Ph.D. ENTRANCE EXAMINATION, APRIL 2021

MICROBIOLOGY

Time : Two Hours

Maximum : 100 Marks

Section A

Answer **all** *the questions.*

1. The part of microscope which controls the intensity of the light source is —————.

    a) Condenser.

    b) Diaphram.

    c) Nose piece.

    d) Light source

2. The ability of a lens to distinguish between small objects that are close together is known as —————.

    a) Refractive index.

    b) Resolving power.

    c) Magnification.

    d) Numerical aperture.

3. Which of the following microscope is best in determining the motility of bacteria ?

    a) Bright field microscope.

    b) Dark field microscope.

    c) Fluorescent microscope.

    d) Phase contrast microscope.

4. Gram staining was discovered by Hans Christian Gram in the year —————.

    a) 1880.

    b) 1882.

    c) 1884.

    d) 1886.

5. Which of the following acts as the fungicide in fungal staining using LPCB ?

    a) Glycerine.

    b) Lactic acid.

    c) Phenol.

    d) Cotton blue.

6. The major amino acids present in the peptide unit of peptidoglycan in Klebsiella pneumoniae ?

    a) L-alanine, D-glutamine, L-lysine, D-alanine.

    b) L-alanine, D-glutamic acid, mesodiaminopimelic acid, D-alanine.

    c) L-alanine, D-glutamine, mesodiaminopimelic acid, D-alanine.

    d) L-alanine, mesodiaminopimelic acid, L-lysine, D-alanine.

Turn over

7. Which of the following component is directly attached to the peptidoglycan content of *Bacillus subtililis* ?

    a) Lipo-polysaccharide.   b) O-Antigen.

    c) Teichoic acid.   d) All of these.

8. The cell wall component of bacterial cell named N- Acetyl muramate is an example of ——————.

    a) Amino sugar.   b) Deoxy sugar.

    c) Acid sugar.   d) Basic sugar.

9. The cell wall of *Aspergillus niger* is mainly composed of ——————.

    a) Starch.   b) Chitin.

    c) Pectin.   d) Xylan.

10. Michaelis constant (Km) is :

    a) The ideal substrate concentration required to achieve maximal velocity of an enzymatic reaction.

    b) The ideal substrate concentration required to achieve half maximal velocity of an enzymatic reaction.

    c) The half substrate concentration required to achieve maximal velocity of an enzymatic reaction.

    d) The half substrate concentration required to achieve half maximal velocity of an enzymatic reaction.

11. Lock and key model of enzyme activity was proposed by :

    a) Linus Pauling.   b) Linor Michalis.

    c) Daniel Koshland.   d) Emil Fischer.

12. Number of subunits present in the heavy chain of immunoglobulin G is

    a) 3.   b) 4.

    c) 5.   d) 6.

13. Which of the following immunoglobulin binds to allergens and triggers histamine and involved in allergy ?

    a) IgG.   b) IgE.

    c) IgA.   d) IgM.

14. The major location of spores in *Clostridium tetani* :

    a) Terminal.
    b) Subterminal.

    c) Both of the above.
    d) Equatorial.

15. Which of the following agent is used to kill the spores of *Clostridium tetani* ?

    a) Hydrogen peroxide.
    b) Phenol.

    c) Halogen.
    d) Mercuric chloride.

16. Which of the following is a selective agent in PLET medium for the cultivation of *Bacllius antharcis* ?

    a) Polymyxin.
    b) Lysozyme.

    c) EDTA.
    d) All of these.

17. The double zone of inhibition of *Clostridium perfringens* in blood agar is due to :

    a) Complete hemolysis by beta toxin and incomplete hemolysis by alpha toxin.

    b) Complete hemolysis by alpha toxin and incomplete hemolysis by beta toxin.

    c) Complete hemolysis by theta toxin and incomplete hemolysis by alpha toxin.

    d) Complete hemolysis by alpha toxin and incomplete hemolysis by theta toxin.

18. A toxoid has ——————.

    a) Both toxic and antigenic properties.

    b) No toxic or antigenic properties.

    c) No toxic properties but have antigenic properties.

    d) Toxic properties but no antigenic properties.

19. The major end products of biocorrosion by anaerobic bacteria :

    a) Metal oxide.
    b) Metal hydroxide.

    c) Metal sufide.
    d) Metal sulfite.

20. Which of the following bacteria commonly carried out iron oxide reduction during biocorrosion ?

    a) Thiobacillus spp.
    b) Beggiatoa spp.

    c) Shewanella spp.
    d) Desulfobibrio spp.

21. Which of the following bacteria involved in the oxidation of ferrous ion in sulphur leaching ?

    a) Acidithiobacillus thiooxidans.
    b) Acidithiobacillus ferrooxidans.

    c) Both of these.
    d) Leptospirillum ferrooxidans.

22. The bioleaching process is happened in natural occurrence where aqueous solution of micro-organisms is pumped through drilled passages within the ore is known as :

   a) Slope leaching.
   b) *In-situ* leaching.
   c) Heap leaching.
   d) Dump leaching.

23. Which of the following consortia of bacteria found to be very effective against the degradation of alkyl benzyl sulphonate ?

   a) Pseudomonas and Streptomyces.
   b) Pseudomonas and Bacillus.
   c) Pseudomonas and Klebsiella.
   d) Pseudomonas and Aspergillus.

24. 'POPs are very dangerous due to the ecosystem.' Which of the following sentence is scientifically suitable to make this claim ?

   a) They have the potential for long-range transport and accumulation in the ecosystem.
   b) They can cause minor damages to human health and environment.
   c) They are not able to degrade by conventional degradation approaches, thus requires attention.
   d) These compounds are obtained from various anthropogenic activities.

25. Which of the following agency declared PCB as human carcinogen ?

   a) WHO.
   b) USDA.
   c) EPA.
   d) CDC.

(25 × 2 = 50 marks)

Section B

Write essay on any **five** *of the following.*

26. Illustrate the major biochemical mechanisms involved in glyoxylate pathway.

27. Investigate the major steps involved in the industrial production of Penicillin G.

28. What do you mean by food additives? Elaborate in detail the ideal characteristics required for chemical preservatives with examples.

29. What do you mean by SCP? Examine the nutritional aspects and major types of SCPs with suitable example.

30. Investigate the methods and devices for the microbiological quality of air.

31. Illustrate the major steps and mechanism involved in electron transport chain.

32. What do you mean by enzyme immobilization ? Elaborate in detail various approaches used for the immobilization of enzymes.

(5 × 10 = 50 marks)