

SEAL

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Series :

a

Question Booklet No. 310053

DT/08/24

PAPER—II

BIOLOGY

Invigilator's Signature

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Time : 2 Hours

Maximum Marks : 100

ROLL NO.

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1. The exoskeleton of cockroaches is made up of

- [A] cellulose
- [B] chitin
- [C] collagen
- [D] keratin

2. Which of the following tissues has the highest regenerative capacity?

- [A] Nervous tissue
- [B] Muscle tissue
- [C] Connective tissue
- [D] Epithelial tissue

3. Which of the following animals has a hydrostatic skeleton?

- [A] Earthworm
- [B] Frog
- [C] Cockroach
- [D] Crab

4. Which of the following is the first tissue to be formed in the embryo and the first tissue to evolve in the animal kingdom?

- [A] Epithelial tissue
- [B] Nervous tissue
- [C] Muscular tissue
- [D] Connective tissue

5. Which of the following bear sensory receptors for taste and smell in cockroaches?

- [A] Tactile hairs
- [B] Campaniform sensillae
- [C] Compound eyes
- [D] Maxillary palps and labium

6. Which type of epithelial tissue is specialized for absorption in the intestines in humans?

- [A] Simple squamous
- [B] Simple cuboidal
- [C] Simple columnar
- [D] Stratified squamous

7. Which gland produces bile that is essential for digestion?

- [A] Pancreas
- [B] Liver
- [C] Salivary glands
- [D] Gall bladder

8. The majority of plants that are known to exist today belong to

- [A] club mosses
- [B] gymnosperms
- [C] ferns
- [D] angiosperms





9. Which of the following is **not** a function of the kidney?

- [A] Filtration of blood
- [B] Reabsorption of water
- [C] Conversion of ammonia to urea
- [D] Regulation of electrolytes

10. Which part of the brain is involved in regulating heart rate and breathing in humans?

- [A] Cerebrum
- [B] Cerebellum
- [C] Medulla oblongata
- [D] Pons

11. The main component of blood plasma is

- [A] protein
- [B] water
- [C] NaCl
- [D] cholesterol

12. The reflex action is controlled by

- [A] frontal lobe of brain
- [B] temporal lobe of brain
- [C] parietal lobe of brain
- [D] spinal cord

13. Which part of the human brain is responsible for memory and learning?

- [A] Cerebrum
- [B] Cerebellum
- [C] Medulla oblongata
- [D] Hypothalamus



14. Which of the following is **not** a part of the human endocrine system?

- [A] Thyroid gland
- [B] Pituitary gland
- [C] Pancreas
- [D] Spleen

15. Which enzyme is involved in the process of glycolysis?

- [A] Amylase
- [B] Hexokinase
- [C] Pepsin
- [D] Lipase

16. Which of the following is a characteristic of dicotyledonous plants?

- [A] Parallel venation
- [B] Taproot system
- [C] Floral parts in multiples of three
- [D] Fibrous root system

17. The majority of biologists think that the first living things were

- [A] heterotrophs
- [B] eukaryotes
- [C] autotrophs
- [D] chemotrophs

18. The protein coat of a virus that protects its genetic material is known as

- [A] capsule
- [B] cell membrane
- [C] capsid
- [D] envelope



19. Melatonin is released by

- [A] pineal gland
- [B] pituitary gland
- [C] thyroid gland
- [D] parathyroid glands

20. Which of the following is **not** a type of simple permanent tissue in plants?

- [A] Phloem
- [B] Parenchyma
- [C] Collenchyma
- [D] Sclerenchyma

21. An impregnated substance which gives tracheophyte cell walls the necessary stiffness for structural support is called

- [A] tannin
- [B] chitin
- [C] lignin
- [D] pectin

22. Which plant hormone is responsible for promoting cell division in plants?

- [A] Auxin
- [B] Cytokinin
- [C] Gibberellin
- [D] Ethylene

23. The energy flow within an ecosystem is

- [A] always unidirectional
- [B] always bidirectional
- [C] multidirectional
- [D] cyclic

24. The main function of the Golgi apparatus is to

- [A] synthesize polypeptides
- [B] modify and package proteins
- [C] break down waste products
- [D] degrade non-functional proteins

25. Plant species with diverse genetic distribution eventually give rise to a local population that is referred as

[A] ecosystem

[B] ecotype

[C] population

[D] biome

26. Which of the following **does not** cause denaturation of proteins?

[A] Charge

[B] Heat

[C] pH

[D] Organic solvents

27. Which protein was the first to be completely sequenced by Frederick Sanger?

[A] Insulin

[B] Myoglobin

[C] Myosin

[D] Haemoglobin

28. Amino acids are joined together in a linear chain by forming

[A] glycosidic bond

[B] peptide bond

[C] phosphodiester bond

[D] hydrogen bond

29. Adrenal glands are located in

[A] neck

[B] brain

[C] kidneys

[D] heart

30. Which of the following organelles in eukaryotic cells carry out protein synthesis?

[A] Mitochondria

[B] Proteasomes

[C] mRNA

[D] Ribosomes

31. The majority of enzymes in their chemical nature are

[A] nucleic acids

[B] carbohydrates

[C] proteins

[D] lipids

32. Which of the following diseases is caused by protein deficiency?

[A] Anaemia

[B] Kwashiorkor

[C] Hypothyroidism

[D] Rickets





33. Which of the following is the most important nutrient for a woman to consume in the early stages of pregnancy in order to prevent birth defects?

- [A] Vitamin C
- [B] Folic acid
- [C] Thiamine
- [D] Vitamin E

34. Which of the following vitamins aids in the clotting of blood?

- [A] Vitamin A
- [B] Vitamin C
- [C] Vitamin D
- [D] Vitamin K

35. Which of the following conditions results from a severe deficiency of niacin?

- [A] Scurvy
- [B] Pellagra
- [C] Rickets
- [D] Anaemia

36. Which of the following is a method of *in-situ* conservation of organisms?

- [A] Botanical gardens
- [B] Seed banks
- [C] National parks
- [D] Zoos

37. When a non-allelic gene suppresses the activity of another gene, this is referred to as

- [A] pseudo-dominance
- [B] hypostasis
- [C] incomplete dominance
- [D] epistasis

38. Which term is used to describe the two characters that are **not** alike?

- [A] Allelomorphs
- [B] Homozygous
- [C] Codominant genes
- [D] Heterozygous



39. Which of the following is **not** a genetic disorder?

- [A] Haemophilia
- [B] Leukemia
- [C] Sickle cell anemia
- [D] Cystic fibrosis

40. The process by which carbon dioxide and oxygen pass through the plasma membrane is called

- [A] random diffusion
- [B] facilitated diffusion
- [C] passive diffusion
- [D] active diffusion

41. Which of the following features is shared by both prokaryotes and eukaryotes?

- [A] Presence of introns
- [B] Circular DNA
- [C] Presence of histones
- [D] Genetic code

42. Apoptosis involves which organelle of the cell?

- [A] Golgi bodies
- [B] Lysosome
- [C] Mitochondria
- [D] Endoplasmic reticulum

43. The author of the book *On the Origin of Species* was

- [A] Charles Darwin
- [B] Ernst Haeckel
- [C] A. R. Wallace
- [D] T. H. Huxley

44. Vestigial structure in humans includes

- [A] wisdom teeth
- [B] tailbone
- [C] vermiform appendix
- [D] All of the above

45. Which part of the human brain is responsible for regulating body temperature?

- [A] Cerebellum
- [B] Hypothalamus
- [C] Medulla oblongata
- [D] Thalamus

46. Net primary production of terrestrial vegetation depends on

- [A] solar radiation
- [B] temperature
- [C] moisture
- [D] All of the above

47. In forest ecosystems, most primary production goes directly into

- [A] herbivores
- [B] carnivores
- [C] detritus
- [D] atmosphere

48. In general, how much energy passes from one trophic level to the next?

- [A] About 1%–4%
- [B] About 5%–20%
- [C] About 25%–30%
- [D] About 20%–50%



49. In a human primary spermatocyte, how many autosomes are present?

- [A] 22
- [B] 23
- [C] 44
- [D] 46

50. In which of the following ecosystems, herbivores would consume a higher fraction of the primary production?

- [A] Aquatic ecosystems
- [B] Forest ecosystems
- [C] Grassland ecosystems
- [D] Both forest and grassland ecosystems

51. The hormone that the testes secrete is

- [A] progesterone
- [B] testosterone
- [C] vasopressin
- [D] aldosterone

52. The fundamental taxonomic rank and unit of classification is

- [A] species
- [B] order
- [C] class
- [D] genus

53. Which one of the following *does not* operate via global nutrient cycles?

- [A] Carbon
- [B] Nitrogen
- [C] Phosphorus
- [D] Water



54. Which chromosome in a human male is the largest in length?

- [A] Chromosome number 1
- [B] Chromosome number 21
- [C] X-Chromosome
- [D] Y-Chromosome

55. How many chromatids are present in each bivalent at the end of Prophase I?

- [A] 1
- [B] 2
- [C] 4
- [D] 2-4

56. In a bivalent, homologous chromosomes are held together at

- [A] chiasmata
- [B] centromere
- [C] kinetochore
- [D] their mid positions



57. In which manner, the paternal and maternal chromosomes do segregate after completion of Meiosis I?

- [A] All paternal chromosomes go to one daughter cell, while all maternal chromosomes go to the other daughter cell
- [B] One half of the paternal and maternal chromosome sets go to each daughter cell
- [C] Paternal and maternal chromosomes segregate randomly between the two daughter cells
- [D] One half of the total bivalent go to each daughter cell randomly

58. Complete synapsis between two homologous chromosome can be observed during

- [A] metaphase I
- [B] diplotene
- [C] pachytene
- [D] diakinesis

59. Meiosis **does not** occur in

- [A] haploid eukaryotic organisms
- [B] polyploid eukaryotic organisms
- [C] diploid eukaryotic cells
- [D] haploid eukaryotic cells

60. Type of chromosomes can be best visualized at

- [A] prophase
- [B] metaphase
- [C] anaphase
- [D] G2 phase



61. Transcription of genes occurs in

- [A] G1 phase only
- [B] both G1 and G2 phases but not in S phase
- [C] S phase only
- [D] during G1, G2 and S phases

62. Cleavage of mammalian zygote occurs rapidly and repeatedly by mitosis. During this division process, the duration of which phase of the cell cycle is relatively most curtailed?

- [A] Gap phase
- [B] S phase
- [C] Prophase
- [D] Metaphase

63. Mitotic spindle forms during

- [A] S phase
- [B] G2 phase
- [C] prophase
- [D] metaphase

64. M-phase Promoting Factor (MPF) is a cell cycle regulating enzyme that adds \_\_\_\_\_ to the substrate proteins.

- [A] sugar molecules
- [B] lipids
- [C] phosphate groups
- [D] methyl groups

65. In older leaves, a deficiency of which mineral results in chlorosis?

- [A] Calcium
- [B] Magnesium
- [C] Sodium
- [D] Nitrogen

66. If a tall heterozygous pea plant is the test cross, the ratio of tall and dwarf progeny plants would be

- [A] all tall
- [B] 1 : 3
- [C] 3 : 1
- [D] 1 : 1

67. Which of the following is **not** a trace element?

- [A] Boron
- [B] Sodium
- [C] Carbon
- [D] Zinc

68. Incomplete dominance is exhibited in the fruit colour of eggplants. If heterozygous F1 plants, obtained from a cross between a homozygous plant that produces purple fruit (PP) and with a homozygous plant that produces white fruit (pp), are crossed with each other, then the ratio of fruit colour in F2 progeny would be

- [A] 1 purple : 1 violet
- [B] 1 purple : 1 white
- [C] 3 purple : 1 white
- [D] 1 purple : 2 violet : 1 white

69. Which of the following statements regarding both Turner syndrome and Klinefelter syndrome in humans is **correct**?



- [A] Turner syndrome is exhibited in females whereas Klinefelter syndrome in males
- [B] Turner syndrome is exhibited in males whereas Klinefelter syndrome in females
- [C] Both syndromes are exhibited in males only
- [D] Both syndromes are exhibited in females only

70. Out of the following, which one **does not** move to younger plant parts?

- [A] Nitrogen
- [B] Phosphorus
- [C] Potassium
- [D] Calcium

71. Which of the following is most likely to exhibit extensive phenotypic variations of a particular inherited characteristic in a given population of organisms?

- [A] Epistasis
- [B] Codominance
- [C] Trihybrid cross
- [D] Cytoplasmic inheritance

72. Three common alleles exist at the locus for the ABO blood group in humans. How many different genotypes and the resulting phenotypes are possible with these three alleles?

- [A] Three each
- [B] Six each
- [C] Four each
- [D] Six and four respectively



73. Which of the following minerals contributes to the improvement of protein in grain crops and dry matter quantity and quality in leafy vegetables?

- [A] Iron
- [B] Copper
- [C] Molybdenum
- [D] Nitrogen

74. Which of the following elements is present in proteins but **not** in nucleic acids?

- [A] Nitrogen
- [B] Phosphorus
- [C] Sulfur
- [D] Carbon

75. After grazing, damaged growing grasses regenerate mostly because of

- [A] intercalary meristem
- [B] apical meristem
- [C] lateral meristem
- [D] secondary meristem

76. *Ascaris*, a large parasite commonly found in human intestine, belongs to the group

- [A] Nematoda
- [B] Platyhelminthes
- [C] Annelida
- [D] Cnidaria

77. Vegetative stage in the form of a *Plasmodium* is found in

- [A] Myxomycota
- [B] Ascomycota
- [C] Zygomycota
- [D] Basidiomycota

78. Which of the following types of chromosome mutation will **not** show looping out of a chromosome segment in heterozygous individuals, when homologous chromosomes will pair in prophase I of meiosis?

- [A] Deletion
- [B] Duplication
- [C] Inversion
- [D] Translocation

79. Flagellated cells are not produced by

- [A] Chlorophyta
- [B] Cyanophyta
- [C] Rhodophyta
- [D] Phaeophyta

80. A peptidoglycan layer is found outside the cell membrane of

- [A] Chlorophyta
- [B] Cyanophyta
- [C] Rhodophyta
- [D] Phaeophyta





81. Which one of the following is a monocot family?

- [A] Orchidaceae
- [B] Solanaceae
- [C] Asteraceae
- [D] Magnoliaceae

82. Which of the following represents double monosomy in a diploid individual?

- [A]  $2n - 2$
- [B]  $2n + 2$
- [C]  $2n - 1 - 1$
- [D]  $2n + 1 + 1$

83. Sieve tubes with companion cells are the characteristics of

- [A] gymnosperms only
- [B] angiosperms only
- [C] both gymnosperms and angiosperms
- [D] both pteridophytes and gymnosperms

84. Inflorescence in the form of a capitulum with ray florets and disc florets is present in the family

- [A] Asteraceae
- [B] Fabaceae
- [C] Poaceae
- [D] Verbenaceae

85. Corolla with two lateral petals and a labellum is found in

- [A] Liliaceae
- [B] Zingiberaceae
- [C] Orchidaceae
- [D] Fagaceae



86. Which of the following statements is **incorrect** for rolling-circle replication?

- [A] Certain viruses use this form of replication
- [B] It is initiated by a break in one of the nucleotide strands
- [C] The replication may continue a number of times
- [D] The replication process is bidirectional

87. What would happen if DNA gyrase becomes entirely non-functional, while DNA replication of *E. coli* chromosome was just half complete?

- [A] Bidirectional DNA replication will become unidirectional
- [B] Only lagging strand will get synthesized till the end but not the leading strand
- [C] DNA replication will stop after sometime
- [D] DNA polymerase will begin replication from another location in the same chromosome

88. Choose the most **correct** statement for the *E. coli* DNA polymerase I.

- [A] It has 5' → 3' polymerase activity but not 3' → 5' exonuclease activity.
- [B] It has both 5' → 3' polymerase and 3' → 5' exonuclease activities.
- [C] It has both 5' → 3' polymerase and 5' → 3' exonuclease activities.
- [D] It has all the enzymatic activities mentioned above.

89. Which of the following is a **wrong** statement about the differences between RNA and DNA?

- [A] Both DNA and RNA molecules are synthesized in 5' to 3' direction.
- [B] DNA molecule form helical structure whereas RNA molecules cannot.
- [C] Ribose sugar in DNA contains one oxygen atom lesser than in RNA.
- [D] RNA is less chemically stable than DNA.

90. Which of the following statements is **not correct** about rho-independent terminators involved in bacterial gene transcription?

- [A] They are inverted repeats present in the DNA template.
- [B] They are transcribed as a part of the nascent RNA chain.
- [C] They form a hairpin like structure which is followed by a stretch of uracil residues.
- [D] They perform helicase action and unwind nascent RNA from the template strand.

91. Which of the following transcription factors possess helicase activity and unwinds duplex DNA for transcription?

- [A] TFIIB
- [B] TFIID
- [C] TFIIF
- [D] TFIIH

92. Which of the following nucleotides is attached to the pre-mRNA by a unique 5'-5' bond to form a cap?

- [A] Adenine
- [B] Uracil
- [C] Guanine
- [D] Cytosine

93. Which one of the following is **not** a termination codon?

- [A] UAA
- [B] UAG
- [C] UGA
- [D] UGG



94. Which one of the following is a tricarboxylic acid?

- [A] Acetic acid
- [B] Succinic acid
- [C] Oxaloacetic acid
- [D] Citric acid



95. Meselson and Stahl distinguished between the heavy  $^{15}\text{N}$ -laden DNA and the light  $^{14}\text{N}$ -containing DNA with the use of a special technique of

- [A] centrifugation
- [B] chromatography
- [C] electrophoresis
- [D] spectroscopy

96. How much ATP is gained overall when glucose is converted to pyruvate?

- [A] 2 ATP
- [B] 6 ATP
- [C] 4 ATP
- [D] 8 ATP

97. Which of the following hormones leads to increased rate of gluconeogenesis in the liver during extended fasting?

- [A] TSH
- [B] Insulin
- [C] Thyroxine
- [D] Glucagon



98. The life cycle of which of the following insects **does not** show these four stages : Egg, Larva, Pupa and Adult?

- [A] Butterflies
- [B] Honey bees
- [C] Moths
- [D] Cockroaches

99. While making a comparison of different forms of DNA, one will always find that the distance between adjacent bases is

- [A] more in A-DNA
- [B] more in B-DNA
- [C] more in Z-DNA
- [D] equal in all the above forms

100. In which of the following modes of respiration, an adult frog exchanges gas with the surroundings?

- [A] Cutaneous and lung
- [B] Mouth and lung respiration
- [C] Cutaneous and mouth
- [D] All of the above



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