JEMAS(PG)-2024 **QB No: 4103400001**

Subject: M.Sc in Medical Laboratory Technology(M.Sc MLT-Biochemistry/Microbiology/Immuno Haematology and Blood Banking)

Duration: 90 minutes **No of MCQ: 100** **Full Marks: 100**

INSTRUCTIONS

1. All questions are of objective type having four answer options for each.
2. **Category-1**: Carries **1** mark each and only one option is correct. In case of incorrect answer or any combination of more than one answer, ¼ mark will be deducted.
3. Questions must be answered on OMR sheet by darkening the appropriate bubble marked A, B, C, or D.
4. Use only **Black/Blue ink ball point pen** to mark the answer by filling up of the respective bubbles completely.
5. Write Question Booklet number and your roll number carefully in the specified locations of the **OMR** sheet. Also fill appropriate bubbles.
6. Write your name (in block letter), name of the examination center and put your signature (as is appeared in Admit Card) in appropriate boxes in the **OMR sheet**.
7. The OMR sheet is liable to become invalid if there is any mistake in filling the correct bubbles for Question Booklet number/roll number or if there is any discrepancy in the name/ signature of the candidate, name of the examination center. The OMR sheet may also become invalid due to folding or putting stray marks on it or any damage to it. The consequence of such invalidation due to incorrect marking or careless handling by the candidate will be sole responsibility of candidate.
8. Candidates are not allowed to carry any written or printed material, calculator, pen, log-table, wristwatch, any communication device like mobile phones, bluetooth devices etc. inside the examination hall. Any candidate found with such prohibited items will be **reported against** and his/her candidature will be summarily cancelled.
9. Rough work must be done on the Question Booklet itself. Additional blank pages are given in the Question Booklet for rough work.
10. Hand over the OMR sheet to the invigilator before leaving the Examination Hall.
11. Candidates are allowed to take the Question Booklet after examination is over.

Signature of the Candidate: _____

(As in Admit Card)

Signature of the Invigilator: _____

ROUGH WORK ONLY

M.Sc. MLT

1. Which of the following methods is used for sterilization of heat sensitive materials?
   (A) Autoclaving.
   (B) Dry heat sterilization.
   (C) Ethyleneoxide gassterilization.
   (D) Flaming.

2. Which of the following bacterial structures is responsible for adherence to surfaces and host cells?
   (A) Flagellum.
   (B) Capsule.
   (C) Pili.
   (D) Endospore.

3. Which of the following viruses is associated with causing cervical cancer?
   (A) Herpes simplex virus.
   (B) Human papilloma virus (HPV.
   (C) Hepatitis C virus.
   (D) Varicella - zoster virus.

4. Which process involves the transfer of DNA from a donor bacterium to a recipient bacterium via a virus?
   (A) Transformation
   (B) Transduction.
   (C) Conjugation.
   (D) Transposition.

5. What is antimicrobial resistance (AMR)?
   (A) The ability of microbes to produce toxins.
   (B) The ability of microbes to evade the host immune system.
   (C) The ability of microbes to resist the effects of antimicrobial drugs.
   (D) The ability of microbes to multiply rapidly.

6. What is the function of the lac operon in Escherichia coli?
   (A) It regulates the expression of genes involved in lactose metabolism.
   (B) It codes for ribosomal RNA.
   (C) It synthesizes lipopolysaccharides.
   (D) It encodes enzymes for DNA replication.

7. What is the primary vector for transmitting the dengue virus?
   (A) Phlebotomus sandfly.
   (B) Anopheles mosquito.
   (C) Culex mosquito.
   (D) Aedes mosquito.

8. Which of the following is a viral disease that has been eradicated through vaccination?
   (A) Small pox.
   (B) Hepatitis.
   (C) Yellow fever.
   (D) Influenza

9. Which of the following is NOT a method by which bacteria acquire antibiotic resistance?
   (A) Mutation.
   (B) Conjugation.
   (C) Binary fission
   (D) Transformation

10. Which of the following is a characteristic feature of retroviruses?
   (A) They have a single-stranded DNA genome.
   (B) They replicate using reverse transcriptase.
   (C) They only infect plants
   (D) They have a helical capsid structure.

11. Which of the following bacteria is associated with causing dental caries (tooth decay)?
   (A) Streptococcus mutans.
   (B) Staphylococcus aureus.
   (C) Neisseria gonorrhoeae.
   (D) Mycobacterium tuberculosis:

12. What is the primary purpose of stool microscopy?
   (A) To detect the presence of blood in the stool.
   (B) To identify parasites and their eggs in the stool.
   (C) To measure stool pH levels
   (D) To assess stool consistency.

13. Which of the following is NOT a consequence of antimicrobial resistance?
   (A) Increased healthcare costs.
   (B) Longer hospital stays.
   (C) Decrease risk of treatment failure.
   (D) Increased mortality rates.

14. What is the primary function of plasmids in bacteria?
   (A) Storage of genetic information.
   (B) Regulation of gene expression.
   (C) Replication of the bacterial chromosome.
   (D) Horizontal gene transfer.

15. What is the purpose of using iodine solution in stool microscopy?
    (A) To stain the nuclei of parasites.
    (B) To highlight the presence of mucus in the stool.
    (C) To enhance the contrast of the microscopic field.
    (D) To dissolve the fecal material.

16. Griffith (1928) reported the phenomenon of transformation first in
    (A) H. influenzae
    (B) Pneumococci
    (C) Bacillus species
    (D) E.coli

17. Mycoplasmas are bacterial cells that
    (A) Fail to reproduce on artificial media
    (B) Have a rigid cell wall
    (C) Are resistant to penicillin
    (D) Stain well with Gram's stain.

18. What is the purpose of the tuberculin skin test (TST) in the diagnosis of TB?
    (A) To detect active TB infection.
    (B) To detect latent TB infection.
    (C) To differentiate between TB and other respiratory infections.
    (D) To assess the effectiveness of TB treatment.

19. What is the purpose of biological safety cabinets (BSCs) in the laboratory?
    (A) To sterilize equipment.
    (B) To protect laboratory personnel from exposure to infectious agents.
    (C) To mix reagents.
    (D) To store specimens.

20. Which of the following actions can help slow down the emergence of antimicrobial resistance?
    (A) Prescribing antibiotics for viral infections.
    (B) Using antibiotics only when necessary and appropriate.
    (C) Not taking antibiotics for the full course prescribed if symptoms improve.
    (D) Using antibiotics in animal feed to promote growth.

21. What is the purpose of conducting regular safety training sessions for laboratory personnel?
    (A) To ensure compliance with regulations.
    (B) To increase productivity.
    (C) To reduce costs.
    (D) To minimize overtime.

22. Which of the following is a characteristic feature of TB granulomas observed in histopathological examination?
    (A) Presence of viral inclusions.
    (B) Presence of yeast forms.
    (C) Central necrosis surrounded by epithelioid cells and lymphocytes.
    (D) Formation of pseudo-hyphae.

23. What is the term used to describe the specific binding of an antibody to its target antigen?
    (A) Agglutination.
    (B) Precipitation.
    (C) Neutralization.
    (D) Affinity.

24. What type of antibody is primarily involved in the secondary immune response to an antigen?
    (A) IgM.
    (B) IgG.
    (C) IgA.
    (D) IgE.

25. How do humans acquire cysticercosis?
    (A) By ingesting eggs of the tapeworm Taenia solium
    (B) Through direct contact with infected individuals
    (C) By consuming undercooked pork contaminated with cysticerci
    (D) Through contaminated water sources

26. What are oncogenes?
    (A) Genes that promote apoptosis
    (B) Genes that regulate cell cycle progression
    (C) Genes that promote cell proliferation and tumorigenesis
    (D) Genes that inhibit angiogenesis

27. What is the causativeagent of cysticercosis?
    (A) Taenia solium
    (B) Ascaris lumbricoides
    (C) Toxoplasma gondii
    (D) Trichinella spiralis

28. What type of samples can be analyzed using MALDI- TOF mass spectrometry?
    (A) Only proteins
    (B) Only DNA
    (C) Both proteins and nucleic acids
    (D) Only carbohydrates

29. In E. coli, during lactose metabolism repressor binds to
    (A) Regulator gene
    (B) Operator gene
    (C) Structural gene
    (D) Promoter gene

30. Mutation generally produces
    (A) Recessive genes
    (B) Lethal genes
    (C) Polygenes
    (D) Dominant genes

31. In a DNA percentage of thymine is 20. What is the percentage of guanine:
    (A) 20
    (B) 40
    (C) 30
    (D) 60

32. Biologically marriage should be avoided between:
    (A) Rh+ male and Rh+ female
    (B) Rh-male and Rh+ female
    (C) Rh+ male and Rh- female
    (D) Rh-male and Rh- female

33. Which of the following is most resistant to antiseptics:
    (A) Spore
    (B) Prion
    (C) Cyst
    (D) Fungus

34. The disposable plastic syringes are commonly sterilized by:
    (A) Formaldehyde
    (B) Ethylene oxide
    (C) Hexachloride
    (D) UV radiation

35. Jumping gene is:
    (A) Transposon
    (B) Episome
    (C) Cosmid
    (D) Plasmid

36. Most sensitive test for antigen detection is:
    (A) RIA
    (B) ELISA
    (C) Immunofluorescence
    (D) Passive hemagglutination

37. Common strain for fungal hyphae:
    (A) Methylene blue
    (B) Gomori Methanamine silver
    (C) Congo red
    (D) Oil red O

38. Amino acid has two optically active centres
    (A) Glycine
    (B) Proline
    (C) Isoleucine
    (D) Lysine

39. Coenzymes are best described by which one of the following?
    (A) They participate in only one reaction, like enzymes
    (B) In humans, they are always synthesized from vitamins
    (C) They are complex, non-protein organic molecules
    (D) They are proteins

40. The movement of calcium across the membrane is an example of which one of the following
    (A) Ligand-gated channel
    (B) Phosphorylated-gated channel
    (C) Passive diffusion
    (D) Voltage-gated channel

41. Serum acid phosphatase (ACP) level is increased in:
    (A) Rickets
    (B) Hepatoma
    (C) Prostate carcinoma
    (D) Excess phosphate intake

42. Which factor causes a shift in the oxygen dissociation curve to left?
    (A) High pO_2
    (B) Low pH
    (C) Low pO_2
    (D) High temperature.

43. Heavy metal ions are usually involved in the following type of enzyme inhibition:
    (A) Competitive inhibition
    (B) Non-competitive inhibition
    (C) Allosteric inhibition
    (D) Un-competitive inhibition.

44. The mineral required for insulin activity is:
    (A) Sulphur
    (B) Cobalt
    (C) Chromium
    (D) Selenium

45. Arithmetic mean of a series is 10 and if 5 is added in all the items of a series, the new arithmetic mean will be
    (A) 10
    (B) 5
    (C) 15
    (D) 20.

46. Which technique separates proteins based on their size and charge?
    (A) PCR
    (B) Mass spectrometry
    (C) SDS-PAGE
    (D) Western blotting

47. Which method is commonly used for separating and analyzing nucleic acids?
    (A) Agarose gel electrophoresis
    (B) Thin layer chromatography
    (C) Distillation
    (D) Freeze drying

48. What is the principle of spectrophotometry?
    (A) Separating molecules based on size
    (B) Measuring the absorbance of light by a sample
    (C) Amplifying genetic material
    (D) Identifying bacteria by shape

49. In Western blotting, what is transferred to a membrane for detection?
    (A) DNA
    (B) RNA
    (C) Lipids
    (D) Proteins.

50. What is the main application of fluorescence microscopy in biochemistry and microbiology?
    (A) To measure pH changes
    (B) To visualize and quantify microorganisms and cellular components
    (C) To separate DNA fragments
    (D) To identify chemical elements

51. Which of the following is a technique used for identifying microorganisms based on their metabolic activity?
    (A) FISH (Fluorescence in situ Hybridization)
    (B) Biochemical testing
    (C) Atomic absorption spectroscopy
    (D) X-ray crystallography

52. What does the term "plaque assay" refer to in microbiology?
    (A) A method to quantify the number of virus particles
    (B) A technique to measure bacterial resistance
    (C) A procedure for DNA sequencing
    (D) A test for enzyme activity

53. In chromatography, what is the stationary phase?
    (A) The mobile phase
    (B) The phase that moves through the column
    (C) The phase that remains fixed in place within the column
    (D) The sample being analyzed

54. Which of the following enzymes is responsible for the conversion of glucose to pyruvate in glycolysis?
    (A) Pyruvate dehydrogenase
    (B) Hexokinase
    (C) Phosphofructokinase-1
    (D) Glycogen synthase

55. Which amino acid is the precursor for synthesizing serotonin and melatonin?
    (A) Tryptophan
    (B) Tyrosine
    (C) Phenylalanine
    (D) Histidine

56. Which of the following is a ketogenic amino acid?
    (A) Glycine
    (B) Alanine
    (C) Leucine
    (D) Glutamine

57. Which of the following is not a function of nucleic acids?
    (A) Storage of genetic information
    (B) Transfer of genetic information
    (C) Catalyzing biochemical reactions
    (D) Providing structural support to cells.

58. Which of the following enzymes catalyzes the rate-limiting step of the urea cycle?
    (A) Arginase
    (B) Ornithine transcarbamoylase
    (C) Carbamoyl phosphate synthetase I
    (D) Argininosuccinate synthetase.

59. Which enzyme catalyses acetyl-CoA conversion to malonyl-CoA in fatty acid synthesis?
    (A) Acetyl-CoA carboxylase
    (B) Fatty acid synthase
    (C) Carnitine acyltransferase I
    (D) Citrate synthase

60. Which of the following amino acids is essential in the human diet?
    (A) Serine
    (B) Glycine
    (C) Histidine
    (D) Proline.

61. Which mineral is essential for maintaining normal nerve and muscle function, as well as regulating blood pressure?
    (A) Calcium
    (B) Iron
    (C) Magnesium
    (D) Potassium.

62. Which of the following is a complete protein containing all essential amino acids?
    (A) Rice
    (B) Quinoa
    (C) Corn
    (D) Lentils

63. Which type of fat is considered heart-healthy and is found in foods like avocados and nuts?
    (A) Saturated fat
    (B) Trans fat
    (C) Monounsaturated fat
    (D) Polyunsaturated fat

64. Which type of cellular transport requires energy in the form of ATP to move molecules against their concentration gradient?
    (A) Passive diffusion
    (B) Facilitated diffusion
    (C) Active transport
    (D) Osmosis.

65. What type of glycosidic bond links two glucose molecules in maltose?
    (A) α-1,4-glycosidic bond
    (B) β-1,4-glycosidic bond
    (C) α-1,6-glycosidic bond
    (D) β-1,6-glycosidic bond.

66. Which level of protein structure is determined by the sequence of amino acids?
    (A) Primary structure
    (B) Secondary structure
    (C) Tertiary structure
    (D) Quaternary structure

67. What term refers to the study of the interactions between foreign substances and biological systems?
    (A) Toxicology
    (B) Pharmacology
    (C) Biochemistry
    (D) Biotechnology

68. Which phase of xenobiotic metabolism involves conjugation reactions to make the compounds more water-soluble?
    (A) Phase I metabolism
    (B) Phase II metabolism
    (C) Phase III metabolism
    (D) Phase IV metabolism

69. How do xenobiotics are eliminated from the body through the kidneys into urine?
    (A) Absorption
    (B) Metabolism
    (C) Excretion
    (D) Distribution

70. What is the purpose of digital PCR (dPCR) in molecular diagnosis?
    (A) To amplify DNA fragments
    (B) To detect specific mutations with high sensitivity
    (C) To separate proteins based on size
    (D) To quantify enzyme activity.

71. Which of these may be a cause of precipitate on a Leishman stained smear?
    (A) Over washing of the slide
    (B) Unclean slide
    (C) Adding too much buffer
    (D) Incorrect pH of the stain

72. Which of the following statements about Leishman stain is correct?
    (A) It requires prefixation of the slides
    (B) It is a true Romanowsky stain
    (C) It contains crystal violet
    (D) It is a supra-vital stain.

73. Which of these cells exhibit the following features with Romanowsky stain; 2 – 3 lobes violet or pinkish granules:
    (A) Neutrophil
    (B) Lymphocyte
    (C) Monocyte
    (D) Basophil

74. A person with blood type AB would have the following antigens on the RBCs:
    (A) A and B
    (B) Neither A nor B
    (C) Only A
    (D) Only B

75. The liquid portion of blood is referred to as
    (A) Whole blood
    (B) Haematocrit
    (C) Plasma
    (D) Serum

76. Which of the following anticoagulants is mostly used for routine haematology?
    (A) EDTA
    (B) Sodium citrate
    (C) Sodium fluoride
    (D) Lithium heparin.

77. A haematocrit of 41% means that in the sample of blood analyzed:
    (A) 41% of the haemoglobin is in the plasma
    (B) 0.4l% of the total blood volume is made up of blood plasma
    (C) 4l% of the total blood volume is made up of red and white blood cells and platelets
    (D) 4l% of the haemoglobin is in red blood cells

78. How many days can blood be stored with CPDA?
    (A) 21 days
    (B) 28 days
    (C) 35 days
    (D) 42 days

79. A smear that is prepared from equal parts of methylene blue and whole blood will be used for:
    (A) WBC count
    (B) Platelet count
    (C) RBC count
    (D) Reticulocyte count

80. MCV is calculated using which of the following parameters?
    (A) Hgb and RBC count
    (B) RBC histogram
    (C) RBC count and Hct
    (D) RBC count and MCHC

81. This cell is the precursor of platelet and is commonly found in the bone marrow:
    (A) Myelocyte
    (B) Metamyelocyte
    (C) Metakaryocyte
    (D) Megakaryocyte

82. A simple check which can be employed to verify that haemoglobin and haematocrit values match would be:
    (A) Hct × 3 = Hb
    (B) Hb ×3 = Hct
    (C) Hct × Hb = 3
    (D) Hb + 3 = Hct

83. In normal human blood
    (A) The eosinophil is the most common type of white blood cell
    (B) There are more lymphocytes than neutrophils
    (C) The iron is mostly in haemoglobin
    (D) There are more white cells than red cells

84. The tourniquet is:
    (A) Applied very tight to the arm
    (B) Used to increase venous fill
    (C) Applied 6 - 8 inches above the elbow
    (D) Tied in a knot to keep it on securely

85. The tourniquet should not be left on the patient for more than
    (A) Two minutes
    (B) One minute
    (C) A takes to find the vein
    (D) Three minutes

86. Which of the following statements about tourniquets is correct?
    (A) A tourniquet is used to stop the blood flood to the venipuncture site
    (B) A tourniquet makes it easier to feel, or palpate the vein when the tourniquet is placed tightly above the site
    (C) A tourniquet is applied three of four inches above the venipuncture site
    (D) The tourniquet should gently pinch the patients skin

87. You need help locating the patient's vein. Which of the following will best provide that assistance?
    (A) Place the patient in a supine position
    (B) Ask the patient to tell you where the best vein is
    (C) Hyperextend the patients' elbow slightly
    (D) Get another phlebotomist to assist you

88. The test that counts immature RBCs is the:
    (A) Osmotic fragility test
    (B) Differential white cell count
    (C) Reticulocyte count
    (D) RBC count

89. When the power of ocular lens is 10× and objective lens is 20×, the magnification is
    (A) 30 times
    (B) 20 times
    (C) 200 times
    (D) 2000 times

90. Which factor may cause a blood smear to be too thin?
    (A) the angle of the spreader is too high
    (B) the edge of the spreader is cracked
    (C) the smear is too slowly
    (D) the angle of the spreader is too low

91. A "TC" pipette is
    (A) allowed to drain freely
    (B) marked with a double ring at the mouthpiece
    (C) used for toxic and corrosive liquids
    (D) rinsed out after delivery

92. All of these tests are performed in the immune-haematology lab except
    (A) Crossmatch
    (B) Group and Rh typing
    (C) Reticulocyte count
    (D) Coombs test

93. A volumetric pipette
    (A) Gives critical measurement
    (B) Is made of class A standards
    (C) Has a bulged out portion in the middle
    (D) All of the above

94. One of these solutions is used as WBC diluting fluid:
    (A) Drabkins solution
    (B) Gentian violet
    (C) Crystal violet
    (D) 3% acetic acid solution tinged with gentian violet

95. The tube used in the microhematocrit method of PCV is?
    (A) Wintrobe tube.
    (B) Westerngren tuber.
    (C) Kahn tube.
    (D) Capillary tube.

96. Dehemoglobinization is related to?
    (A) Thin Smears.
    (B) Wet Smears.
    (C) Thick Smears.
    (D) Impression Smears.

97. Does infective erythropoiesis occur in:
    (A) Myelodysplastic syndrome.
    (B) Megaloblastic anemia.
    (C) Leukaemia.
    (D) Both (i) and (ii)

98. Malarial Parasite can not affect the RBC of:
    (A) Sickle cell disease.
    (B) Aplastic anaemia.
    (C) Megaloblastic anaemia.
    (D) Iron deficiency anaemia.

99. Immunoglobin is found in the body's Secretions?
(A) IgG.
(B) IgM.
(C) IgA
(D) IgD

100. Red cell destruction occurs after::
(A) 2months.
(B) 120 days.
(C) 240 days.
(D) 150 days