THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA, VADODARA

Ph. D. ENTRANCE TEST (PET) 2023

Signature of Invigilator

Roll. No. | | | | | | |

Paper - II
Life Sciences

Maximum Marks: 50 **No. Of Printed Pages: 8**

Instruction for the Candidate:

1. This paper consists of **FIFTY (50)** multiple choice type questions. Each Question carries **ONE (1)** mark.
2. There is no Negative Marking for Wrong Answer.
3. A separate OMR Answer Sheet has been provided to answer questions. Your answers will be evaluated based on your response in the OMR Sheet only. No credit will be given for any answering made in question booklet.
4. Defective question booklet or OMR if noticed may immediately replace by the concerned invigilator.
5. Write roll number, subject code, booklet type, category and other information correctly in the OMR Sheet else your OMR Sheet will not be evaluated by machine.
6. Select most appropriate answer to the question and darken appropriate oval on the OMR answer sheet, with black / blue ball pen only. DO NOT USE PENCIL for darkening. In case of over writing on any answer, the same will be treated as invalid. Each question has exactly one correct answer and has four alternative responses (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item.
   Example: Ⓐ ● Ⓒ Ⓓ where (B) is correct response.
7. Rough Work is to be done in the end of this booklet.
8. If you write your Name, Roll Number, Phone Number or put any mark on any part of the OMR Answer Sheet, except for the space allotted for the relevant entries, which may disclose your identity, or use abusive language or employ any other unfair means, such as change of response by scratching or using white fluid, you will render yourself liable to disqualification.
9. Calculators, Log tables any other calculating devices, mobiles, slide rule, text manuals etc are NOT allowed in the examination hall. If any of above is seized from the candidates during examination time; he/ she will be immediately debarred from the examination and corresponding disciplinary action will be initiated by the Center Supervisor as deemed fit.
10. DO NOT FOLD or TEAR OMR Answer sheet as machine will not be able to recognize torn or folded OMR Answer sheet.
11. **You have to return the OMR Answer Sheet to the invigilator at the end of the examination compulsorily** and must not carry it with you outside the Examination Hall. You are however, allowed to carry original question booklet on conclusion of examination.

Paper - II
Life Sciences

Note: This paper contains **FIFTY (50)** multiple-choice questions. Each Question carries **ONE (1)** mark.

01) On a plant low red/far red ratio of shade light is falling. This reduces the activity of phytochrome b allowing Phytochrome Interacting Factors (PIFs) to trigger transcription factors of genes of one of these hormones to avoid shade response
A) GA
B) BA
C) IAA
D) ABA

02) Which one among the following is a marker enzyme of glyoxylate pathway?
A) Citrate synthase
B) Aconitase
C) Malate dehydrogenase
D) Malate synthase

03) Dark diversity refers to _____.
A) Species that belong to a particular species pool but are not locally present
B) Species that are absent from the aquatic environment for some time
C) Species that are not present in human managed plantations
D) Species that are present in tropics and not seen in the temperate environment

04) The seeds of sunflower, leaves of cacti and other succulents show their arrangement as
A) Gaussian distribution
B) Fibonacci series
C) Fisher series
D) Darwin pattern

05) Jeffrey's theory on stelar evolution of Pteridophytes is further extended by suggesting that the eustele of seed plants is derived by the lengthening and overlapping of leaf gaps in a siphonostele. A new concept proposed by Namboodri & Beck for the stele development of seed plants suggests that:
A) Stele development in all the Tracheophyta is the same
B) Gymnosperms and Angiosperms show the different pattern of stele development
C) Parenchymatous areas may arise having no association with leaf gaps
D) Secondary thickening could impact stele development

06) Group of land plants having high species diversity, second only to Angiosperms is:
A) Gymnosperms
B) Pteridophytes
C) Monocots
D) Bryophytes

07) Commonality amongst Brassicales, Vitales, Malphigiales and Rosales is that:
A) They represent early divergent eudicots
B) All belong to Superrosids
C) All belong to Superasterids
D) All belong to Monocots

08) Hemicelluloses are an important constituents of cell wall and are made up of
A) Cellulose
B) Hexoses
C) Hexoses and Pentoses
D) D-glucose

09) In a 24h cycle, the size of starch grain in a chloroplast remains/becomes
A) The same
B) Large by noon
C) Small by evening
D) Large by evening

10) Nutrients obtained by plants after the process of weathering are:
A) Phosphate and sulfate
B) Nitrate and phosphate
C) Sulfate and Nitrite
D) Nitrite, phosphate and nitrate

11) Budding, conidia formation and fragmentation are different methods of asexual reproduction in:
A) Basidiomycota
B) Ascomycota and Basidiomycota
C) Glomeromycota and Basidiomycota
D) Chytrids and ascomycota

12) Decarboxylation of _____ amino acid forms a vasodilator in humans.
A) Arginine
B) Glutamic acid
C) Aspartic acid
D) Histidine

13) Which of the following is a characteristic feature of obligate anaerobic bacteria?
A) They require oxygen for growth
B) They cannot tolerate oxygen
C) They can switch between aerobic and anaerobic metabolism
D) They can survive in both aerobic and anaerobic conditions

14) What is the process by which bacteria can sense and respond to changes in their environment?
A) Quorum sensing
B) Chemotaxis
C) Signal transduction
D) Gene regulation

15) Which of the following is an example of a bacterial disease transmitted through contaminated food and water?
A) Leishmaniasis
B) Malaria
C) Cholera
D) Influenza

16) What is the role of superantigens in bacterial infections?
A) They inhibit host immune responses
B) They promote bacterial replication
C) They trigger excessive immune activation
D) They facilitate bacterial attachment to host cells

17) Which of the following is a mechanism used by bacteria to acquire iron from the host?
A) Secretion of iron-binding proteins
B) Production of siderophores
C) Induction of host iron uptake
D) Disruption of host iron metabolism

18) Which of the following is a characteristic feature of biofilms formed by bacteria?
A) Increased susceptibility to antibiotics
B) Enhanced genetic diversity
C) Protection from immune responses
D) Reduced metabolic activity

19) What is the process by which bacteria form dormant structures to survive in unfavourable conditions?
A) Endocytosis
B) Lysis
C) Sporulation
D) Conjugation

20) Which of the following is a type of bacterial motility involving the movement towards or away from light?
A) Phototaxis
B) Chemotaxis
C) Aerotaxis
D) Magnetotaxis

21) Which of the following is an antifungal drug that disrupts fungal cell membrane integrity?
A) Penicillin
B) Vancomycin
C) Amphotericin B
D) Ciprofloxacin

22) Which of the following is a mechanism used by viruses to evade the host immune response?
A) Antigenic shift
B) Antigenic drift
C) Latency
D) Quorum sensing

23) Which of the following is a mechanism used by pathogens to evade the host immune response?
A) Antigenic shift
B) Antigenic drift
C) Molecular mimicry
D) Quorum sensing

24) Which of the following is a mechanism used by viruses to establish latency in host cells?
A) Lysogeny
B) Transformation
C) Lytic
D) Transduction

25) Which of the following describes a microorganism that requires oxygen for growth but can also grow in its absence?
A) Obligate aerobe
B) Facultative anaerobe
C) Microaerophile
D) Aerotolerant anaerobe

26) Organism or species that share derived character states from a subset within the study group called _____.
A) Traits
B) Clades
C) Branch
D) Origin

27) Which of the following is mitochondrial derivative found associated with the kinetosome of protozoan flagella or cilia?
A) Kinetoplast
B) Tubules
C) Adhesion protein
D) Kinetochore

28) Which of the following phylum have radial symmetry in adult and bilateral symmetry at the larval stage?
A) Mollusca
B) Echinodermata
C) Annelida
D) Cnidaria

29) Which of the following ecological pyramid is always upright?
A) Pyramid of Number
B) Pyramid of Biomass
C) Pyramid of Energy
D) Pyramid of Mass

30) Late successional plants:
A) Are shade intolerant.
B) Requires soil rich in all nutrients.
C) Are called climax species.
D) Grow rapidly.

31) Which of the following describes orthologous genes?
A) Genes that do not share common ancestral origin
B) Homologous genes that are present in the genomes of different organisms.
C) Homologous genes that are present in the same genomes.
D) Non – Homologous genes that arose from convergent evolution.

32) Based on Hardy Weinberg equilibrium, the genotype frequency of heterozygotes, if the frequency of two alleles at the gene being studied are 0.6 and 0.4, will be
A) 0.8
B) 0.64
C) 0.48
D) 0.32

33) The only bone marrow cell that never appears in peripheral blood is _____
A) Myeloblast
B) Myelocyte
C) Lymphoblast
D) Megaloblast

34) Thyroxin releasing hormone (TRH) receptor belongs to _____
A) Nuclear receptor family
B) Receptor tyrosine kinase family
C) G-protein coupled receptor
D) Guanylate cyclase receptor family

35) Which of the following functions is not served by the plasma proteins?
A) Blood clotting
B) O_2 transport
C) Hormone binding and transport
D) Buffering capacity of blood

36) Production of excessive amounts of corticotropin (ACTH) occurs in which of the following?
A) Graves' disease
B) Cushing syndrome
C) Greig's syndrome
D) Alport's syndrome

37) The type-1 glomus cells present in the carotid bodies contain granules which release some substances during hypoxia. Which one of the following is released in hypoxia?
A) Serotonin
B) GABA
C) Dopamine
D) IL-8

38) What is a Bimodal distribution?
A) A distribution which has mean and median.
B) A distribution which has two modes.
C) A distribution which has mean and median coincident.
D) A distribution which has no mean and median.

39) If a protein has five cysteines and forms two disulphides, how many different arrangements are possible?
A) Fifteen
B) One hundred and twenty
C) Eight
D) One

40) Which of the following DNA replication enzymes are lesion bypass enzymes?
A) DNA Polymerase I and DNA Polymerase II
B) DNA Polymerase I and DNA Polymerase III
C) DNA Polymerase I and DNA Polymerase IV
D) DNA Polymerase IV and DNA Polymerase V

41) In eukaryotic cells tRNA is transcribed by which RNA polymerase?
A) RNA Polymerase I
B) RNA Polymerase II
C) RNA Polymerase III
D) RNA Polymerase II and III

42) The reagent/s commonly used for precipitating DNA, while purifying protein is/are:
A) Isopropanol and KCl
B) Ethanol and NaCl
C) Polyethylene imine
D) Ammonium sulphate

43) Which compounds can be detected by Electron capture detector in gas chromatography (GC)?
A) Organic compounds
B) Halogenated compounds
C) Nitrogen containing compounds
D) Phosphorus containing compounds

44) Electrophoretic mobility shift assay is used to know _____
A) Size of DNA
B) Supercoiling status in DNA
C) Size of a protein
D) if there is DNA- protein interaction

45) An aliquot of ^{32}P-ATP of 1 μCi was added to 1 L of water and if 1 mL of solution was taken out, it contains how many dpm?
A) 3.7 d.p.m.
B) 37 d.p.m.
C) 222 d.p.m
D) 2220 d.p.m

46) Which technique is useful in detecting the heavy metal content in chocolate?
A) Atomic absorption spectroscopy
B) ESR spectroscopy
C) MALDI-TOF
D) NMR spectroscopy

47) Molar extinction coefficient ε of tryptophan at 280 nm is 5600 M^{-1} cm^{-1}, then the absorbance that is obtained with a 100 μM solution of tryptophan is:
A) 0.280
B) 0.560
C) 0.028
D) 2.800

48) Synthesis of prostaglandins is inhibited by:
A) Cyanide
B) Fluoride
C) Arsenate
D) Acetylsalicylic acid

49) Which is the most abundant protein in human body?
A) Type I Collagen
B) Type II Collagen
C) Elastin
D) α-Keratin

50) Where is the enzyme monoamine oxidase located in mitochondria?
A) outer membrane
B) intermembrane space
C) inner membrane
D) matrix

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Rough Work: