# 096/2024

Maximum : 100 marks

Time : 1 hour and 30 minutes

**1.** Which of the following is a common method for disinfecting drinking water?

(A) Pasteurization
(B) Filtration
(C) Chlorination
(D) Fermentation

**2.** The process of removing or killing all microorganisms in a material or on an object is known as :

(A) Disinfection
(B) Sterilization
(C) Sanitation
(D) Antisepsis

**3.** Which type of microscopy enhances the contrast of transparent and colourless objects without staining?

(A) Bright-field microscopy
(B) Dark-field microscopy
(C) Phase-contrast microscopy
(D) Fluorescence microscopy

**4.** The resolving power of a light microscope is primarily determined by :

(A) Magnification
(B) Numerical aperture of the objectives lens
(C) The type of light source
(D) The use of stains

**5.** In continuous culture, which device maintains bacterial cultures in a state of exponential growth?

(A) Batch culture
(B) Chemostat
(C) Petri dish
(D) Test tube

**6.** Who first provided evidence that microorganisms can cause disease in humans?

(A) Robert Koch
(B) Louis Pasteur
(C) Antonie van Leeuwenhoek
(D) Edward Jenner

**7.** Which culture method is used to determine the antibiotic susceptibility of bacteria?

(A) Spread plate method
(B) Streak plate method
(C) Broth dilution method
(D) Disk diffusion method

8. What is the purpose of using a selective medium in microbiological culture?
   (A) To differentiate between organisms based on biochemical properties
   (B) To grow all types of organisms
   (C) To support the growth of fastidious organisms
   (D) To inhibit the growth of certain organisms while allowing others to grow

9. Which medium is specifically designed for the isolation of Gram-positive bacteria, inhibiting Gram-negative bacteria?
   (A) MacConkey agar
   (B) Mannitol salt agar
   (C) Eosin methylene blue agar
   (D) Blood agar

10. Which type of wastewater treatment involves the use of microorganisms to decompose organic matter?
   (A) Primary treatment
   (B) Secondary treatment
   (C) Tertiary treatment
   (D) Quaternary treatment

11. Which of the following is the most effective method to prevent the spread of many infectious diseases?
   (A) Regular use of antibiotics
   (B) Quarantine of infected individuals
   (C) Vaccination
   (D) Handwashing with soap and water

12. Which of the following is an example of a vector-borne disease?
   (A) Tuberculosis
   (B) Influenza
   (C) Malaria
   (D) Hepatitis A

13. Which waterborne disease is caused by a protozoan parasite and can lead to severe diarrhoea?
   (A) Cholera
   (B) Typhoid fever
   (C) Giardiasis
   (D) Legionellosis

14. Which of the following antibiotics is effective against a wide range of both Gram-positive and Gram-negative bacteria?
   (A) Isoniazid
   (B) Rifampin
   (C) Ciprofloxacin
   (D) Vancomycin

15. Which of the following is a mechanism by which bacteria develop resistance to antibiotics?
   (A) Increased membrane permeability
   (B) Efflux pumps that remove the antibiotic from the cell
   (C) Decreased expression of efflux pumps
   (D) Reduced production of enzymes that degrade the antibiotic

16. Which class of antibiotics inhibits bacterial protein synthesis by binding to the 50S ribosomal subunit?

(A) Penicillins
(B) Aminoglycosides
(C) Macrolides
(D) Tetracyclines

17. In fluorescence microscopy, the fluorescent dyes used are excited by which type of light?

(A) Infrared light
(B) Ultraviolet light
(C) Visible light
(D) X-rays

18. The Gram staining technique differentiates bacteria based on the composition of their :

(A) Cytoplasm
(B) Ribosomes
(C) Cell wall
(D) Capsule

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20. Which method is used to increase the contrast of specimens in TEM?

(A) Coating with heavy metals
(B) Using phase contrast
(C) Staining with fluorescent dyes
(D) Immersion in oil

21. Which of the following is used in cold sterilisation?

(A) Ultrasonic waves
(B) Ultraviolet rays
(C) Infrared ray
(D) Gamma rays

22. Toxins are produced by bacteria in :

(A) Lag phase
(B) Log phase
(C) Stationary phase
(D) Phase of decline

23. Organelle involved in bacterial respiration is :

(A) Plasma membrane
(B) Pili
(C) Mesosome
(D) Flagella

24. The enzyme which is absent in anaerobes is :

(A) Oxidase
(B) Catalase
(C) Urease
(D) Nitrate reductase

25. Enhancement of virulence in bacteria is called :

(A) Attentuation
(B) Extrapolation
(C) Exaltation
(D) Pathogenicity

26. A population of bacteria derived by binary fission from a single cell is called :

(A) Strain
(B) Clone
(C) Species
(D) Biotype

27. Organisms which prefer cold environments with optimum growth temperature of 15°C or below are :

(A) Mesophilic
(B) Thermophilic
(C) Psychrophilic
(D) Hyperthermophilic

28. Culture Media used for Anaerobic organisms :

(A) Nutrient broth
(B) Robertson's Cooked meat broth
(C) Selenite F broth
(D) Peptone water

29. Capnophilic bacteria require ———————— for growth and multiplication.

(A) Nitrous oxide
(B) Cadmium
(C) Selenium sulphate
(D) Carbon dioxide

30. Total energy production from One Glucose molecule is :

(A) 34 ATP
(B) 36 ATP
(C) 38 ATP
(D) 40 ATP

31. T lymphocytes are identified by :

(A) Rosette formation with sheep RBC
(B) Immunoglobulin on its surface
(C) EAC rosette with sheep RBC
(D) Have filamentous projections on its surface

32. The immunoglobulin class is determined by :

(A) Heavy chain isotype
(B) Light chain isotype
(C) Variable portion of Ig molecule
(D) Constant region of Ig molecule

33. Type of immune response in transplant rejection is :
(A) Type I
(B) Type II
(C) Type III
(D) Type IV

34. Grafts transplanted between identical twins :
(A) Autograft
(B) Homograft
(C) Isograft
(D) Allograft

35. Which one of the following could function both as central and peripheral lymphoid organ?
(A) Liver
(B) Bone marrow
(C) Thymus
(D) Lymph nodes

36. Antigen recognition on the surface of the Antigen presenting cell is by :
(A) T cell recognition Antigen
(B) Fc part of immunoglobulin
(C) Fab part of immunoglobulin
(D) B cell recognition Antigen

37. When a soluble antigen combines with its antibody in the presence of electrolytes at suitable temperature and pH, the reaction is :
(A) Agglutination
(B) Precipitation
(C) Passive agglutination
(D) Reverse passive agglutination

38. Which blood group antibody is IgG class?
(A) Anti A1
(B) Anti B
(C) Anti A2
(D) Anti Rh

39. Which complement fragment is called C3 convertase : in Complement cascade?
(A) C567
(B) $C14_b2_a$
(C) C1qrs
(D) C1a

40. A substance reacts with an antibody but no antibody formation in its native state is called :
(A) Antigen
(B) Allergen
(C) Adjuvant
(D) Hapten

41. A method of horizontal gene transfer among prokaryotes in which DNA is transferred from one cell to another via a replicating virus :
(A) Transduction
(B) Transformation
(C) Transcription
(D) Conjugation

42. A DNA gene synthesized from an RNA template is :
(A) Complementary DNA
(B) Reverse transcription
(C) Recombinant DNA
(D) Probe DNA

43. A type of electrophoresis which is extensively used for the quantification and analysis of proteins?
(A) Immunoelectrophoresis
(B) Gel electrophoresis
(C) 2D electrophoresis
(D) All of the above

44. Auxotrophic mutants are referred to as :
(A) Revertant
(B) Wild type
(C) Nutritional
(D) None of the above

45. Beer Lambert's law gives the relation between which of the following?
(A) Reflected radiation and concentration
(B) Energy absorption and reflected radiation
(C) Scattered radiation and concentration
(D) Energy absorption and concentration

46. Choose the false statement concerning vectors in recombinant DNA technology :
(A) Vectors must contain genes for self-replication
(B) Vectors are small enough to manipulate outside a cell
(C) Vectors contain a recognizable genetic marker
(D) Vectors survive inside cells

47. DNA repair system that is used to remove pyrimidine dimers formed by UV radiation :
(A) Nucleotide excision Repair
(B) Base excision Repair
(C) Mismatch repair
(D) SOS response

48. ———————— is used as a media for density gradient.
(A) Agarose
(B) Ficoll
(C) Luria broth
(D) Propylene glycol

49. Ethidium bromide is used in gel electrophoresis :
(A) Stain DNA and make it visible under UV light
(B) Color the gel
(C) Enhance the conductivity of the gel
(D) Increase viscosity of the gel

**50.** In a native PAGE, proteins are separated on the basis of :

(A) Net positive charges size
(B) Net negative charge
(C) Net positive charge
(D) Net charge and size

**51.** Light source used in Uv-Vis spectroscopy :

(A) LASER
(B) Xenon lamp
(C) Sodium vapour lamp
(D) Tungsten lamp

**52.** Mode of action of β-Lactamases in rendering penicillin resistance is by :

(A) Preventing access to the target of the antibiotic
(B) Degrading the antibiotic
(C) Altering the antibiotic
(D) Rapidly extruding the antibiotic

**53.** One cell takes DNA from the other and inserts it into its chromosome despite the fact that the two cells are completely unrelated. The procedure is :

(A) Horizontal gene transfer
(B) Transposition
(C) Crossing over of DNA from the two cells
(D) Vertical gene transfer

**54.** Plasmids are :

(A) Transposons
(B) Chromosome
(C) Accessory genetic information
(D) RNA found in bacterial cells

**55.** The study of genomes recovered from natural samples without first isolating members of the microbial community and growing them in pure cultures :

(A) Phenomics
(B) Proteomics
(C) Metabolomics
(D) Metagenomics

**56.** The process used in the laboratory to produce millions of copies of DNA is :

(A) In situ polymerization
(B) Fluctuation test
(C) Polymerase Chain Reaction (PCR)
(D) Reverse transcriptase

**57.** Transposons are :

(A) Jumping genes
(B) Inverted repeat
(C) Insertion sequences
(D) All of the above

58. Which of the following is not a type of centrifugation?

(A) Disk stack separator
(B) Microfiltration
(C) Tubular centrifuge
(D) Hydro cyclone

59. DNA fingerprinting consists of identifying individuals or organisms by their unique :

(A) A series of clones containing the entire genome of a microbe
(B) Recombinant microbial cells
(C) Restriction enzyme fragments of DNA molecules
(D) Single-stranded DNA localized on a substrate

60. Which statement is not true regarding difference between prokaryotes and eukaryotes?

(A) Chromosomes in prokaryotes are circular while linear in eukaryotes
(B) Polyribosomes are present in prokaryotes but not by eukaryotes
(C) Cytoplasm is the site of transcription and translation occur in prokaryotes but not in eukaryotes
(D) Prokaryotes have one copy of each gene while eukaryotes have two copies of each gene

61. Growth of culture without the presence of added free water is :

(A) Fluidized bed reactor
(B) Solid state fermentation
(C) Dialysis culture unit
(D) Fixed bed reactor

62. Phenylacetic acid is added as a precursor to maximize the production of antibiotic :

(A) Penicillin G
(B) Streptomycin
(C) Both
(D) None

63. The amino acids lysine and ———— are used in the food industry as nutritional supplements in bread products and as flavor enhancing compounds such as monosodium glutamate.

(A) Glutamic acid
(B) Methionine
(C) Valine
(D) Phenyl alanine

64. Citric acid is produced by the microorganism :

(A) *Rhizopus nigricans*
(B) *Aspergillus niger*
(C) *Acetobacter*
(D) *Lactobacillus*

65. Antibiotics and mycotoxins falls under which category of microbial products :

(A) Primary metabolites (B) Secondary metabolites

(C) Both (D) None

66. In continuous culture techniques using chemostat, cell output is improved by maintain microorganisms in ———— phase.

(A) Lag (B) Logarithmic

(C) Stationary (D) Decline

67. $\alpha$ -amylase is industrially produced from the microorganism :

(A) *Bacillus subtilis* (B) *Streptomyces olivaceus*

(C) *Acetobacter xylinum* (D) *Aspergillus flavus*

68. An industrial strain or microorganism should ideally exhibit :

(A) Genetic stability (B) Safety, non-pathogenicity

(C) Efficient production (D) All of these

69. ———— are used as nitrogen source in fermentation media.

(A) Corn steep liquor (B) Yeast extracts

(C) Soya meal (D) All of these

70. ———— have been particularly useful for biomass production for animal feed.

(A) Tray fermenters (B) Column bioreactors

(C) Fluidized bed reactor (D) None

71. Benzoate shows greatest antimicrobial activity at ———— pH.

(A) 4 (B) 6

(C) 8 (D) 10

72. Homofermentative lactic acid bacteria lacks the enzyme :

(A) Aldolase (B) Phosphoketolase

(C) Hexose isomerase (D) All of these

73. Yoghurt is produced using a mixed culture of *Streptococcus thermophiles* and *Lactobacillus bulgaricus* in the ratio :

(A) 2 : 1 (B) 2 : 3

(C) 1 : 1 (D) 1 : 2

74. *Propionibacterium shermanii* is added to ———— cheese for flavour development and eye formation.

(A) Camembert (B) Blue
(C) Feta (D) Swiss

75. ———— is a staple food of West Africa prepared by fermenting root of cassava plant.

(A) Gari (B) Tempeh
(C) Ogi (D) Miso

76. Sake is an alcoholic beverage prepared from :

(A) Steamed rice (B) Coffee beans
(C) Apple juice (D) Palm sap

77. 'Black leg' in potatoes is caused by ———— sp.

(A) *Erwinia* (B) *Bacillus*
(C) *Xanthomonas* (D) *Pseudomonas*

78. Cereolysin is a thiol activated toxin produced by :

(A) *Clostridium perfringens* (B) *Bacillus cereus*
(C) *Staphylococcus aureus* (D) *Campylobacter*

79. Food borne outbreaks associated with egg and poultry products are generally caused by :

(A) *Salmonella* (B) *Listeria*
(C) *Bacillus* (D) *Clostridium*

80. Alarm water content is the water content that should not be exceeded if ———— is to be avoided.

(A) Bacterial growth (B) Mold growth
(C) Viral growth (D) None

81. Bacillus anthracis was isolated by :

(A) Louis Pasteur (B) Robert Koch
(C) Antonie von Leeuwenhoek (D) Joseph Lister

82. In which organ does Salmonella Typhi exist in carriers?

(A) Lungs (B) Pancreas
(C) Gall bladder (D) Spleen

**83.** Warthin-Starry silver staining is used for demonstration of :

(A) Leptospira (B) Staphylococci
(C) Haemophilus (D) Brucella

**84.** Urea breath test is used to diagnose :

(A) Actinomycetes (B) Yersinia enterocolitica
(C) Helicobacter pylori (D) Plesiomonas

**85.** Toxin produced by certain strains of both E.coli and Shigella :

(A) Heat labile toxin (B) Heat stable toxin
(C) Shiga toxin (D) Cholera toxin

**86.** In its action, Diphtheria toxin resembles the toxin of :

(A) Staphylococcus aureus (B) Bacillus cereus
(C) Clostridium perfringes (D) Pseudomonas aeruginosa

**87.** The most common agent causing respiratory infection in cystic fibrosis patients :

(A) Pseudomonas aeruginosa (B) E.coli
(C) Staphylococcus aureus (D) Bordetella

**88.** Appearance of Bordetella in Gram's smear resembles :

(A) Palisading (B) Cuneiform
(C) Thumb print (D) Boxcar

**89.** Which of the following pneumococcal vaccine is not recommended for children under 2 years of age?

(A) 7 valent conjugate vaccine (B) 23 valent polysaccharide vaccine
(C) 13 valent conjugate vaccine (D) All of these

**90.** Reduction of disease incidence, prevalence, morbidity or mortality to a locally acceptable level as a result of deliberate efforts is known as :

(A) Eradication (B) Elimination
(C) Control (D) Source reduction

**91.** In Eijkman test, MacConkey broth tubes are incubated at :

(A) 44°C (B) 25°C
(C) 37°C (D) 52°C

92. Trickling filter method is used in which of the following :

(A) Primary sewage treatment
(B) Sewage effluent disposal
(C) Secondary sewage treatment
(D) Screening of sewage

93. Ground water include all except :

(A) Shallow wells
(B) Deep wells
(C) Spring
(D) Lakes

94. Chlorine demand is measured by :

(A) Horrock's apparatus
(B) Chlorimeter
(C) Double pot
(D) Berkfeld filter

95. Evaluation of the quality of air can be performed by all the following method except :

(A) Settle plate
(B) Slit sampler
(C) Particle count
(D) Sweep plate method

96. Which of the following method is used for detection of endotoxin in water?

(A) Multiple tube method
(B) Membrane filtration method
(C) Limulus amebocyte lysate assay
(D) Slit sampler method

97. HEPA filter used in biosafety cabinet is :

(A) High energy particulate air
(B) Highly equipped particulate air
(C) High effective particulate air
(D) High efficiency particulate air

98. Which of the following is the heart of the activated sludge process?

(A) Primary sedimentation tank
(B) Aeration tank
(C) Sludge digestion tank
(D) Secondary sedimentation tank

99. Which of the following is not used to express the strength of sewage?

(A) E.coli count
(B) Biochemical oxygen demand
(C) Suspended solids
(D) Chemical oxygen demand

100. Aerosol transmission occurs in :

(A) Mycobacterium tuberculosis
(B) Staphylococcus
(C) Streptococcus
(D) E.coli

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