 500 $\mu\text{g}/\text{ml}$.
33. The protein used as a standard in estimation of protein of by Folin's method is
- (A) bovine serum albumin.
 - (B) coronin.
 - (C) Aquaporin.
 - (D) gelatine.
 - (E) Casein.
34. In estimation of protein by Folin's method, alkaline copper reagent reacts with _____ to give blue colour.
- (A) sulfhydryl bonds
 - (B) phosphate bonds
 - (C) peptide bonds
 - (D) hydrogen bonds
 - (E) glycosidic bonds
35. In estimation of protein by Folin's method, phosphomolybdate and phosphotungstate are reduced by amino acids.
- (A) alanine and glutamine.
 - (B) glutamic acid and histidine.
 - (C) alanine and asparagine.
 - (D) aspartic acid and isoleucine.
 - (E) tyrosine and tryptophan.
36. In estimation of protein by Folin's method, _____ Folin's ciocalteu reagent is added in all the test tubes containing protein solution and alkaline copper reagent.
- (A) 0.1 ml
 - (B) 0.5 ml
 - (C) 1.0 ml
 - (D) 1.5 ml
 - (E) 2.0 ml

37. After addition of Folin's ciocalteu reagent in all the tubes, the tubes are incubated at
- (A) room temperature for 10 minutes.
 - (B) boiling temperature for 10 minutes.
 - (C) room temperature for 15 minutes.
 - (D) room temperature for 30 minutes.
 - (E) boiling temperature for 30 minutes.
38. In estimation streptomycin by sodium nitroprusside method, sodium nitroprusside reagent contains
- (A) 10% $K_3Fe(CN)_6$, 10% NaOH, 10% sodium nitroprusside solution.
 - (B) 1.0% $K_3Fe(CN)_6$, 1.0% NaOH, 1.0% sodium nitroprusside solution.
 - (C) 10% $K_3Fe(CN)_6$, 1.0% NaOH, 10% sodium nitroprusside solution.
 - (D) 10% $K_3Fe(CN)_6$, 10% NaOH, 1.0% sodium nitroprusside solution.
 - (E) 1.0% $K_3Fe(CN)_6$, 1.0% NaOH, 10% sodium nitroprusside solution.
39. To prepare standard streptomycin solution in estimation streptomycin by sodium nitroprusside method, streptomycin solution containing 1000 $\mu\text{g/ml}$ should be diluted by
- (A) adding 50 ml streptomycin solution in 50 ml distilled water.
 - (B) adding 10 ml streptomycin solution in 90 ml distilled water.
 - (C) adding 20 ml streptomycin solution in 80 ml distilled water.
 - (D) adding 10 ml streptomycin solution in 100 ml distilled water.
 - (E) adding 20 ml streptomycin solution in 100 ml distilled water.
40. In estimation streptomycin by sodium nitroprusside method, streptomycin reacts with _____ to give red coloured complex.
- (A) nitroprusside in presence of $K_3Fe(CN)_6$ under acidic conditions.
 - (B) nitroprusside in presence of $K_3Fe(CN)_6$ under alkaline conditions.
 - (C) $K_3Fe(CN)_6$ in presence of nitroprusside under acidic conditions.
 - (D) $K_3Fe(CN)_6$ in presence of nitroprusside under alkaline conditions.
 - (E) $K_4Fe(CN)_6$ in presence of nitroprusside under acidic conditions

41. In estimation streptomycin by sodium nitroprusside method, aliquots of standard streptomycin solution are taken
- (A) ranging from 0 to 0.5 ml. (B) ranging from 0 to 1.0 ml
 (C) ranging from 0 to 1.5 ml. (D) ranging from 0 to 2.0 ml
 (E) ranging from 0 to 2.5 ml.
42. In estimation streptomycin by sodium nitroprusside method, the intensity of red colour is measured in colorimeter at
- (A) 260 nm. (B) 490 nm.
 (C) 520 nm. (D) 620 nm.
 (E) 750 nm.
43. Colonies of yeasts are
- (A) convex, creamy-white and opaque.
 (B) convex, creamy-white and semi-transparent.
 (C) convex, off-white and semi-transparent.
 (D) flat, colourless and opaque.
 (E) flat, colourless and semi-transparent.
44. *Saccharomyces cerevisiae* belongs to
- (A) Chytridiomycetes (B) Phycomycetes
 (C) Ascomycetes (D) Basidiomycetes
 (E) Deuteromycetes
45. _____ is a pathogenic yeast.
- (A) *Candida albicans* (B) *Histoplasma capsulatum*
 (C) *Cryptococcus neoformans* (D) *Coccidioides immitis*
 (E) All of these
46. Identify the fungus from the given diagram.



- (A) Mucor (B) Rhizopus
 (C) *Aspergillus* (D) *Penicillium*
 (E) *Saccharomyces*

47. Colonies of *Rhizopus* are
(A) white, cottony with fluffy growth, which becomes dirty white on aging.
(B) white or pink with velvety growth.
(C) black, green, brown or yellow with dry, powdery growth.
(D) green to blue, velvety, smooth with folds in growth.
(E) dark olive green to black in colour with black pigment at reverse.
48. Medium not used for the cultivation of fungi is
(A) Glucose yeast extract agar. (B) Glucose asparagine agar.
(C) Potato dextrose agar. (D) Sabouraud's agar.
(E) Rose Bengal agar.
49. *Penicillium* produces
(A) long, tubular slender, coenocytic mycelia
(B) long, slender coenocytic mycelia having rhizoids.
(C) long, slender coenocytic mycelia with short unbranched conidiophores.
(D) septate mycelia with short, branched conidiophores.
(E) septate mycelia with long, unbranched conidiophores.
50. Streptomycin is added in Rose Bengal agar medium to
(A) induce growth of bacteria. (B) inhibit growth of bacteria.
(C) induce growth of fungi. (D) inhibit growth of fungi.
(E) differentiate the growth of bacteria and fungi.
51. The chemical nature of antigen on RBC is
(A) hydrocarbon. (B) carbohydrate.
(C) lipoprotein. (D) lipopolysaccharide.
(E) lipid.
52. Who discovered blood groups?
(A) Thomas Cooley. (B) Karl Landsteiner.
(C) Camillo Golgi. (D) Ernst Haeckel.
(E) Ernst Landsteiner.

53. The blood group considered to be universal donor is
(A) A. (B) B.
(C) AB positive. (D) O.
(E) all of these
54. In determining the phenotype for the ABO blood system
(A) O is dominant over A. (B) B is dominant over A.
(C) O is recessive. (D) A is dominant over B.
(E) O is dominant over B.
55. Inheritance of blood group follows the following.
(A) Chargaff's law. (B) Newton's law.
(C) Pasture effect. (D) Liebig's law.
(E) Mendelian law.
56. What would happen to red blood cells if the haem group were removed from haemoglobin?
(A) Red blood cells would not be able to bind oxygen.
(B) Red blood cells would not be able to reproduce.
(C) Blood clot formation would be inhibited.
(D) White blood cells would not be able to reproduce.
(E) White blood cells will be destroyed.
57. Which of the following tests are included in a CBC test?
(A) Total count of RBC. (B) Differential count WBC.
(C) Platelets count. (D) Packed cell volume.
(E) All of these.
58. The average number of RBC in a healthy male is
(A) $0.45 \times 10^5/\text{cmm}$ (B) $4.5 \times 10^5/\text{cmm}$
(C) $0.45 \times 10^6/\text{cmm}$ (D) $4.5 \times 10^6/\text{cmm}$
(E) $4.5 \times 10^7/\text{cmm}$
59. Anaemia is caused due to
(A) copper deficiency. (B) zinc deficiency.
(C) iron deficiency. (D) manganese deficiency.
(E) magnesium deficiency.

60. _____ amount of blood is collected to estimate Haemoglobin by sahli's method.
- (A) 2.0 μ l (B) 20 μ l
(C) 0.2 ml (D) 2.0 ml
(E) 20 ml
61. What is the function of red blood cells ?
- (A) Carry oxygen from the lungs to tissues.
(B) Carry carbon dioxide from the lungs to tissues.
(C) Carry waste products of metabolism from the cells.
(D) Fight infection.
(E) Help stop bleeding by forming clots.
62. What is not found in haemocytometer ?
- (A) Neubauer chamber slide (B) Thoma's pipette for RBC
(C) Thoma's pipette for WBC (D) Glass rod for mixing
(E) Glass coverslip
63. Which of the following is not a function of blood ?
- (A) to transport respiratory gases.
(B) to transport waste products of metabolism to organ of excretion.
(C) to maintain acid-base equilibrium of the body.
(D) to maintain body temperature at constant level.
(E) to produce hormones.
64. Serum does not contain
- (A) albumin. (B) electrolytes.
(C) antibodies. (D) fibrinogen.
(E) vitamins.
65. _____ is a natural anticoagulant.
- (A) Heparin (B) EDTA
(C) Trisodium citrate (D) Potassium oxalate
(E) Acetylsalicylic acid
66. Which property do white blood cells of human blood have in common ?
- (A) All WBCs are granulocytes.
(B) WBCs are nucleated.
(C) WBCs transport oxygen.
(D) All WBCs have a phagocytic function.
(E) All WBC can produce antibodies.

67. _____ is a part of Turk's solution.
- (A) HgCl_2 (B) ZNCF
(C) Glacial acetic acid (D) NaCl
(E) Na_2SO_4
68. Granulocytes do not include _____.
- (A) Monocytes (B) Basophils
(C) Polymorphonuclear Neutrophils (D) Neutrophils
(E) Eosinophils
69. Which of the following is a function of basophils ?
- (A) Kill parasites.
(B) Transport blood gases.
(C) Phagocytize bacteria.
(D) Mount immune response.
(E) Release histamine during allergic reaction.
70. Which of the following types of white blood cells kills parasitic worms and inactivates some inflammatory chemicals of allergy ?
- (A) Monocyte (B) Lymphocyte
(C) Basophils (D) Eosinophil
(E) Neutrophil
71. Volume of one small square for counting of RBC is
- (A) 0.00025 mm^3 (B) 0.0025 mm^3
(C) 0.025 mm^3 (D) 0.25 mm^3
(E) 0.0025 cm^3
72. Leucopoiesis is
- (A) Synthesis of erythrocytes.
(B) Synthesis of leucocytes.
(C) Synthesis of both leucocytes and erythrocytes.
(D) Synthesis of plasma.
(E) Synthesis of platelets.
73. _____ is used as a fixative to fix blood film.
- (A) Heat (B) Formalin
(C) Methanol (D) Glacial acetic acid
(E) Buffer

74. _____ stain is not Romanowsky's stain.
- (A) Giemsa's (B) Leishman's
(C) Field's (D) Loeffler's
(E) None of these
75. Monocytopenia is seen during
- (A) malaria. (B) hairy cell leukaemia.
(C) tuberculosis. (D) mumps.
(E) infectious mononucleosis.
76. Widal test is performed for diagnosis of _____.
- (A) Enteric fever. (B) Hepatitis.
(C) Haemorrhagic fever. (D) Rheumatic fever.
(E) Septic fever.
77. What is not true for titre in the double dilution technique ?
- (A) It is inversely proportionate to the amount of antibodies.
(B) It is directly proportionate to the amount of antibodies.
(C) It can give prognosis of diseases.
(D) Lower titre value may not be significant if person is vaccinated.
(E) It can predict efficacy of treatment.
78. Which of the following is true about the widal reaction ?
- (A) Antibody to H antigen appears first and persists.
(B) Antibody to O antigen appears first and persists.
(C) Antibodies to H and O antigens appear simultaneously and persist.
(D) Antibody to Vi antigen appears only after the dissociation of the organism from the body.
(E) Antibody to Vi antigen does not appear in carriers.
79. ELISA stands for
- (A) Enzyme linked immunological assay.
(B) Enzyme linked immunofluorescent assay.
(C) Enzyme linked immunosorbent assay.
(D) Energy linked immunofluorescent assay.
(E) Energy linked immunosorbent assay.

80. Typhoid fever is commonly acquired by
 (A) direct sexual contact.
 (B) by inhaling contaminated air.
 (C) consuming food or water contaminated by faecal material of infected person.
 (D) drinking pasteurized milk.
 (E) by rat bite.
81. Screening of microorganisms includes
 (A) done in one or few steps.
 (B) allow discarding of many valueless microbes.
 (C) easy detection of the small percentage of useful microorganism.
 (D) simple and easy technique with simple media requirement.
 (E) all of these
82. _____ screening allow the detection of microorganism from the natural source able to produce an industrially important product.
 (A) Primary (B) Secondary
 (C) Tertiary (D) All of these
 (E) None of these
83. Secondary screening cannot give information about
 (A) the genetic instability in microbial cultures.
 (B) number of products produced in a single fermentation.
 (C) the structure of product.
 (D) waste generation and treatment.
 (E) ability of organism to grow and form product from cheaper carbon source.
84. Antibiotic producing microorganisms can be detected by
 (A) incorporation of CaCO_3 in the agar medium.
 (B) crowded plate method.
 (C) using starch agar plate.
 (D) by incorporation of pH indicator dye in the agar medium.
 (E) using gelatine agar plate.
85. According to the enzyme commission (E.G.), α -amylase belongs to _____.
 (A) Transferase (B) Oxidoreductase
 (C) Hydrolase (D) Isomerase
 (E) Ligase
86. Which fungi are utilized for industrial production of amylase ?
 (A) *Rhizopus* (B) *Aspergillus oryzae*
 (C) *Mucor* (D) *Fusarium*
 (E) *Penicillium notatum*

87. Alpha amylase randomly splits which linkage ?
 (A) α -1, 4 glycosidic bond (B) β -1, 4 glycosidic bond
 (C) β -1, 6 glycosidic bond (D) α -1, 6 glycosidic bond
 (E) None of these
88. Amylase is not used in
 (A) textile industry. (B) brewing industry.
 (C) food and confectionary. (D) leather industry.
 (E) detergent.
89. Clear zone observed on starch agar plate is
 (A) zone of inhibition. (B) zone of hydrolysis.
 (C) zone of stimulation. (D) zone of dissolution.
 (E) none of these.
90. Which of the following method is not used in isolation and screening of desired microorganisms ?
 (A) crowded plate technique. (B) auxanographic technique.
 (C) slide culture technique. (D) enrichment culture technique.
 (E) spread plate technique.
91. Which of the media can be used to detect and isolate organic acid producers ?
 (A) Medium containing phenol red (B) Potato Dextrose Agar
 (C) MacConkey's Agar (D) Rose Bengal Agar
 (E) None of these
92. 1 ml of the stock solution is taken and transferred to the test tube containing 9ml of distilled water. For this dilution, it may be said that the solution was diluted
 (A) 2-fold. ✓(B) 4-fold.
 (C) 6-fold. (D) 8-fold.
 (E) 10-fold.
93. The term antibiotic was coined by
 (A) A. Fleming ✗(B) L. Pasteur
 ✓(C) S. Waksman (D) E. Chain
 (E) H. Florey

94. What is the percentage of sucrose and CaCO_3 in the medium used for screening of organic acid producers ?
- (A) 3 and 1% (B) 0.1 and 3%
 (C) 2 and 6% (D) 6 and 2%
 (E) 0.3 and 0.1%
95. Citric acid is used
- (A) as flavouring agent in food
 (B) in soft drinks.
 (C) as preservative
 (D) as metal chelators and sequestering agent.
 (E) all of these
96. Industrial production of citric acid in an aerobic condition is carried out by the fungi
- (A) *Aspergillus* (B) *Penicillin*
 (C) *Mucor* (D) *Alternaria*
 (E) *Bortrytis*
97. Which size of bubbles is relevant for mass transfer ?
- (A) Small (B) Very small
 (C) Large (D) Very large
 (E) Size is irrelevant
98. Viscosity of the medium is
- (A) air flow characteristics. (B) mass flow characteristics.
 (C) gas flow characteristics. (D) medium flow characteristics.
 (E) none of these.
99. What is the strength of iodine used for titration in determination of Oxygen Transfer Rate ?
- (A) 1N (B) 0.1N
 (C) 0.01N (D) 1M
 (E) 0.01M
100. Oxygen Transfer Rate is expressed as
- (A) mM of oxygen/litre/minute (B) M of oxygen /litre/minute
 (C) M of oxygen /ml/minute (D) mM of oxygen /ml/second
 (E) mM of oxygen /litre/second