ENTRANCE EXAMINATION FOR ADMISSION, MAY 2012.

M.Sc. (MICROBIOLOGY)

COURSE CODE : 308

Register Number : | | | | | | | | | | |

Signature of the Invigilator
(with date)

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 of the question carefully and shade the relevant answer (A) or (B) or (C) or (D) 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. Light microscopy allows meaningful magnification of up to around
(A) 1000× (B) 10000× (C) 15000× (D) 100000×

2. Lysosymes break linkage between ———— in bacterial cell wall.
(A) N-acetyl muramic acid & L-alanine
(B) N-acetyl muramic acid & N-acetyl glucose amine
(C) N-acetyl muramic acid & D-alanine
(D) N-acetyl muramic acid & first aminoacid in glycin chain

3. What is the purpose of Koch's postulates?
(A) To prove that an infection is bacterial, rather than viral
(B) To determine whether a disease is caused by a particular pathogen
(C) To determine whether vaccination is effective against a particular disease
(D) To determine whether a disease can be transmitted from person to person

4. Objects smaller than 0.2 microns cannot be seen with a light microscope. The main reason for this is:
(A) At higher magnification, optical distortion interferes with the image
(B) Higher power objectives cannot be manufactured
(C) Resolution is limited by the wavelength of light
(D) Smaller objects do not adhere to slides

5. Which of the following processes can move molecules against a concentration gradient (i.e., from an area of low concentration to an area of high concentration) ?
(A) Active transport (B) Facilitated diffusion
(C) Simple diffusion (D) (A) and (B)

6. Lactic acid, which gives yogurt and saurkraut their characteristic sour flavor, is a product of:
(A) The Krebs cycle (B) The electron transport chain
(C) Fermentation (D) ATP synthase

7. What is the main function of the light-independent (dark) reactions of photosynthesis?
(A) Production of O_2 (B) Production of ATP
(C) Production of NADPH (D) Production of glucose

8. Which of the following method works primarily by denaturing proteins?
(A) Ultra Filtration (B) Heat
(C) UV radiation (D) None of the above

9. A feature shared by HIV, malaria, and tuberculosis is:
   (A) They primarily infect red blood cells
   (B) They are caused by bacteria
   (C) They are most prevalent in Asia
   (D) Patients can be asymptomatic carriers

10. The purpose of the mordant in the gram-staining procedure is:
   (A) To trap the crystal violet in the gram-positive cell wall
   (B) To remove crystal violet from gram-negative cells
   (C) To remove excess iodine
   (D) To stain gram negative cells pink

11. Nutrient agar is:
   (A) Selective
   (B) Differential
   (C) Both selective and differential
   (D) Neither selective nor differential

12. When growing bacteria on blood agar, you see a clear yellow area around certain colonies. These clear areas are regions of:
   (A) α hemolysis
   (B) β hemolysis
   (C) γ hemolysis
   (D) none of the above

13. Which two types of medium are selective for gram-negative organisms?
   (A) Mannitol Salt Agar and EMB Agar
   (B) MacConkey agar and EMB Agar
   (C) MacConkey agar and Mannitol Salt Agar
   (D) Spirit Blue Agar and EMB Agar

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. Iron is essential in bacterial metabolism. When bacteria invade the human host they must capture iron in order to survive. Which of the macromolecules listed below is important in bacterial iron metabolism?
   (A) Transferrin
   (B) Ferric oxide
   (C) Lipopolysaccharide (LPS)
   (D) Siderophores

16. Direct transfer of a plasmid between two bacteria is defined as

(A) Conjugation
(B) Recombination
(C) Transformation
(D) Transduction

17. An operon is:

(A) A group of genes that are regulated together
(B) A small, circular DNA molecule
(C) An RNA molecule that brings amino acids to the ribosome
(D) A robot used for genetic experiments

18. Quinolone antibiotic with broad Gram-negative and Gram-positive activity is

(A) Piperacillin
(B) Cefoperazone
(C) Ceftriaxone
(D) Ciprofloxacin

19. Which one of the following antibiotics binds sterols and alters membrane permeability?

(A) Penicillin
(B) Amdinocillin
(C) Amphotericin
(D) Chloramphenicol

20. The class of antibiotics known as the quinolones are bactericidal. Their mode of action on growing bacteria is thought to be

(A) Inhibition of DNA gyrase
(B) Inactivation of penicillin-binding protein II
(C) Inhibition of β-lactamase
(D) Prevention of the cross-linking of glycine

21. Mycobacterium cell walls are characterized by

(A) Phospholipid
(B) Ribitol teichoic acid
(C) Glycolipids (waxes)
(D) Ketodeoxyoctonate

22. A bacterial species capable of mixed-acid fermentation would give a positive result in the _____ test.

(A) Methyl red test
(B) Citrate test
(C) Coliform test
(D) Voges-Proskauer test

23. Group A streptococci are characterized by

(A) Repeating polysaccharide capsule of glucose and glucuronic acid
(B) Outer-membrane proteins
(C) γ-Glutamyl polypeptide
(D) Hyaluronic acid

24. Pathogenic mechanisms involved in tuberculosis can be primarily attributed to which of the following?

(A) Toxin production by the mycobacteria

(B) Specific cell adhesion sites

(C) Cell-mediated hypersensitivity

(D) Humoral immunity

25. Recently, there have been sensational media reports of patients infected with invasive, "flesh-eating" bacteria that spread rapidly through the tissues. This necrotizing fasciitis is usually caused by

(A) S. aureus

(B) Group A streptococci

(C) Bacillus cereus

(D) Clostridium tetani

26. Rhizopus is best described by which of the following statements?

(A) Widespread in environment; conidia may be inhaled; microscopic appearance in specimen reveals dichotomous branching and septate hyphae

(B) Round, black sporangia filled with endospores; sporangia unbranched, rising from a runner called a stolon

(C) Single-tipped sporangiophores; no rhizoids or stolons; nonseptate hyphae, which show branching

(D) Yeast forms with budding blastoconidia often showing pseudohyphae; positive germ tube test; chlamydospores present

27. C. albicans is recognized in microscopic examination of infected tissues by the presence of

(A) Spherules containing endospores

(B) Metachromatic granules

(C) Yeasts and pseudohyphae

(D) Asci containing 2–8 ascospores

28. Which of the following best describes the presently available vaccine for Hepatitis B?

(A) Synthetic peptide vaccine

(B) Killed virus vaccine

(C) Live virus vaccine

(D) Recombinant viral vaccine

29. The latest and most effective therapy for AIDS patients includes azidothymidine (AZT), dideoxyinosine (DDI), and saquinavir or similar agents. Use of these three drugs would inhibit which of the following viral processes?

(A) RNase, DNase

(B) gp120 formation

(C) p24 antibody expression

(D) Reverse transcriptase, protease

30. The presence of Negri inclusion bodies in host cells is characteristic of

(A) Mumps
(B) Infectious mononucleosis
(C) Rabies
(D) Aseptic meningitis

31. Mad Cow Disease has been highly publicized in Great Britain. This disease, which is similar to scrapie, is caused by

(A) Prion
(B) Virus
(C) Rickettsiae
(D) Autoimmune reaction

32. E. histolytica infection is best diagnosed by

(A) Sigmoidoscopy and aspiration of mucosal lesions
(B) Baermann technique
(C) Dilution followed by egg count
(D) Enzyme immunoassay (EIA)

33. The diagnostic characteristics of Plasmodium falciparum are best described by which one of the following statements?

(A) A period of 72 h is required for the development of the mature schizont, which resembles a rosette with only 8 to 10 oval merozoites
(B) An important diagnostic feature is the irregular appearance of the edges of the infected red blood cell
(C) The signet-ring–shaped trophozoite is irregular in shape with ameboid extensions of the cytoplasm
(D) Except in infections with very high parasitemia, only ring forms of early trophozoites and the gametocytes are seen in the peripheral blood

34. Trichinella spiralis, a helminth causing trichinosis, transmitted by ingestion of pork, bear, or walrus meat could be detected in

(A) Vaginal secretions
(B) Duodenal contents
(C) Blood
(D) Biopsied muscle

35. Which of the following is a feature of most biofilms?

(A) Presence of a matrix that helps the microbes stick to surfaces
(B) Ability to resist antimicrobials
(C) Presence of more than one type of microbe
(D) All of the above

36. A mycorrhiza is a mutually beneficial association between plant roots and a species of

(A) Bacteria (B) Fungus

(C) Algae (D) None of the above

37. A cooperative interaction in which two or more organisms combine to synthesize a required growth factor or to catabolize a substrate or exchange nutrients is termed

(A) syntrophy (B) myotrophy

(C) dystrophy (D) atrophy

38. Which one of the following species is used in the preparation of Soy sauce?

(A) *A.niger* (B) *A.flavus* (C) *A.fumigatus* (D) *A.oryzae*

39. Biochemical oxygen demand (BOD):

(A) measures of the amount of degradable organic matter in sewage

(B) is a result of bacteria consuming oxygen as they break down organic matter

(C) only one of the above are true

(D) both (A) and (B) are true

40. Upon completion of production of sauerkraut that involves bacteria such as Klebsiella species, Leuconostoc mesenteroides and Lactobacillus brevis, conditions have been created that essentially preserve the sauerkraut (i.e., no additional preservatives need be added). One particularly important end result that contributes significantly to this preservative status is:

(A) permanent anaerobic conditions, even when the package of sauerkraut is open

(B) accumulation of high levels of organic acids

(C) presence of large quantities of ethanol as a result of an Embden-Meyerhoff fermentation pathway

(D) alkaline conditions created by ammonia by-products (similar to those produced by Helicobacter pylori)

41. UV radiation is antimicrobial because

(A) The radiation generates significant amounts of heat within the given cell

(B) The energy present causes breaks in the DNA molecule

(C) The radiation generates magnetic poles which denature the cellular components

(D) All of the above

42. What is the name of the process that creates messenger RNA?

(A) Replication (B) Translation

(C) Transposition (D) Transcription

43. Eastern equine encephalitis virus is associated with a high fatality rate. Control of the disease could be possible by eradication of

(A) Horses (B) Birds (C) Mosquitoes (D) Fleas

44. A person who contracts gonorrhea is most likely to have acquired it via the

(A) Skin (B) Gastrointestinal tract

(C) Genital tract (D) Nasal tract

45. Which of these chemicals or processes can reliably kill endospores?

(A) Formaldehyde (B) Alcohol hand sanitizer

(C) Freezing (D) Pasteurization

46. Cleaning your hands with alcohol hand sanitizer is an example of:

(A) sterilization (B) antisepsis

(C) disinfection (D) none of the above

47. Which category of parasitic helminths has NO hooks or suckers?

(A) Flatworms (B) Roundworms

(C) Tapeworms (D) Flukes

48. M. tuberculosis can be found in the sputum of patients with tuberculosis. After digestion of the sputum, isolation is best accomplished using

(A) Löffler's medium

(B) Thayer-Martin agar

(C) Thiosulfate citrate bile salts sucrose medium

(D) Löwenstein-Jensen medium

49. In Gel electrophoresis technique, DNA separation is based on:

(A) pH (B) color (C) concentration (D) size

50. A positive result in the indole test indicates that bacteria have the ability to:

(A) Produce the neutral product acetoin (B) Utilize citrate as a carbon source

(C) Break down tryptophan (D) Reduce sulfur

51. Which of the following is a feature of most biofilms?

(A) Presence of a matrix that helps the microbes stick to surfaces

(B) Ability to resist antimicrobials

(C) Presence of more than one type of microbe

(D) All of the above

52. Most microorganisms obtain usable nitrogen by:

(A) Using folic acid as a coenzyme

(B) Fixing N_2 gas from the air

(C) Consuming proteins, amino acids, and nucleic acids

(D) Absorbing phosphates from water contaminated by detergents and fertilizer

53. How can bacterial resistance to drugs be acquired?

(A) Conjugation (B) Transduction

(C) Transformation (D) All of the above

54. Which of the following drugs blocks protein synthesis in prokaryotes?

(A) Chloroquine (B) Penicillin (C) Amphotericin B (D) Tetracycline

55. E. coli causes disease by different methods. Which one of the following E. coli types is characterized by the presence of LT (heat-labile) and ST (heat-stable) proteins?

(A) Enteroinvasive (EIEC) (B) Enterotoxigenic (ETEC)

(C) Enterohemorrhagic (EHEC) (D) Enteropathogenic (EPEC)

56. Malaria is a significant worldwide public health problem. Which one of the following control methods for malaria is currently effective?

(A) A vaccine (B) Chemoprophylaxis

(C) Antibiotics (D) White clothing

57. The enzyme responsible for initiating the unwinding of double-stranded DNA (eliminating super coiling) by nicking a single strand of the DNA molecule is:

(A) Topoisomerase (B) Gyrase (C) Ligase (D) Helicase

58. Cell fusion the formation of a single hybrid cell containing the nuclei and cytoplasms from different cells is induced by

(A) Killed Sendai virus (B) Gum acacia

(C) Agar (D) Agarose

59. Host-encoded proteins that provide first line of defense against viral infections are

(A) Interferons (B) Transposons

(C) T cell encoded proteins (D) Tubulins

60. Many animal retroviruses have acquired transforming genes called

(A) Oncogenes (B) Pseudogenes

(C) Methylated genes (D) Nonmethylated genes

61. Antigenic determinants are known as

(A) Paratope (B) Carriers (C) Epitopes (D) Markers

62. Toxic shock syndrome is caused by

(A) Endootoxins of Staphylococcus aureus

(B) Retroviruses

(C) Exotoxins of Staphylococcus aureus

(D) Lentiviruses

63. Chlamydia trachomatis infects

(A) Genital tract (B) Skin

(C) Respiratory tract (D) Lungs

64. The proton-sugar transporter in bacteria is

(A) Uniport (B) Symport (C) Antiport (D) Diport

65. Ti plasmids belongs to a

(A) Natural bacterium (B) Virus

(C) Yeast (D) Lambda phage

66. Zoospore is

(A) flagellated, asexual spore (B) flagellated, sexual spore

(C) spermatogonia (D) a submicroscopic, noncellular spore

67. In light microscope what function does a condenser serve?

(A) Focuses the light rays onto our eyes

(B) Magnifies the light rays after their passage through the sample

(C) Converge the light rays on the sample

(D) Increases light intensity

68. The total magnification of a microscope is calculated by

(A) Addition of the objective lens and ocular lens magnification powers

(B) Multiplication of the objective lens and ocular lens magnification powers

(C) Multiplication of the objective lens and condenser lens magnification powers

(D) Square of objective lens power

69. The order of reagents used in Gram's stain are:

(A) Crystal violet, Iodine, Saffranine and Alcohol

(B) Crystal violet, Saffranine, Alcohol and Iodine

(C) Crystal violet, Iodine, Alcohol and Saffranine

(D) Iodine, Alcohol, Crystal violet and Saffranine

70. In what phase of a typical bacterial growth curve does the cell decay rate exceed the cell multiplication rate?

(A) Lag phase

(B) Stationary phase

(C) Log phase

(D) Decline phase

71. AIDS is caused by a human retrovirus that kills

(A) B lymphocytes

(B) Lymphocyte stem cells

(C) CD4-positive T lymphocytes

(D) CD8-positive T lymphocytes

72. Some bacteria that have complex nutritional requirements and are called

(A) Obligate aerobes

(B) Psychrophiles

(C) Capnophiles

(D) Fastidious

73. Bacteria that lack the enzymes superoxide dismutase and catalase are called as:

(A) Microaerophiles

(B) Capnophiles

(C) Obligate anaerobes

(D) Facultative anaerobes

74. The collapse of a cell due to water loss is called

(A) Plasmolysis

(B) Osmosis

(C) Hypotonicity

(D) Hydrogenesis

75. 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

76. Bacteria that survive very low temperatures (below 0°C)

(A) Thermophiles (B) Psychrophiles

(C) Pedophiles (D) Mesophiles

77. Gram negative bacteria are selectively grown in

(A) Nutrient agar plate (B) Mac Conkey's agar plate

(C) Blood agar plate (D) None of the above

78. The flask used to disprove spontaneous generation by Louis Pasteur was:

(A) Flat flask (B) Round flask

(C) Swan-necked flask (D) All of the above

79. Bacteria that grow in bottom layers of deep water bodies are usually:

(A) Aerobes (B) Facultative aerobes

(C) Obligate anaerobes (D) Capnophiles

80. What type of bacteria are also called blue green algae?

(A) Eubacteria (B) Cyanobacteria

(C) Archeobacteria (D) Purple sulphue bacteria

81. Plasma continuously leaks out of capillaries; still the blood plasma level remains constant due to:

(A) Regular intake of fluids

(B) Plasma returns to capillaries

(C) Lymph vessels return the plasma to blood stream

(D) Reabsorptive capacity of kidneys

82. Transcription is directly involved in which of the following steps in the flow of genetic information?

(A) DNA to RNA (B) RNA to DNA

(C) DNA to DNA (D) RNA to protein

83. Cancer is a disease associated with

(A) RNA (B) Mitochondria (C) DNA (D) Ribosomes

84. BRCA oncogenes are responsible for producing cancer in the following organ

(A) Liver (B) Lungs (C) Breast (D) Bones

85. Minimata disease was caused by

(A) water pollution (B) methyl mercury poisoning

(C) lead sulphate (D) carbon monoxide

86. Normal cell of the living human body can divide up to

(A) 10-20 times (B) 100-150 times

(C) 20-50 times (D) No limit

87. Unlike animals, fungi

(A) Digest their food before ingesting it

(B) Ingest their nutrients before digesting them

(C) Photosynthesize their food before digesting it

(D) None of the above

88. Mycorrhizae

(A) Aid in the transfer of minerals from the soil to a plant

(B) Aid in the transfer of minerals to fungi

(C) Are found only on aquatic fungi

(D) Cause a variety of plant diseases

89. Blue green algae are

(A) Eukaryotes (B) Prokaryotes

(C) Plants (D) None of the above

90. Unicellular fungi that resemble bacteria are called

(A) Ascocarp (B) Lichen (C) Mold (D) Yeast

91. Hyphae that do NOT have septa are called

(A) Coenocytic (B) Dimorphism (C) Mycelium (D) Sporangium

92. All fungi are

(A) Eukaryotic and nonphotosynthetic (B) Multicellular and prokaryotic

(C) Prokaryotic and photosynthetic (D) Unicellular and photosynthetic

93. The cell walls of fungi are made of

(A) Cellulose (B) Chitin (C) Mycelia (D) Silica

94. The individual filaments that make up the body of a fungus are called

(A) Rhizoids (B) Stems

(C) Hyphae (D) Vascular tissue

95. An industrial important use of fungi is in

(A) The making of cheese (B) The manufacture of soft drinks

(C) The production of antibiotics (D) All of the above

96. The normal human chromosome diploid number is:

(A) 23 (B) 24 (C) 46 (D) 48

97. Introns are:

(A) coding regions of DNA (B) non-coding regions of DNA

(C) type of proteins (D) type of tRNA

98. Which of the following contains polysaccharide?

(A) Gram negative cell wall (B) Pili

(C) Flagella (D) Plasmids

99. A pair of genes representing two alternatives of the same character and located at the same position in the homologous chromosomes are called

(A) genomorphs (B) allele

(C) homologous genes (D) homozygous genes

100. Ephemeral plants are those which

(A) live for a brief period in deserts (B) live for a long period in deserts

(C) possess a long tap root system (D) possess succulent leaves