

Ph.D. Entrance Test – 2015
Subject: Microbial Biotechnology
Paper – I

Important: Please consult your Admit Card/Roll No. slip before filling your Roll Number on the Test Booklet and Answer Sheet.

Roll No. *In Figure* *In Words*

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O.M.R. Answer Sheet Serial No.

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Signature of Candidate: _____

Signature of Invigilator: _____

Time: 60 Minutes Number of Questions: 50 Maximum Marks: 50

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO.

INSTRUCTIONS:

1. Write your Roll No. on the Questions Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Question Booklet Serial No. on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point/Black Gel Pen**.
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. Please check that this Question Booklet contains **50** Questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of Test.
5. Each question has four alternative answer (A,B,C,D) of which only one is correct. For each question, darken only one bubble (A or B or C or D), whichever you think is the correct answer, on the Answer Sheet with **Black Ball Point/Black Gel Pen**. **There shall be no negative marking for wrong answers.**
6. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Booklet. No marks will be deducted in such cases.
7. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the question given in the Question Booklet.
8. If you want to change an already marked answer, erase the shade in the darkened bubble completely.
9. For rough work only the blank sheet at the end of the Question Booklet be used.
10. The Answer Sheet is designed for computer evaluation. Therefore, if you do not follow the instructions given on the Answer Sheet, it may make evaluation by the computer difficult. **Any resultant loss to the candidate on the above account, i.e. not following the instructions completely, shall be of the candidate only.**
11. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
12. In no case the Answer Sheet, the Question Booklet, or its part or any material copied/noted from this Booklet is to be taken out of the examination hall. Any candidate found doing so would be expelled from the examination.
13. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistant or found giving or receiving assistance or found using any other unfair means during the examination will be expelled from the examination by the Centre Superintendent/Observer whose decision shall be final.
14. **Communication equipment such as mobile phones, pager, wireless set, scanner, camera or any electronic/digital gadget etc., is not permitted inside the examination hall. Use of calculators is not allowed.**
15. The candidates will not be allowed to leave the Examination Hall/Room before the expiry of the allotted time.

- The organism that causes gonorrhoea is described as a
 - Small Gram-negative diplococcus
 - Gram-positive rod that has a capsule
 - Gram-positive rod that forms spores
 - Gram-positive rod that is anaerobic
- DiGeorge's syndrome is one in which
 - The B cells fails to form
 - The stem cells fail to form
 - The T cells fail to form
 - Agammaglobulinemia occurs
- Electron acceptor in anaerobic conditions in prokaryotes is
 - Glucose, fructose, maltose
 - Fatty acids
 - SO_4^{2-} , NO_3^- , CO_2
 - Antioxidants such as vitamin K
- Taxol, an anti-cancerous drug effects by
 - Inhibiting polymerization of tubulin
 - Inhibiting depolymerization of tubulin
 - Polymerization of actin
 - Favoring depolymerization of tubulin
- When a cell stops growing, say due to a shortage of nutrients this will occur in which phase of the cell cycle?
 - G_1
 - S
 - G_2
 - M
- The inner membrane of the mitochondria is very selective about what it normally allows to enter the organelle. One molecule it regularly allows in is
 - Citric acid
 - ATP
 - Pyruvic acid
 - Glucose
- The wavelengths of visible light are shorter than the wavelengths of
 - Infrared
 - Ultraviolet
 - X-rays
 - Gamma rays
- Which of the following statements is not true? In archaebacteria
 - Cell wall is not made up of peptidoglycan
 - Cell membranes have branched chain hydrocarbons
 - Cell walls have both D- and L-form of amino acids
 - First amino acid to initiate polypeptide chain is methionine
- Heterocysts of cyanobacteria
 - Are specialized for oxygenic photosynthesis
 - Form spores
 - Are specialized for gamete formation
 - Are specialized for N_2 fixation

10. A virus with RNA-dependent RNA polymerase
- A) Synthesizes DNA from a RNA template
 - B) Synthesizes dsRNA from a RNA template
 - C) Synthesizes dsRNA from a DNA template
 - D) Transcribes mRNA from DNA
11. Statute of Anne got the Royal assent in
- A) April, 1710
 - B) October, 1720
 - C) December, 1710
 - D) December, 1714
12. In *Drosophila* sex is determined by
- A) X and Y chromosomes
 - B) Ratio of pairs of X- chromosomes to the pairs of autosomes
 - C) Ratio of number of X- chromosomes to the sets of autosomes
 - D) Whether the egg is fertilized or develops parthenogenetically
13. Pseudopeptidoglycan is present in the cell wall of
- A) *Escherichia coli*
 - B) *Bacillus subtilis*
 - C) *Saccharomyces cerevisiae*
 - D) *Methanococcus jannaschii*
14. If a mouse is repeatedly immunized with a complex protein such as bovine serum albumin (BSA), the resulting serum antibodies will be
- A) Identical isotype and identical antigen binding sites
 - B) Various isotype but identical antigen binding sites
 - C) Identical isotype but various antigen binding sites
 - D) Various isotype but various antigen binding sites
15. Which of the following events can induce a transient arrest in the translation of a secretory protein?
- A) Binding of a polysome to an ER receptor
 - B) Binding of SRP to an N-terminal signal sequence
 - C) Binding of snRNPs to the large ribosomal subunit
 - D) Presence of a stop-transfer sequence in the polypeptide
16. FOS, JUN and MYC are
- A) Genes coding for surface proteins expressed on cancerous cells
 - B) Genes coding for protein kinases that phosphorylate transcription factors regulating cancer genes
 - C) Genes coding for transcription factors that induce growth-dependent genes
 - D) Genes coding for membrane receptors
17. Cholera toxin exerts its harmful effect in gut cells by
- A) Inhibiting the receptor part of the CFTR protein
 - B) Inducing the onset of apoptosis
 - C) Stimulating the production of cyclic AMP
 - D) Blocking the chloride channel in the cell membrane

18. The mode of action of steroid hormones involves
- Binding to a cell membrane receptor
 - Activation of protein kinases
 - Covalent modification of enzyme activity
 - Modifying gene transcription
19. Peptides derived from exogenous antigens are presented by
- MHC-I molecules on the antigen presenting cell surface
 - Both MHC-I and MHC-II molecules on the antigen presenting cell surface
 - MHC-II molecules on the antigen presenting cell surface
 - CD-I molecules present on the antigen presenting cell surface
20. Which of the following are caused by defect in the mitochondrial DNA?
- Leigh disease
 - Myotonic dystrophy
 - Kearn-Sayers syndrome
 - Leber hereditary optic neuropathy
- (i) and (ii)
 - (ii) and (iii)
 - (i) and (iii)
 - (i), (iii) and (iv)
21. Idiotypic determinants are located within
- Constant regions of heavy chains
 - Constant regions of light chains
 - Hypervariable regions of heavy and light chains
 - The Hing C region
22. The sum total of an organism's interaction with the biotic and abiotic resources of its environment is called its
- Habitat
 - Logistic growth
 - Biotic potential
 - Ecological niche
23. Which of the following is not directly associated with regulation of eukaryotic gene regulation?
- Acetylation of histones
 - Methylation of DNA
 - Alternative splicing
 - Activation of caspases
24. *Shigella* enters into the host cell by the process of
- Cell-cell fusion
 - Clatherin coated pits
 - By exploiting host cell organelles
 - Phagocytosis
25. Which of the following modes of action would not be fungicidal?
- Inhibition of peptidoglycan synthesis
 - Inhibition of mitosis
 - Injury to plasma membrane
 - Inhibition of nucleic acid synthesis
26. In non-competitive inhibition, allosteric inhibitor
- Attaches to the active site, preventing the substrate from attaching there
 - Attaches to the substrate, preventing it from attaching to the active site
 - Changes the pH of the environment, thus preventing enzyme-substrate complex formation
 - Attaches to the enzyme at a site away from the active site, altering the shape of the enzyme

27. Vitamin lipoic acid is responsible for
- Carboxylation
 - Molecular rearrangement
 - Transfer of acyl group
 - Aldehyde group transfer
28. The purity of a solute collected between two times t_1 and t_2 during chromatographic separation can be calculated as
- Amount of solute eluted - amount of impurity eluted
 - Amount of solute eluted/amount of impurity eluted
 - Amount of solvent eluted + amount of impurity eluted
 - Amount of solvent eluted/amount of impurity eluted
29. The cellular productivity in a continuous stirred tank fermenter increases with an increase in dilution rate and reaches a maximum value. If the dilution rate is increased beyond the maximum point, the productivity will
- Decrease abruptly
 - Increase
 - Increase drastically
 - Be zero
30. Which of the following is considered as a disadvantage of the adsorption method?
- It is possible to separate and purify the enzymes while being immobilized
 - The enzymes are not usually deactivated by adsorption
 - The adsorption is a reversible process
 - State of immobilization is very sensitive to solution pH, ionic strength and temperature.
31. Selectivity can be expressed as
- Ratio of the distribution coefficients in different solute
 - Mass fraction of the solute in the extract phase at equilibrium
 - Mass fraction of the solute in the raffinate phase
 - Ratio of the mass fraction of the solute in the extract phase to the raffinate
32. BLOSUM matrices are used for
- Multiple sequence alignment
 - Pair wise sequence alignment
 - Phylogenetic analysis
 - Multiple sequence disalignment
33. In an airlift bioreactor, the spent gases released from the liquid are called
- Downcomer
 - Disengagement zone
 - Air riser
 - Flotsam
34. A tautomeric shift causing the substitution of one purine for another is called
- Transversion
 - Translocation
 - Transition
 - Inversion
35. Which of the following prosthetic group is required by pyruvate carboxylase, an enzyme involved in gluconeogenic pathway
- Pyridoxal phosphate
 - Biotin
 - Tetrahydrofolate
 - TPP

36. The C in TORCH group of diseases refer to
- A) Cytopathic viruses
B) Cytomegalo viruses
C) Complementary viruses
D) Concentrated viruses
37. The enzyme specific to glyoxylate cycle is
- A) Isocitrate lyase
B) Succinate dehydrogenase
C) Isocitrate dehydrogenase
D) Aconitase
38. Bioassay for gibberellins is
- A) *Avena* coleoptile test
B) α -amylase induction in cereal endosperms
C) Callus formation in tobacco from pith tissue
D) Formation of abscission layer in cotton
39. Which RNA virus carries oncogenes?
- A) Hepatitis B virus
B) Epstein-Barr virus
C) Human papilloma virus
D) Rous sarcoma virus
40. In aerobic yeast fermentation for production of citric acid from alkanes using a fed-batch culture, alkanes are slowly fed to the yeast because
- A) Citric acid is toxic to the cells
B) Alkanes cause foaming
C) Fast addition of alkanes will inhibit the cells and reduce oxygen transfer rates
D) Fast addition of alkanes will cause the cells to grow too quickly
41. Doha declaration was adopted in
- A) May, 2000
B) June, 2004
C) November, 2001
D) January, 2004
42. Nobel Prize for the development of super-resolved fluorescence microscopy was awarded to
- A) Eric Betzig, William Moerner and Stefan Hell
B) Gerd Binnig and Heinrich Rohrer
C) Albert Crewe and Manfred von Ardenne
D) Max Knoll and Ernst Ruska
43. ExpASY is a bioinformatics resource portal operated by
- A) European Molecular Biology Laboratory
B) DNA databank of Japan
C) National Centre for Biotechnology Laboratory
D) Swiss Institute of Bioinformatics
44. Elie Metchnikoff discovered
- A) Phagocytes
B) Red blood cells
C) Plasma
D) Serum
45. An elderly, alcoholic male develops severe, necrotizing lobar pneumonia. The organism is *Lac*⁻ and produces a luxuriant capsule. The most likely agent is
- A) *Serratia* species
B) *Klebsiella pneumoniae*
C) *Yersinia pseudotuberculosis*
D) *Pseudomonas aeruginosa*

46. Two dimensional electrophoresis is a combination of
- A) Ion-exchange chromatography and SDS-PAGE
 - B) Isoelectric focussing and SDS-PAGE
 - C) Isoelectric focussing and affinity chromatography
 - D) Affinity chromatography and SDS-PAGE
47. The mirror image of right handed α -helix with all L-amino acids will appear as
- A) Left handed α -helix with L-amino acids
 - B) Left handed α -helix with D-amino acids
 - C) Right handed α -helix with L-amino acids
 - D) Right handed α -helix with D-amino acids
48. Function of enhancer during transcription of an eukaryotic gene is to
- A) Initiate transcription
 - B) Enhance mRNA
 - C) Elongate transcription
 - D) Stimulate the rate of transcription
49. Barbara McClintock described "jumping genes" in maize. Such mobile segments of DNA, now called transposons, can insert themselves into
- A) Only DNA molecules where there are complementary base pairs with unfilled active sites
 - B) Start and stop signals, only
 - C) Virtually any part of any DNA molecule
 - D) Plasmid molecules only
50. Methods for the Study of Pathogenic Organisms was published by
- A) Paul Ehrlich
 - B) C. L. Alphonse Laveran
 - C) Robert Koch
 - D) Joseph Lister

X-X-X