OPSC
PGT

Previous Year Paper

(Biology)

30 Apr, 2023

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO

T. B. C. : PGT – 4/21

Test Booklet Series

A

TEST BOOKLET

PAPER – II

BIOLOGY

Sl. No. 40585

Time Allowed : 2 Hours

Maximum Marks : 100

: INSTRUCTIONS TO CANDIDATES :

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET **DOES NOT** HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET OF THE SAME SERIES ISSUED TO YOU.
2. ENCODE CLEARLY THE TEST BOOKLET SERIES **A, B, C** OR **D**, AS THE CASE MAY BE, IN THE APPROPRIATE PLACE IN THE ANSWER SHEET USING BALL POINT PEN (BLUE OR BLACK).
3. You have to enter your **Roll No.** on the Test Booklet in the Box provided alongside. **DO NOT** write *anything else* on the Test Booklet.
4. **YOU ARE REQUIRED TO FILL UP & DARKEN ROLL NO., TEST BOOKLET / QUESTION BOOKLET SERIES IN THE ANSWER SHEET AS WELL AS FILL UP TEST BOOKLET / QUESTION BOOKLET SERIES AND SERIAL NO. AND ANSWER SHEET SERIAL NO. IN THE ATTENDANCE SHEET CAREFULLY. WRONGLY FILLED UP ANSWER SHEETS ARE LIABLE FOR REJECTION AT THE RISK OF THE CANDIDATE.**
5. This Test Booklet contains **100** items (questions). Each item (question) comprises four responses (answers). You have to select the correct response (answer) which you want to mark (darken) on the Answer Sheet. In case, you feel that there is more than one correct response (answer), you should mark (darken) the response (answer) which you consider the best. In any case, choose **ONLY ONE** response (answer) for each item (question).
6. You have to mark (darken) all your responses (answers) **ONLY** on the **separate Answer Sheet** provided, by using **BALL POINT PEN (BLUE OR BLACK)**. See instructions in the Answer Sheet.
7. All items (questions) carry equal marks. All items (questions) are compulsory. Your total marks will depend only on the number of correct responses (answers) marked by you in the Answer Sheet. **There will be no negative markings for wrong answers.**
8. Before you proceed to mark (darken) in the Answer Sheet the responses (answers) to various items (questions) in the Test Booklet, you have to fill in some particulars in the Answer Sheet as per the instructions sent to you with your **Admission Certificate**.
9. After you have completed filling in all your responses (answers) on the Answer Sheet and after conclusion of the examination, you should hand over to the Invigilator the *Answer Sheet* issued to you. You are allowed to take with you the candidate's copy / second page of the Answer Sheet along with the **Test Booklet**, after completion of the examination, for your reference.
10. Sheets for rough work are appended in the Test Booklet at the end.

SEAL

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1. Algal partner in Lichens can be :
   (A) Cyanobionts
   (B) Phycobionts
   (C) Cyanobionts and phycobionts
   (D) Rhodophyta

2. Specialized hyphal structures for nutrient uptake by parasitic fungus is :
   (A) Arbuscules
   (B) Haustoria
   (C) Mycelium
   (D) Rhizomorphs

3. 90 percent of vascular plants show mycorrhizal association except plants from :
   (A) Amranthaceae
   (B) Chenopodiaceae
   (C) Brassicaceae
   (D) All of these

4. Aflatoxins, a highly carcinogenic liver toxin is produced by :
   (A) Claviceps
   (B) Amanita
   (C) Candida
   (D) Aspergillus

5. In Bryophytes, the 'Alternation of generation' involves :
   (A) Haploid gametophyte alternates with diploid sporophyte
   (B) Diploid gametophyte alternates with haploid sporophyte
   (C) Haploid gametophyte alternates with haploid sporophyte
   (D) Diploid gametophyte alternates with diploid sporophyte

6. In Lycopodium, plant body is differentiated into :
   (A) Adventitious root, stem, rhizophores and leaves
   (B) Underground rhizome, rhizophores and leaves
   (C) Stem, rhizoids and scaly leaves
   (D) Root, stem, rhizoids and leaves

7. Prothallus is :
   (A) Zygote developing into sporophyte
   (B) Zygote developing into gametophyte
   (C) Spores developing into an independent gametophyte
   (D) Spores developing into an independent sporophyte

8. Gymnosperms appeared during :
   (A) Cretaceous
   (B) Jurassic
   (C) Triassic
   (D) Permian

9. The 'Maiden fern' tree is :
   (A) **Marselia**
   (B) **Selaginella**
   (C) **Cycas**
   (D) **Ginkgo biloba**

10. Vascular phanerogams are :
   (A) Bryophytes
   (B) Pteridophytes
   (C) Gymnosperms
   (D) Angiosperms

11. Following is true regarding the Crustaceans :
   (A) Metanauplius is the first fundamental stage in all crustaceans
   (B) Nauplius larva is the first fundamental stage in all crustaceans
   (C) Protozoea is the first fundamental stage in all crustaceans
   (D) Zoea is the first fundamental stage in all crustaceans

12. Microscopic Molluscs are :
   (A) Monoplacophorans
   (B) Aplacophorans
   (C) Polyplacophorans
   (D) Sacphopoda

13. Echinoderms are :
   (A) Protostomes with exoskeleton
   (B) Deuterostomes with endo-skeleton
   (C) Protostomes with radial symmetry
   (D) Protostomes with water-vascular system

14. One of the following is not a basic chordate character :
   (A) Notochord
   (B) Ventral nerve chord
   (C) Pharyngeal gill slits
   (D) Post-anal tail

15. A unique set of cells that originate above the neural tube during development is :
   (A) Neural arch
   (B) Centrum
   (C) Neural crest cells
   (D) Neural tube

16. First fishes known were jawless with heavy bony armor are usually referred to as :

(A) Agnathans

(B) Chondrichthyes

(C) Osteichthyes

(D) Placoderms

17. The first terrestrial vertebrates were :

(A) Tetrapods

(B) Lancelet

(C) Pisces

(D) None of these

18. Kinetic skull is a feature of :

(A) Lizard

(B) Snakes

(C) Both (A) and (B)

(D) None of these

19. **Archaeopteryx** was considred a bird because of :

(A) Feathers on wings and tail

(B) Solid bones

(C) Lack of breast bone

(D) Long reptilian tail

20. Egg laying mammals are :

(A) Marsupials

(B) Monotremes

(C) Placentals

(D) None of these

21. Cell number is controlled by :

(A) Cell division

(B) Apoptosis

(C) Both cell division and apoptosis

(D) None of these

22. Lampbrush chromosomes are formed during the :

(A) Leptotene stage of meiotic prophase I

(B) Zygotene stage of meiotic prophase I

(C) Pachytene stage of meiotic prophase I

(D) Diplotene stage of meiotic prophase I

23. Polytene chromosomes are formed as a result of :

(A) Repeated rounds of DNA replication

(B) Lack of cell division

(C) Repeated DNA replication without cell division

(D) Repeated DNA replication with cell division

24. Signal peptides have a common characteristic tripartite structure composed of :

(A) A positively charged N-terminus (n region)

(B) Stretch of 7-15 hydrophobic residues (h region)

(C) A polar region that often contains helix-breaking proline and glycine residues as well as the signal peptide cleavage site (c region)

(D) All of these

25. GAAP :

(A) Resides in the Mitochondria and protects cells from apoptosis

(B) Resides in the Endoplasmic reticulum and protects cells from apoptosis

(C) Resides in the Golgi and protects cells from apoptosis

(D) Resides in the Nucleus and protects cells from apoptosis

26. Mitochondrial disorder due to mutation in mitochondrial DNA (mtDNA) is :

(A) Kearns-Sayre syndrome

(B) Leber's hereditary optic neuropathy

(C) Pearson's syndrome

(D) All of these

27. Prokaryotes have 70S ribosomes are composed of :

(A) Small (20S) and a large (50S) subunits

(B) Small (30S) and a large (40S) subunits

(C) Small (30S) and a large (50S) subunits

(D) Small (10S) and a large (60S) subunits

28. Eukaryotic cytoskeleton is composed of :

(A) Microfilaments

(B) Intermediate filaments

(C) Microtubules

(D) Microfilaments, intermediate filaments and microtubules

29. Lamin proteins is part of :

(A) Nuclear lamina

(B) Nucleolus

(C) Nuclear pore

(D) Nuclear membrane

30. Endoplasmic reticulum forms the interconnected network of :
(A) Tubules
(B) Vesicles
(C) Cisternae
(D) Tubules, vesicles and cisternae

31. The core activators of the cell cyele control system is / are :
(A) Cyclin Dependent Kinases
(B) Cyclin proteins
(C) Kinases
(D) Phosphorylase

32. Brakes on the cell cycle are provided by :
(A) Rb protein
(B) p16, p21
(C) p27
(D) All of these

33. The LOD score (logarithm (base 10) of odds) is a statistical test used for :
(A) Crossing-over studies
(B) Linkage analysis
(C) Crossing-over and linkage
(D) None of these

34. Haemophilia A and B are :
(A) X-linked genetic disorders
(B) Autosomal dominant disorders
(C) Autosomal recessive disorders
(D) Non-genetic disorders

35. Mutation in 'Dystrophin' gene leads to :
(A) Duchenne Muscular Distrophy (DMD)
(B) Becker Muscular Distrophy (BMD)
(C) Duchenne Muscular Distrophy (DMD) and Becker Muscular Distrophy (BMD)
(D) Neurofibromatosis

36. Cystic fibrosis has following symptoms :
(A) Muscle wasting
(B) Dementia
(C) Abnormal bleeding
(D) Progressive lung damage

37. Polygenic inheritance in human can be exemplified by :
(A) Height
(B) Eye colour
(C) Hair colour
(D) All of these

38. 1 : 2 : 1 is the :
(A) The phenotypic ratio of the incomplete dominance
(B) The genotypic ratio of the incomplete dominance
(C) The genotypic and the phenotypic ratio of the incomplete dominance
(D) The genotypic ratio of Lethality

39. Deviation from the Mendel's dihybrid cross is shown by :

(A) Epistasis

(B) Hypostasis

(C) Complementation

(D) All of these

40. Polyploid cells in humans occur in highly differentiated cells such as :

(A) Liver parenchyma

(B) Heart muscle

(C) Bone marrow

(D) All of these

41. A multitude of protein structures are rapidly determined by :

(A) X-ray crystallography

(B) Nuclear Magnetic Resonance (NMR)

(C) Circular Dichroism spectroscopy (CD)

(D) All of these

42. α-helices, β-sheets and turns are defined by :

(A) Torsion angles between backbone atoms $C_{i-\ell} - N_i - C i\alpha - C_i$

(B) $N_i - C i\alpha - C_i - N_{i+\ell}$

(C) Regular main chain hydrogen bonding patterns

(D) All of these

43. Aromatic amino acid are :

(A) Phenylalanine, Tyrosine, Tryptophan

(B) Glycine, Tyrosine, Tryptophan

(C) Phenylalanine, Serine, Tryptophan

(D) Phenylalanine, Tyrosine, Methionine

44. Amino acids with amide side-chains are :

(A) Glycine, Glutamine

(B) Asparagine, Glutamine

(C) Asparagine, Alanine

(D) Valine, Glutamine

45. In sickle-cell anemia :

(A) Valine mutates to Histidine

(B) Valine mutates to Proline

(C) Glutamic acid mutates to valine

(D) Glutamic acid mutates to Leucine

46. The Michaelis-Menten constant (K_m) estimates :

(A) Substrate concentration required for an enzyme to reach one-half its maximum reaction rate

(B) Enzyme concentration required to reach one-half its maximum reaction rate

(C) Number of substrate molecules handled by one active site per second

(D) Number of substrate molecules handled by several active site per second

47. An irreversible inhibitor :

(A) Binds to an allosteric site

(B) Binds to an Enzyme-substrate complex

(C) Permanently inactivates the enzymes

(D) Strongly resembles the actual substrate

48. Carbonic anhydrase :

(A) Uses Zn as a cofactor bound to its active site

(B) Uses Zn as a cofactor bound to its allosteric site

(C) Uses Cu as a cofactor bound to its active site

(D) Uses Cu as a cofactor bound to its allosteric site

49. Gluconeogenesis :

(A) Generates glucose using carbohydrate source

(B) Generates glucose using non-carbohydrate carbon substrates

(C) Generates lipids using carbohydrate source

(D) Generates lipid using non-carbohydrate carbon substrates

50. Fatty acids are metabolically oxidized at their :

(A) α-carbon atom

(B) β-carbon atom

(C) γ-carbon atom

(D) λ-carbon atom

51. The variant forms of DNA are :

(A) A, C, D, E, Z

(B) F, C, D, E, Z

(C) A, G, D, E, Z

(D) A, C, H, E, Z

52. Two types of gene groups / clusters are :

(A) Operons

(B) Multigene families

(C) Operons and Multigene families

(D) Pseudogene

53. Open Reading Frame (ORF) is :

(A) A set of codons that runs discontinuously and is bound by initiation codon at start and termination codon at the end

(B) A set of codons that runs continuously and is bound by initiation codon at start and termination codon at the end

(C) A set of codons that runs continuously and is bound by initiation codon at both the end

(D) A set of codons that runs discontinuously and is bound by termination codon at both the end

54. In **E. coli** termination occurs at :

(A) Promoter site

(B) Enhancer site

(C) Palindromes

(D) Silencer site

55. Third base degeneracy or Wobbling serves to minimize the effect of :

(A) Mutation

(B) DNA Repair

(C) Proof-reading function

(D) None of these

56. During translation :

(A) GTP is used to charge tRNA and in removing secondary structure from mRNA while ATP is used for ribosome movement and binding of accessory factors while

(B) GTP is used for ribosome movement and binding of accessory factors while ATP is used to charge tRNA and in removing secondary structure from mRNA

(C) GTP and ATP are used for ribosome movement and binding of accessory factors

(D) GTP and ATP are used to charge tRNA and in removing secondary structure from mRNA

57. Separation of double helix during replication is achieved by :

(A) Single strand binding proteins

(B) Ligase

(C) Helicase enzyme

(D) Primase

58. DNA binding domains in eukaryotes are :

(A) Helix-turn-helix

(B) Zinc fingers

(C) Basic domains

(D) Helix-turn-helix, Zinc fingers and Basic domains

59. Chromosomal scaffold that is involved in the binding with chromatin fibres are largely composed of :

(A) Acidic non-histone nuclear protein Topoisomerase II

(B) Histone nuclear protein Topoisomerase II

(C) Both histone and acidic non-histone nuclear protein Topoisomerase II

(D) Acidic non-histone cytoplasmic protein Topoisomerase II

60. 5-bromouracil (5-BU) is a base analog derived from :

(A) Adenine

(B) Guanine

(C) Cytosine

(D) Thymine

61. Major group of blood plasma proteins are :
(A) Albumin
(B) Globulins
(C) Fibrinogen
(D) Albumin, Globulins and Fibrinogens

62. Opening in the fetal heart in the interatrial septum is :
(A) Fossa ovalis
(B) Foramen ovale
(C) Septum primum
(D) Semilunar valves

63. Cardiac Output (CO) can be estimated by Stroke Volume (SV) and Heart Rate (HR) by an equation :
(A) CO = SV + HR
(B) CO = SV – HR
(C) CO = SV × HR
(D) CO = SV ÷ HR

64. Obligate nasal breathers are :
(A) Human
(B) Horse
(C) Birds
(D) Elephant

65. Respiratory gaseous exchange takes place at :
(A) Trachea
(B) Bronchi
(C) Alveoli
(D) Pharynx

66. Pyelonephritis is a urinary tract infection caused by :
(A) Bacteria
(B) Virus
(C) Protozoa
(D) Fungi

67. The functional and structural unit of the kidney is :
(A) Bowman's capsule
(B) Glomerulus
(C) Nephron
(D) Loop of Henle

68. Major endocrine feedback systems that are mediated through hypothalamus-pituitary are :
(A) TRH-TSH-T3 / T4
(B) CRH-ACTH-Cortisol
(C) Renin-Angiotensin-Aldosterone
(D) All of these

69. The beginning of gastrulation is marked by :
(A) Embryonic disc
(B) Primitive streak
(C) Blastocoel
(D) Cleavage furrow

70. The functional kidney in human is :

(A) Pronephros

(B) Mesonephros

(C) Metanephros

(D) All of these

71. Water potential (ψ_w) of a plant cell is given by inter-relationship between solute potential or osmotic potential (ψ_s) and pressure potential or hydrostatic pressure (ψ_p) through a equation :

(A) $\psi_w = \psi_s + \psi_p$

(B) $\psi_w = \psi_s - \psi_p$

(C) $\psi_w = \psi_s \times \psi_p$

(D) $\psi_w = \psi_s \div \psi_p$

72. Loss of water in plants is regulated by :

(A) Change in the vascular diameter

(B) Trichomes

(C) Leaf cuticle

(D) All of these

73. Photosynthesis occurs via :

(A) **Light dependent reactions** to synthesize NADPH and ATP

(B) **Light independent reactions** to capture and reduce CO_2

(C) Both (A) and (B)

(D) None of these

74. P_{680} and P_{700} are the two special molecules of :

(A) Chlorophyll A

(B) Chlorophyll B

(C) Carotenes

(D) Phycobilins

75. Cryptochrome mediated photo-responses are :

(A) Phototropism

(B) Stomatal opening

(C) Phototaxis

(D) All of these

76. Skotomorphogenesis is :

(A) Regulatory effect of light on plant cell, tissue growth

(B) Regulatory effect of light on the differentiation of plant cell, tissue

(C) Development of seedling in dark

(D) None of these

77. During seed germination the level of Abscisic acid (ABA) :

(A) Increases

(B) Decreases

(C) Remains the same

(D) None of these

78. Secondary xylem differentiation is promoted by :

(A) Auxin

(B) Cytokinin

(C) Ethylene

(D) Gibberellin

79. Of the following the gaseous phytohormone is :

(A) Salicyclic acid

(B) Strigolactones

(C) Ethylene

(D) Jasmonates

80. Test-tube fertilization of angiosperms was invented by :

(A) B. M. Johri

(B) P. Maheswari

(C) W. A. Jensen

(D) S. G. Nawaschin

81. Lymphocytes and antibodies constitute :

(A) First line of defence

(B) Second line of defence

(C) Third line of defence

(D) None of these

82. Antibody dependent cell mediated toxicity (ADCC) :

(A) Used to destroy large organisms that cannot be phagocytosed

(B) Used to destroy virus

(C) Used to destroy bacteria

(D) Natural killer cells are not involved in the process

83. Capsules, cell walls, toxins, viral capsids, and flagella etc, constitute :

(A) Antigen of microbial nature

(B) Antigen of non-microbial nature

(C) Antigen of both microbial and non-microbial nature

(D) Haptens

84. Autoimmune disorders can be exemplified by :

(A) Systemic Lupus Erythematosus

(B) Rheumatoid Arthritis

(C) Hashimoto's Thyroiditis

(D) All of these

85. Major criteria for bacteriophage classification is :

(A) Phage morphology

(B) Nucleic acid properties

(C) Phage morphology and nucleic acid properties

(D) None of these

86. Temperate phages used :

(A) Lysogenic cycles

(B) Lytic cycles

(C) Lysogenic and lytic cycles

(D) None of these

87. Lambda phage (λ) parasitizes :

(A) **Escherichia coli**

(B) **Clostridium botulinum**

(C) **Vibrio cholera**

(D) **Streptococcus pyogenes**

88. Enterovirus follows :

(A) Respiratory transmission

(B) Faecal-oral transmission

(C) Sexual transmission

(D) Blood borne transmission

89. Generation of novel Influenza A viruses is due to :

(A) Antigenic drift

(B) Antigenic shift

(C) Antigenic drift and antigenic shift

(D) Altered cytokine expression

90. Cervical carcinoma and benign warts are caused by :

(A) Epstein Barr virus

(B) Human Papilloma virus

(C) Hepatitis C virus

(D) Human T cell Leukaemia virus

91. Density-dependent limiting factors of a population are :

(A) Intrapopulation competition

(B) Predation

(C) Disease and parasites

(D) All of these

92. Prey-predator interactions show their numbers oscillate over time depicting :

(A) Sigmoid curve

(B) J-shaped curve

(C) Bell shaped curve

(D) Wave shaped curve

93. Human and other large mammal populations are :

(A) r-selected

(B) k-selected

(C) Both r- and k-selected

(D) None of these

94. Simpson dominance index for a stream inhabiting 55 percent of blackfly larvae and 9 other species, 5 percent each will be :

(A) 3.25

(B) 0.325

(C) 32.5

(D) 325

95. Species diversity depends on :

(A) Species richness

(B) Species evenness

(C) Both species richness and evenness

(D) None of these

96. Herbivores (primary consumers) constitute the :

(A) First trophic level

(B) Second trophic level

(C) Third trophic level

(D) None of these

97. Various types of food chain in an ecosystem are :

(A) Grazing food chain

(B) Saprophytic / Detritus food chain

(C) Parasitic food chain

(D) All of these

98. Percentage flow of energy across various trophic levels is :

(A) 10 percent

(B) 20 percent

(C) 30 percent

(D) 40 percent

99. Functioning of an ecosystem depends on :

(A) Energy flow

(B) Material cycling

(C) Energy flow and material cycling

(D) None of these

100. Major gaseous pollutants are :

(A) Carbon monoxide

(B) Sulphur dioxide

(C) Chlorofluorocarbons

(D) All of these

SPACE FOR ROUGH WORK

SEAL