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SET-Y

A

PG-EE-July, 2024

SUBJECT : Life Sciences

11013

Sr. No. .....

Time : **1¼ Hours** Max. Marks : **100** Total Questions : **100**

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SEAL

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1. Which algal group is mismatched with its descriptions ?
   (1) Dinoflagellates – glassy, two-part shells
   (2) Green algae – closest relatives of land plants
   (3) Red algae – no flagellated stages in life cycle
   (4) Brown algae – include the largest seaweeds

2. Identify the correct statement :
   (1) Cyanobacteria are the highest evolved algae
   (2) Dominant pigment of blue green algae is haemoerythrin
   (3) Sexual reproduction in cyanobacteria is isogamous
   (4) No spindle formation occurs in nostoc cell at the time of division

3. In case of viruses, an envelope is acquired during which of the following steps :
   (1) Penetration
   (2) Release
   (3) Lysis
   (4) Assembly

4. Which of the following cells or structures are associated with asexual reproduction in fungi ?
   (1) Ascospores
   (2) Basidiospores
   (3) Conidiophores
   (4) Zygosporangia

5. What properties is/ are not expected to be significantly different between hot spring bacteria (that live at 120 degree Celsius) and regular intestinal *E.coli* :
   (a) Number of cysteines in the proteins;
   (b) Number of methionines in the protein;
   (c) Molecular weight of the protein;
   (d) GC richness of the genomic DNA;
   (e) Richness of saturated fatty acids in plasma membranes.
   (1) (a) and (e)
   (2) (b) and (c)
   (3) (c) and (d)
   (4) (a) and (c)

6. Which of the following is true of the Bryophytes ?
   (1) It is the only group that shows an alternation of generations
   (2) Bryophytes exhibit extensive vascular tissue
   (3) The sporophyte (multicellular diploid) is the dominant stage
   (4) The gametophye (multicellular haploid) is the dominant stage

7. Which of the following best describes a fern gametophyte ?
   (1) Its cells are haploid
   (2) It lacks chlorophyll
   (3) It is tough and woody
   (4) It is larger than the sporophyte

8. The *Riccia* is a bryophyte because :
   (1) It occurs mostly on land and has motile sperm.
   (2) It has heteromorphic alternation of generation and lacks leaves.
   (3) It has multicellular sex organs with a sterile jacket and lacks vascular tissues.
   (4) Its sporophyte lacks differentiation and has a single-layered jacket.

9. The aquatic fern which supports the growth of blue-green algae, Anabaena, and used to increase the yield of paddy crop is :
   (1) Salvinia
   (2) Marsilea
   (3) Selaginella
   (4) Azolla

10. As we go from species to kingdom in a taxonomic hierarchy, the number of common characteristics :
   (1) Will decrease
   (2) Will increase
   (3) Remain same
   (4) May increase or decrease

11. Which of the following systems for plant classification is not phylogenetic ?
   (1) Bentham and Hooker's system
   (2) Engler and Prantl's system
   (3) Hutchinson's system
   (4) Takhtajan's system

12. Which of the following characters is seen in the gymnosperms, but is not seen in other seeded vascular plants ?
(1) Occurrence of alternation of generations
(2) Naked seeds
(3) Dominant sporophyte stage
(4) Formation of pollen grains

13. Root nodules occur in plants of the family :
(1) Fabaceae (2) Liliaceae
(3) Malvaceae (4) Compositae

14. Ovule is morphologically equivalent to :
(1) Megaspore (2) Megasporangium
(3) Microspore (4) Megasporophyll

15. Which of the following Gymnospermic orders resembles with Angiosperms ?
(1) Cycadales (2) Coniferales
(3) Gnetales (4) Ginkgoales

16. A minimum number of meiotic divisions required to produce 50 seeds of an angiosperm is :
(1) 13 (2) 26
(3) 50 (4) 63

17. In the angiosperms, the :
(1) Gametophyte is prominent, and the sporophyte is dependent upon the gametophyte
(2) Sporophyte is prominent, with the sporophyte and the gametophyte living independently
(3) Sporophyte is prominent, and the gametophyte is dependent upon the sporophyte
(4) Gametophyte is prominent, and the sporophyte stage has disappeared

18. Which sequence correctly illustrates the arrangement of layers from outside to inside in a dicot stem ?

(1) Hypodermis → Endodermis → Pericycle → Phloem → Xylem

(2) Endodermis → Hypodermis → Pericycle → Xylem → Phloem

(3) Hypodermis → Endodermis → Pericycle → Xylem → Phloem

(4) Endodermis → Hypodermis → Pericycle → Phloem → Xylem

19. Which of the following statements is incorrect about the companion cell ?

(1) It is a specialized parenchymatous cell

(2) Its nucleus controls the function of sieve tube

(3) It helps in maintaining the pressure gradient in sieve tube

(4) It is present in all vascular plants having phloem

20. Plant cells that are photosynthetically active, are found in which layer of the leaf, and are what type of cells :

(1) Epidermis, Parenchymatous

(2) Mesophyll, Parenchymatous

(3) Mesophyll, Sclerenchymatous

(4) Aerenchyma, Collenchymatous

21. Which one of the following statement is not correct ?

(1) Pollen tube grows by cell elongation

(2) Endosperm is always triploid

(3) Pseudoembryo sac is formed by the breakdown of nucellar tissue

(4) Development of egg without fertilization is termed as parthenogenesis

22. Choose the mismatch :

(1) Polyps :: Coelenterates

(2) First triploblastic :: Flatworms

(3) Free-living flatworm :: Planaria

(4) Radial symmetry :: Larvae of Echinoderm

23. Characteristics which distinguish arthropods from annelids and molluscs are :
(a) Absence of a trochophore larva;
(b) An external skeleton made of chitin;
(c) Subdivision of the legs into movable segments;
(d) Distinct mandibles
(1) (a) and (b)
(2) (b) and (c)
(3) (a), (b), and (c)
(4) (a), (b), (c), and (d)

24. Member of Echinodermata has a specific system, which is not found in other phylum, it is :
(1) Canal system
(2) Water vascular system
(3) Respiratory system
(4) Jointed appendages

25. Which of the following phyla is correctly matched with its general characteristics :
(1) Porifera - Cellular level of organization and external fertilization
(2) Coelenterata - Diploblastic and mostly asymmetric
(3) Aschelminthes - Pseudocoelomates and dioecious
(4) Hemichordata - Coelomates and closed circulatory system

26. Which of the following is a matching pair of a body feature and the animal possessing it :
(1) Canal system :: Asterias
(2) Metagenesis :: Obelia
(3) Dorsal nerve cord :: Pheretima
(4) Muscular pharynx :: Taenia

27. Which of the following group of animals has a constant body temperature ?
(1) Aves and Mammalia
(2) Reptiles, Aves and Mammalia
(3) Aves and Cyclostomata
(4) Pisces and Amphibia

28. If an "Axolotl larva" is placed in water containing sufficient iodine, then :
(1) Larva will die soon
(2) Its skin pigmentation will change
(3) It will start metamorphosis
(4) It remains as usual without any change

29. Teeth in Amphibia are :

(1) Homodont, Pleurodont, and Diphyodont

(2) Thecodont, Heterodont, and Diphyodont

(3) Homodont, Pleurodont, and Polyphyodont

(4) Homodont, Thecodont, and Polyphyodont

30. Which of the following statements is incorrect about the occurrence of notochord ?

(1) It is present only in larval tail in ascidian

(2) It is replaced by a vertebral column in adult frog

(3) It is absent throughout life in humans from the very beginning

(4) It is present throughout life in Amphioxus

31. Crocodile and penguin are similar to whale and dogfish in which one of the following features :

(1) Possess a solid single stranded central nervous system

(2) Lay eggs and guard them till they hatch

(3) Possess bony skeleton

(4) Have gill slits at some stage

32. Which of the following is a correct sequence of decreasing order of number of species ?

(1) Aves, pisces, reptiles, amphibians, mammals

(2) Pisces, aves, reptiles, mammals, amphibians

(3) Pisces, mammals, reptiles, amphibians, aves

(4) Amphibians, aves, pisces, mammals, reptiles

33. Which one of the following animals bears hollow and pneumatic long bones ?

(1) Ornithorhyncus (2) Neophron

(3) Hemidactylus (4) Macropus

34. Which of the following groups of animals is correctly matched with its characteristic feature without any exception ?
(1) Reptilia - possess 3-chambered heart with an incompletely divided ventricle
(2) Chordata - possess a mouth with an upper and a lower jaw
(3) Chondrichthyes - possess cartilaginous endoskeleton
(4) Mammalia - Give birth to young ones

35. Which of the following is the correct sequence for the auditory pathway ?
(1) External auditory canal, tympanic membrane, auditory ossicles, oval window, cochlea and spiral organ.
(2) Tympanic membrane, external auditory canal, auditory ossicles, cochlea and spiral organ, round window.
(3) Auditory ossicles, tympanic membrane, cochlea, round window, oval window, external auditory canal.
(4) Auricle, tympanic membrane, round window, cochlea and spiral organ, oval window.

36. Which of the following statements are correct ?
(a) The anterior (ventral) gray horns contain cell bodies of neurons that cause skeletal muscle contraction;
(b) The gray commissure connects the white matter of the right and left sides of the spinal cord;
(c) Cell bodies of autonomic motor neurons are located in the lateral gray horns;
(d) Gray matter in the spinal cord consists of cell bodies of neurons, neuroglia, unmyelinated axons and dendrites of interneurons and motor neurons.
(1) (a) and (b)
(2) (b) and (d)
(3) (b), (c), and (d)
(4) (a), (b), and (d)

37. Which arrangement correctly identifies the type of blood that the four chambers of the heart (RA- Right Atrium; RV- Right Ventricle; LA- Left Atrium; LV- Left Ventricle) collect and pump:
(1) RA- Oxygenated; RV- Deoxygenated; LA- Oxygenated; LV- Deoxygenated
(2) RA- Deoxygenated; RV- Oxygenated; LA- Deoxygenated; LV- Oxygenated
(3) RA- Deoxygenated; RV- Deoxygenated; LA- Oxygenated; LV- Oxygenated
(4) RA- Oxygenated; RV- Oxygenated; LA- Deoxygenated; LV- Deoxygenated

38. On the summit of Mt. Everest, where the barometric pressure is about 250 mm Hg, the partial pressure of O_2 is about:

(1) 0.1 mm Hg
(2) 0.5 mm Hg
(3) 5 mm Hg
(4) 50 mm Hg

39. Which of the following statements about rhodopsin is true ?

(1) Rhodopsin is the primary photoreceptor of both rods and cones.
(2) The prosthetic group of rhodopsin is all-*trans*-retinol derived from β-carotene.
(3) Rhodopsin is located in the cytosol of the cell.
(4) Absorption of a photon by rhodopsin causes an isomerization of 11-*cis*-retinal to all-*trans*-retinal.

40. Drinking which of the following would lead to the highest rate of ADH secretion and release :

(1) Two litters of distilled water
(2) Two liters of sea water (mainly hyperosmotic saline)
(3) Two liters of iso-osmotic (isotonic) saline
(4) Two liters of human blood plasma

41. Which of the following is not a function of the liver ?

(1) Storage of vitamin C
(2) Production of bile
(3) Detoxification of drugs
(4) Storage of glucose

42. During ovulation, all of the following occur except :

(1) Rupture of the Graafian follicle
(2) Estrogen production reaches its lowest point
(3) FSH and LH plasma levels surge
(4) Corpus luteum is formed

43. In which of the following combinations is the name of the hormone, its chemical type, and its tissue of origin correctly matched ?
(1) Aldosterone → Peptide → Pancreas
(2) Glucagons → Peptide → Adrenal Cortex
(3) ACTH → Polypeptide → Adrenal Cortex
(4) Vasopressin → Peptide → Posterior Pituitary

44. The system that controls smooth muscle, cardiac muscle, and gland activity is the :
(1) Somatic nervous system
(2) Autonomic nervous system
(3) Skeletal division
(4) Sensory nervous system

45. The sap of a plant cell has an osmotic potential of -10 bars and there is a wall pressure of 2 bars. When this cell is placed in a solution with an osmotic potential of -3 bars, the force causing water to enter the cell is :
(1) -8 bar
(2) -7 bar
(3) -5 bar
(4) -3 bar

46. A carotenoid-less mutant plant was grown under normal sunlight, it will experience :
(1) Increased photosynthetic rate
(2) Increased chlorophyll biosynthesis
(3) Reduced photorespiration
(4) Increased chlorophyll oxidation and necrosis

47. Following are some statements regarding plant growth hormones :
(a) Ethylene regulates abscission;
(b) Gibberellins do not play any role in flowering;
(c) Auxin and cytokinin promote cell division;
(d) Over-production of cytokinin promotes root growth;
(e) ABA inhibits root growth and promotes shoot growth at low water potential;
(f) ABA promotes leaf senescence independent of ethylene.
Which of the following combination of above statements is correct ?
(1) (a), (c), and (f)
(2) (b), (c), and (d)
(3) (d), (e), and (f)
(4) (b), (d), and (e)

48. Which of the following is not a difference between sugar translocation in phloem and water movement in the xylem ?

(1) Sugar translocation is a metabolically active process, while water movement is entirely passive

(2) Pressure is positive in sieve tubes, while xylem is usually under tension

(3) Sieve tubes are living cells, while mature xylem is dead

(4) All of these are correct

49. Which of the following function is not associated with phytochrome ?

(1) Nyctinastic movement in *Mimosa*

(2) Seed germination in lettuce

(3) Stomatal opening

(4) Circadian rhythms

50. During non-cyclic photophosphorylation, the reduction of "chlorophyll *a*" to its original forms is effected by :

(1) Electron stored within "cytochrome *a*"

(2) Electron released following irradiation of "cytochrome *b*"

(3) Electron carried by NADH

(4) Electron released by photolysis of water

51. What is the step in photosynthesis that contributes the greatest number of protons to the generation of a concentration gradient across the thylakoid membrane ?

(1) The Q cycle

(2) Reduction of $NADP^+$ to NADPH

(3) Oxidation of water to O_2

(4) None of the above contribute to the proton concentration gradient

52. Production of one molecule of 3-phosphoglyceraldehyde requires how many turns of the Calvin cycle :

(1) 01

(2) 02

(3) 03

(4) 06

53. Which of the following statements best supports the fact that photorespiration commonly occurs in C_3 plants ?

(1) C_3 plants do not possess Kranz anatomy

(2) C_3 plants have usually high CO_2 compensation species

(3) C_3 plants are less efficient in photosynthesis

(4) C_3 plants are characterized by RuBP oxygenase activity under high oxygen supply

54. A cell at incipient plasmolysis, with a solute potential of –2000 kPa, is placed in a solution of water potential –1200 kPa. The direction of flow of water will be :

(1) From cell to solution

(2) From solution to cell

(3) Data incomplete

(4) No flow of water

55. The greatest amount of free energy is available at which of the following levels ?

(1) Tertiary consumers

(2) Secondary consumers

(3) Decomposers

(4) Producers

56. The role of decomposers in nitrogen cycle is to :

(1) Fix N_2 into ammonia

(2) Release ammonia from organic compounds, thus returning it to the soil

(3) Denitrify ammonia, thus returning N_2 into the soil

(4) Incorporate nitrogen into amino acids and organic compounds

57. According to the concept of competitive exclusion :

(1) Two species cannot coexist in the same habitat

(2) Extinction or emigration are the only possible results of competitive interaction

(3) Intraspecific competition results in the success of the best adapted individuals

(4) Two species cannot share the same niche in a habitat

58. Which of the following are homologous organs ?

(1) Wings of birds, flippers of whales, and forearms of man

(2) Wings of butterfly, pterygium of flying squirrel, and fins of flying fishes

(3) Tails of snake, scorpion, and wall lizard

(4) Lungs of rabbit, trachea of cockroach, and book lungs of scorpion

59. The most likely sequence for the biological evolution of life is :

(1) Aerobic prokaryotes – Photosynthetic prokaryotes – Anaerobic prokaryotes – Eukaryotes

(2) Photosynthetic prokaryotes – Anaerobic prokaryotes – Aerobic prokaryotes – Eukaryotes

(3) Anaerobic prokaryotes – Photosynthetic prokaryotes – Aerobic prokaryotes – Eukaryotes

(4) Aerobic prokaryotes – Eukaryotes – Anaerobic prokaryotes – Photosynthetic prokaryotes

60. Which of these ecosystem has the lowest primary productivity per square meter ?

(1) A salt marsh

(2) A grassland

(3) An open ocean

(4) A tropical rainforest

61. The molecules in a membrane that limit its permeability are :

(1) Carbohydrates

(2) Phospholipids

(3) Proteins

(4) Water

62. Transport across a membrane is said to be coupled when :

(1) Two molecules are transported across the membrane in the same direction

(2) Membrane transport is coupled to an energy source, such as ATP hydrolysis

(3) Transport of one ion down its gradient provides the energy to transport another molecule against the gradient

(4) Both the concentration gradient and membrane potential determine the rate of transport across the membrane

63. Which statement is false ?

(1) The Golgi complex forms vesicles that fuse to form the endoplasmic reticulum.

(2) If a lysosome bursts, its contents can seriously damage the cytoplasm of a cell.

(3) Secreted proteins are formed by ribosomes attached to the endoplasmic reticulum.

(4) The nucleolus is where ribosomes are assembled.

64. Which of the following show the correct order of the secretory pathway ?

(1) RER → Golgi → Secretory vesicle → Cell exterior

(2) SER → Golgi → Secretory vesicle → Cell exterior

(3) Golgi → SER → Secretory vesicle → Cell exterior

(4) Golgi → Lysosome → SER → Secretory vesicle → Cell exterior

65. If base order in one chain of DNA is "ATCGA", then how many number of H-bond are found in the DNA duplex ?

(1) 20 (2) 12

(3) 10 (4) 11

66. The linkage map of X-chromosome of fruitfly has 66 map units, with yellow body gene (y) at one end and bobbed hair (b) gene at the other end. The recombination frequency between these two genes (y and b) should be :

(1) 60 % (2) Greater than 50 %

(3) Less than or equal to 50 % (4) 100 %

67. Which of the following does not occur when a cell enters M phase ?

(1) Chromatin condenses

(2) Histone H1 is dephosphorylated

(3) The nuclear envelope, the endoplasmic reticulum, and the golgi break down

(4) The spindle is formed

68. All of the following processes occur in the mitochondria of mammalian cells except :

(1) Fatty acid biosynthesis (2) Protein synthesis

(3) DNA synthesis (4) β-oxidation of fatty acids

69. During DNA replication, Okazaki fragments are used to elongate :
(1) The lagging strand towards the replication fork
(2) The leading strand away from the replication fork
(3) The lagging strand away from the replication fork
(4) The leading strand towards the replication fork

70. Pick out the correct statements :
(a) Haemophilia is a sex-linked recessive disease;
(b) Down's syndrome is due to aneuploidy;
(c) Phenylketonuria is an autosomal recessive gene disorder;
(d) Sickle cell anaemia is a X-linked recessive gene disorder;
(1) (a) and (d) are correct
(2) (b) and (d) are correct
(3) (a), (c), and (d) are correct
(4) (a), (b), and (c) are correct

71. Inversions are considered as cross-over suppressors because :
(1) Homozygous inversions are lethal and thus they do not appear in next generation.
(2) Inversion heterozygotes, i.e., one copy having normal chromosome and its homologue having inversion, does not allow crossing-over to occur as they cannot pair at all.
(3) Due to inversion present, four chromosomes take part in the pairing and crossing-over events, and make the structure difficult for separation and gamete formation.
(4) The pairing and crossing-overs do occur in inversion heterozygotes, but the gametes having cross-over products are lethal.

72. Rifampicin is a bactericidal antibiotic drug used typically in treating *Mycobacterium* infections. Which of the following statements describes the mechanism of action of rifampicin ?
(1) Rifampicin inhibits DNA-dependent RNA polymerase in bacterial cells by binding its β-subunit, thus preventing transcription to RNA.
(2) Interferes with translation through binding to the 30S ribosomal subunit.
(3) Interferes with the cell wall biosynthesis of growing bacteria.
(4) Interferes with 70S ribosomes resulting in incorrect translation of mRNA.

73. The RNA polymerase holoenzyme transcribes :

(1) The promoter, structural gene, and the terminator region

(2) The promoter and the terminator region

(3) The structural gene and the terminator region

(4) The structural gene only

74. Given below are the steps of protein synthesis :

(a) Codon-anticodon reaction between mRNA and aminoacyl tRNA complex

(b) Attachment of mRNA and smaller sub-unit of ribosome

(c) Charging or aminoacylation of tRNA

(d) Attachment of larger sub-unit of ribosome to the mRNA-$tRNA_{Met}$ Complex

(e) Linking of adjacent amino acids

(f) Formation of polypeptide chain

(1) (b) → (a) → (c) → (e) → (d) → (f)

(2) (e) → (b) → (a) → (c) → (d) → (f)

(3) (c) → (b) → (d) → (a) → (e) → (f)

(4) (c) → (b) → (a) → (d) → (e) → (f)

75. Under which of the following conditions, there will be no change in the reading frame of the following mRNA: 5' AACAGCGGUGCUAUU 3' :

(1) Deletion of GGU from 7th, 8th, and 9th positions

(2) Insertion of G at the 5th position

(3) Deletion of G from the 5th position

(4) Insertion of A and G at 4th and 5th position, respectively

76. During mismatch repair in *E. coli*, the parental strand is recognized by :

(1) Single-stranded breaks

(2) Glycosylated adenines

(3) Methylated adenines

(4) Methylation of the 6th position of guanine residues

77. Enzymes increase the rate of reaction by :

(1) Increasing the free energy of activation

(2) Increasing the free-energy change of the reaction

(3) Changing the equilibrium constant of the reaction

(4) Decreasing the energy of activation

78. In a Michaelis-Menten enzyme mechanism, what substrate concentration (relative to K_m) is needed for the reaction rate to be 0.5 V_{max}.

(1) 1/9 K_m (2) 1/3 K_m

(3) K_m (4) 1/4 K_m

79. The enzymes where catalysis involves transfer of electrons are named as :

(1) Isomerases (2) Transferases

(3) Oxidoreductases (4) Lyases

80. Which of the following is not an example of allosteric regulation ?

(1) Regulation of phosphofructokinase activity by fructose 2,6-bisphosphate

(2) Inactivation of nitrogenase by ADP-ribosylation .

(3) Regulation of the lac operon by allolactose in *E. coli*

(4) Catabolite repression by CAP in *E. coli*

81. Which of the following is common to both fatty acid synthesis and degradation ?

(1) The oxidation/reduction reactions occur between the α and the β carbons of the fatty acid.

(2) The biochemical nature of the reductant/oxidant.

(3) The intracellular location of the metabolic pathways.

(4) The nature of the two carbon unit.

82. Most of the free fatty acids are transported in the blood :

(1) Inside the red blood cells (2) As lipoproteins

(3) Combined with glucose (4) Bound to albumin

83. The oxidation of 1 mol of glucose by anaerobic glycolysis yields a net of :
(1) 2 mol of lactate and 2 mol of ATP
(2) 2 mol of lactate, 2 mol of NADH, and 2 mol of ATP
(3) 2 mol of lactate, 2 mol of NAD^+, and 6 mol of ATP
(4) 2 mol of acetyl-CoA, and 2 mol of ATP

84. The function of the TCA cycle is characterized by all of the following statements except :
(1) It generates reduced NAD^+ and reduced FAD
(2) It generates guanosine triphosphate
(3) It catalyzes the complete oxidation of acetate to carbon dioxide and water
(4) It causes the net synthesis of oxaloacetate from acetyl-CoA

85. Inside an active mitochondrion, most electrons follow which pathway ?
(1) Krebs cycle → NADH → Electron transport chain → Oxygen
(2) Glycolysis → NADH → Oxidative phosphorylation → ATP → Oxygen
(3) Krebs cycle → $FADH_2$ → Electron transport chain → ATP
(4) Electron transport chain → Krebs cycle → ATP → Oxygen

86. Which one of the following statements is incorrect about the role of oxidative pentose phosphate pathway in plant metabolism ?
(1) Production of NADH to generate ATP
(2) Generation of NADPH required to drive biosynthetic reactions
(3) Production of pentose phosphate for the synthesi of nucleic acids
(4) Formation of erythrose 4-phosphate for biosynthesis of aromatic amino acids

87. Which of the following statements is incorrect about leg-haemoglobin ?
(1) It acts as O_2 scavenger
(2) It imparts pink or red colour to the nodules
(3) It combines with O_2 and protects nitrogenase
(4) It is a Mo-Fe protein

88. BACs, cosmids, phages, plasmids and YACs are all commonly used cloning vectors that differ in their cloning capacities, with a range from approximately 100 bp to 3000 kb. Which of the following is the proper order for these vectors in terms of increasing cloning capacity ?

(1) BAC, cosmid, phage, plasmid, YAC

(2) YAC, BAC, cosmid, phage, plasmid

(3) Plasmid, phage, cosmid, BAC, YAC

(4) Plasmid, cosmid, phage, BAC, YAC

89. A certain purified DNA sample was cut with two restriction endonucleases E1 & E2. The following results were obtained from agarose gel electrophoresis :

Sample cut with E1 alone- two bands of size 35 kb and 15 kb.

Sample cut with E2 alone- two bands of size 40 kb and 10 kb.

Sample cut simultaneously with E1 & E2- three bands of 35 kb, 10 kb & 5 kb.

From these data, it can be inferred that the DNA has :

(1) Two sites for E1 and one site for E2

(2) One site for E1 and two sites for E2

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100. In Xenopus, a type of frog, and most vertebrates, there is a certain factor that arrests the secondary oocyte in metaphase II of meiosis. What is the name of this factor ?

(1) Mitosis Promoting Factor (MPF)

(2) Vitellogenesis Factor (VF)

(3) Cytostatic Factor (CSF)

(4) Sonic Hedgehog (SH)

Total No. of Printed Pages : 21

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B

SET-Y

PG-EE-July, 2024

SUBJECT : Life Sciences

Sr. No. 11014

Time : 1¼ Hours | Max. Marks : 100 | Total Questions : 100

Roll No. (in figures)_____ (in words) _____

Name _____ Date of Birth_____

Father's Name _____ Mother's Name_____

Date of Examination _____

(Signature of the Candidate) (Signature of the Invigilator)

SEAL

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2. The candidates ***must return*** the question booklet as well as OMR Answer-Sheet to the Invigilat concerned before leaving the Examination Hall, failing which a case of use of unfair-means / mis-behaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
4. Question Booklet along with answer key of all the A, B, C & D code shall be got uploaded on the University Website immediately after the conduct of Entrance Examination. Candidates may raise valid objection/complaint if any, with regard to discrepancy in the question booklet/answer key within 24 hours of uploading the same on the University Website. The complaint be sent by the students to the Controller of Examinations by hand or through email. Thereafter, no complaint in any case, will be considered.
5. The candidate ***must not*** do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself. Answers ***must not*** be ticked in the question booklet.
6. ***There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.***
7. Use only **Black** or **Blue Ball Point Pen** of good quality in the OMR Answer-Sheet.
8. *Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained* 30 *minutes after starting of the examination.*

1. Inversions are considered as cross-over suppressors because :
   (1) Homozygous inversions are lethal and thus they do not appear in next generation.
   (2) Inversion heterozygotes, i.e., one copy having normal chromosome and its homologue having inversion, does not allow crossing-over to occur as they cannot pair at all.
   (3) Due to inversion present, four chromosomes take part in the pairing and crossing-over events, and make the structure difficult for separation and gamete formation.
   (4) The pairing and crossing-overs do occur in inversion heterozygotes, but the gametes having cross-over products are lethal.

2. Rifampicin is a bactericidal antibiotic drug used typically in treating *Mycobacterium* infections. Which of the following statements describes the mechanism of action of rifampicin ?
   (1) Rifampicin inhibits DNA-dependent RNA polymerase in bacterial cells by binding its β-subunit, thus preventing transcription to RNA.
   (2) Interferes with translation through binding to the 30S ribosomal subunit.
   (3) Interferes with the cell wall biosynthesis of growing bacteria.
   (4) Interferes with 70S ribosomes resulting in incorrect translation of mRNA.

3. The RNA polymerase holoenzyme transcribes :
   (1) The promoter, structural gene, and the terminator region
   (2) The promoter and the terminator region
   (3) The structural gene and the terminator region
   (4) The structural gene only

4. Given below are the steps of protein synthesis :
   (a) Codon-anticodon reaction between mRNA and aminoacyl tRNA complex
   (b) Attachment of mRNA and smaller sub-unit of ribosome
   (c) Charging or aminoacylation of tRNA
   (d) Attachment of larger sub-unit of ribosome to the mRNA-$tRNA_{Met}$ Complex
   (e) Linking of adjacent amino acids
   (f) Formation of polypeptide chain
   (1) (b) → (a) → (c) → (e) → (d) → (f)
   (2) (e) → (b) → (a) → (c) → (d) → (f)
   (3) (c) → (b) → (d) → (a) → (e) → (f)
   (4) (c) → (b) → (a) → (d) → (e) → (f)

5. Under which of the following conditions, there will be no change in the reading frame of the following mRNA: 5' AACAGCGGUGCUAUU 3' :
   (1) Deletion of GGU from 7th, 8th, and 9th positions
   (2) Insertion of G at the 5th position
   (3) Deletion of G from the 5th position
   (4) Insertion of A and G at 4th and 5th position, respectively

6. During mismatch repair in *E. coli*, the parental strand is recognized by :
   (1) Single-stranded breaks
   (2) Glycosylated adenines
   (3) Methylated adenines
   (4) Methylation of the 6th position of guanine residues

7. Enzymes increase the rate of reaction by :
   (1) Increasing the free energy of activation
   (2) Increasing the free-energy change of the reaction
   (3) Changing the equilibrium constant of the reaction
   (4) Decreasing the energy of activation

8. In a Michaelis-Menten enzyme mechanism, what substrate concentration (relative to K_m) is needed for the reaction rate to be 0.5 V_{max}.
   (1) 1/9 K_m
   (2) 1/3 K_m
   (3) K_m
   (4) 1/4 K_m

9. The enzymes where catalysis involves transfer of electrons are named as :
   (1) Isomerases
   (2) Transferases
   (3) Oxidoreductases
   (4) Lyases

10. Which of the following is not an example of allosteric regulation ?
   (1) Regulation of phosphofructokinase activity by fructose 2,6-bisphosphate
   (2) Inactivation of nitrogenase by ADP-ribosylation .
   (3) Regulation of the lac operon by allolactose in *E. coli*
   (4) Catabolite repression by CAP in *E. coli*

11. What is the step in photosynthesis that contributes the greatest number of protons to the generation of a concentration gradient across the thylakoid membrane ?

(1) The Q cycle

(2) Reduction of $NADP^+$ to NADPH

(3) Oxidation of water to O_2

(4) None of the above contribute to the proton concentration gradient

12. Production of one molecule of 3-phosphoglyceraldehyde requires how many turns of the Calvin cycle :

(1) 01 (2) 02

(3) 03 (4) 06

13. Which of the following statements best supports the fact that photorespiration commonly occurs in C_3 plants ?

(1) C_3 plants do not possess Kranz anatomy

(2) C_3 plants have usually high CO_2 compensation species

(3) C_3 plants are less efficient in photosynthesis

(4) C_3 plants are characterized by RuBP oxygenase activity under high oxygen supply

14. A cell at incipient plasmolysis, with a solute potential of –2000 kPa, is placed in a solution of water potential –1200 kPa. The direction of flow of water will be :

(1) From cell to solution (2) From solution to cell

(3) Data incomplete (4) No flow of water

15. The greatest amount of free energy is available at which of the following levels ?

(1) Tertiary consumers (2) Secondary consumers

(3) Decomposers (4) Producers

16. The role of decomposers in nitrogen cycle is to :

(1) Fix N_2 into ammonia

(2) Release ammonia from organic compounds, thus returning it to the soil

(3) Denitrify ammonia, thus returning N_2 into the soil

(4) Incorporate nitrogen into amino acids and organic compounds

17. According to the concept of competitive exclusion :

(1) Two species cannot coexist in the same habitat

(2) Extinction or emigration are the only possible results of competitive interaction

(3) Intraspecific competition results in the success of the best adapted individuals

(4) Two species cannot share the same niche in a habitat

18. Which of the following are homologous organs ?

(1) Wings of birds, flippers of whales, and forearms of man

(2) Wings of butterfly, pterygium of flying squirrel, and fins of flying fishes

(3) Tails of snake, scorpion, and wall lizard

(4) Lungs of rabbit, trachea of cockroach, and book lungs of scorpion

19. The most likely sequence for the biological evolution of life is :

(1) Aerobic prokaryotes – Photosynthetic prokaryotes – Anaerobic prokaryotes – Eukaryotes

(2) Photosynthetic prokaryotes – Anaerobic prokaryotes – Aerobic prokaryotes – Eukaryotes

(3) Anaerobic prokaryotes – Photosynthetic prokaryotes – Aerobic prokaryotes – Eukaryotes

(4) Aerobic prokaryotes – Eukaryotes – Anaerobic prokaryotes – Photosynthetic prokaryotes

20. Which of these ecosystem has the lowest primary productivity per square meter ?

(1) A salt marsh
(2) A grassland
(3) An open ocean
(4) A tropical rainforest

21. Crocodile and penguin are similar to whale and dogfish in which one of the following features :

(1) Possess a solid single stranded central nervous system
(2) Lay eggs and guard them till they hatch
(3) Possess bony skeleton
(4) Have gill slits at some stage

22. Which of the following is a correct sequence of decreasing order of number of species ?

(1) Aves, pisces, reptiles, amphibians, mammals
(2) Pisces, aves, reptiles, mammals, amphibians
(3) Pisces, mammals, reptiles, amphibians, aves
(4) Amphibians, aves, pisces, mammals, reptiles

23. Which one of the following animals bears hollow and pneumatic long bones ?

(1) Ornithorhyncus
(2) Neophron
(3) Hemidactylus
(4) Macropus

24. Which of the following groups of animals is correctly matched with its characteristic feature without any exception ?

(1) Reptilia - possess 3-chambered heart with an incompletely divided ventricle
(2) Chordata - possess a mouth with an upper and a lower jaw
(3) Chondrichthyes - possess cartilaginous endoskeleton
(4) Mammalia - Give birth to young ones

25. Which of the following is the correct sequence for the auditory pathway ?
(1) External auditory canal, tympanic membrane, auditory ossicles, oval window, cochlea and spiral organ.
(2) Tympanic membrane, external auditory canal, auditory ossicles, cochlea and spiral organ, round window.
(3) Auditory ossicles, tympanic membrane, cochlea, round window, oval window, external auditory canal.
(4) Auricle, tympanic membrane, round window, cochlea and spiral organ, oval window.

26. Which of the following statements are correct ?
(a) The anterior (ventral) gray horns contain cell bodies of neurons that cause skeletal muscle contraction;
(b) The gray commissure connects the white matter of the right and left sides of the spinal cord;
(c) Cell bodies of autonomic motor neurons are located in the lateral gray horns;
(d) Gray matter in the spinal cord consists of cell bodies of neurons, neuroglia, unmyelinated axons and dendrites of interneurons and motor neurons.
(1) (a) and (b) (2) (b) and (d)
(3) (b), (c), and (d) (4) (a), (b), and (d)

27. Which arrangement correctly identifies the type of blood that the four chambers of the heart (RA- Right Atrium; RV- Right Ventricle; LA- Left Atrium; LV- Left Ventricle) collect and pump:
(1) RA- Oxygenated; RV- Deoxygenated; LA- Oxygenated; LV- Deoxygenated
(2) RA- Deoxygenated; RV- Oxygenated; LA- Deoxygenated; LV- Oxygenated
(3) RA- Deoxygenated; RV- Deoxygenated; LA- Oxygenated; LV- Oxygenated
(4) RA- Oxygenated; RV- Oxygenated; LA- Deoxygenated; LV- Deoxygenated

28. On the summit of Mt. Everest, where the barometric pressure is about 250 mm Hg, the partial pressure of O_2 is about:
(1) 0.1 mm Hg (2) 0.5 mm Hg
(3) 5 mm Hg (4) 50 mm Hg

29. Which of the following statements about rhodopsin is true ?

(1) Rhodopsin is the primary photoreceptor of both rods and cones.

(2) The prosthetic group of rhodopsin is all-*trans*-retinol derived from β-carotene.

(3) Rhodopsin is located in the cytosol of the cell.

(4) Absorption of a photon by rhodopsin causes an isomerization of 11-*cis*-retinal to all-*trans*-retinal.

30. Drinking which of the following would lead to the highest rate of ADH secretion and release :

(1) Two litters of distilled water

(2) Two liters of sea water (mainly hyperosmotic saline)

(3) Two liters of iso-osmotic (isotonic) saline

(4) Two liters of human blood plasma

31. Which of the following systems for plant classification is not phylogenetic ?

(1) Bentham and Hooker's system (2) Engler and Prantl's system

(3) Hutchinson's system (4) Takhtajan's system

32. Which of the following characters is seen in the gymnosperms, but is not seen in other seeded vascular plants ?

(1) Occurrence of alternation of generations

(2) Naked seeds

(3) Dominant sporophyte stage

(4) Formation of pollen grains

33. Root nodules occur in plants of the family :

(1) Fabaceae (2) Liliaceae

(3) Malvaceae (4) Compositae

34. Ovule is morphologically equivalent to :

(1) Megaspore
(2) Megasporangium
(3) Microspore
(4) Megasporophyll

35. Which of the following Gymnospermic orders resembles with Angiosperms ?

(1) Cycadales
(2) Coniferales
(3) Gnetales
(4) Ginkgoales

36. A minimum number of meiotic divisions required to produce 50 seeds of an angiosperm is :

(1) 13
(2) 26
(3) 50
(4) 63

37. In the angiosperms, the :

(1) Gametophyte is prominent, and the sporophyte is dependent upon the gametophyte
(2) Sporophyte is prominent, with the sporophyte and the gametophyte living independently
(3) Sporophyte is prominent, and the gametophyte is dependent upon the sporophyte
(4) Gametophyte is prominent, and the sporophyte stage has disappeared

38. Which sequence correctly illustrates the arrangement of layers from outside to inside in a dicot stem ?

(1) Hypodermis → Endodermis → Pericycle → Phloem → Xylem
(2) Endodermis → Hypodermis → Pericycle → Xylem → Phloem
(3) Hypodermis → Endodermis → Pericycle → Xylem → Phloem
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39. Which of the following statements is incorrect about the companion cell ?
(1) It is a specialized parenchymatous cell
(2) Its nucleus controls the function of sieve tube
(3) It helps in maintaining the pressure gradient in sieve tube
(4) It is present in all vascular plants having phloem

40. Plant cells that are photosynthetically active, are found in which layer of the leaf, and are what type of cells :
(1) Epidermis, Parenchymatous
(2) Mesophyll, Parenchymatous
(3) Mesophyll, Sclerenchymatous
(4) Aerenchyma, Collenchymatous

41. Shoot organogenesis by tissue culture results into :
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(3) Cytostatic Factor (CSF) (4) Sonic Hedgehog (SH)

51. The molecules in a membrane that limit its permeability are :
(1) Carbohydrates (2) Phospholipids
(3) Proteins (4) Water

52. Transport across a membrane is said to be coupled when :
(1) Two molecules are transported across the membrane in the same direction
(2) Membrane transport is coupled to an energy source, such as ATP hydrolysis
(3) Transport of one ion down its gradient provides the energy to transport another molecule against the gradient
(4) Both the concentration gradient and membrane potential determine the rate of transport across the membrane

53. Which statement is false ?
(1) The Golgi complex forms vesicles that fuse to form the endoplasmic reticulum.
(2) If a lysosome bursts, its contents can seriously damage the cytoplasm of a cell.
(3) Secreted proteins are formed by ribosomes attached to the endoplasmic reticulum.
(4) The nucleolus is where ribosomes are assembled.

54. Which of the following show the correct order of the secretory pathway ?
(1) RER → Golgi → Secretory vesicle → Cell exterior
(2) SER → Golgi → Secretory vesicle → Cell exterior
(3) Golgi → SER → Secretory vesicle → Cell exterior
(4) Golgi → Lysosome → SER → Secretory vesicle → Cell exterior

55. If base order in one chain of DNA is "ATCGA", then how many number of H-bond are found in the DNA duplex ?
(1) 20 (2) 12
(3) 10 (4) 11

56. The linkage map of X-chromosome of fruitfly has 66 map units, with yellow body gene (y) at one end and bobbed hair (b) gene at the other end. The recombination frequency between these two genes (y and b) should be :

(1) 60 %
(2) Greater than 50 %
(3) Less than or equal to 50 %
(4) 100 %

57. Which of the following does not occur when a cell enters M phase ?

(1) Chromatin condenses
(2) Histone H1 is dephosphorylated
(3) The nuclear envelope, the endoplasmic reticulum, and the golgi break down
(4) The spindle is formed

58. All of the following processes occur in the mitochondria of mammalian cells except :

(1) Fatty acid biosynthesis
(2) Protein synthesis
(3) DNA synthesis
(4) β-oxidation of fatty acids

59. During DNA replication, Okazaki fragments are used to elongate :

(1) The lagging strand towards the replication fork
(2) The leading strand away from the replication fork
(3) The lagging strand away from the replication fork
(4) The leading strand towards the replication fork

60. Pick out the correct statements :

(a) Haemophilia is a sex-linked recessive disease;
(b) Down's syndrome is due to aneuploidy;
(c) Phenylketonuria is an autosomal recessive gene disorder;
(d) Sickle cell anaemia is a X-linked recessive gene disorder;

(1) (a) and (d) are correct
(2) (b) and (d) are correct
(3) (a), (c), and (d) are correct
(4) (a), (b), and (c) are correct

61. Which of the following is common to both fatty acid synthesis and degradation ?
(1) The oxidation/reduction reactions occur between the α and the β carbons of the fatty acid.
(2) The biochemical nature of the reductant/oxidant.
(3) The intracellular location of the metabolic pathways.
(4) The nature of the two carbon unit.

62. Most of the free fatty acids are transported in the blood :
(1) Inside the red blood cells
(2) As lipoproteins
(3) Combined with glucose
(4) Bound to albumin

63. The oxidation of 1 mol of glucose by anaerobic glycolysis yields a net of :
(1) 2 mol of lactate and 2 mol of ATP
(2) 2 mol of lactate, 2 mol of NADH, and 2 mol of ATP
(3) 2 mol of lactate, 2 mol of NAD^+, and 6 mol of ATP
(4) 2 mol of acetyl-CoA, and 2 mol of ATP

64. The function of the TCA cycle is characterized by all of the following statements except :
(1) It generates reduced NAD^+ and reduced FAD
(2) It generates guanosine triphosphate
(3) It catalyzes the complete oxidation of acetate to carbon dioxide and water
(4) It causes the net synthesis of oxaloacetate from acetyl-CoA

65. Inside an active mitochondrion, most electrons follow which pathway ?
(1) Krebs cycle $\rightarrow$ NADH $\rightarrow$ Electron transport chain $\rightarrow$ Oxygen
(2) Glycolysis $\rightarrow$ NADH $\rightarrow$ Oxidative phosphorylation $\rightarrow$ ATP $\rightarrow$ Oxygen
(3) Krebs cycle $\rightarrow$ $FADH_2$ $\rightarrow$ Electron transport chain $\rightarrow$ ATP
(4) Electron transport chain $\rightarrow$ Krebs cycle $\rightarrow$ ATP $\rightarrow$ Oxygen

66. Which one of the following statements is incorrect about the role of oxidative pentose phosphate pathway in plant metabolism ?

(1) Production of NADH to generate ATP

(2) Generation of NADPH required to drive biosynthetic reactions

(3) Production of pentose phosphate for the synthesi of nucleic acids

(4) Formation of erythrose 4-phosphate for biosynthesis of aromatic amino acids

67. Which of the following statements is incorrect about leg-haemoglobin ?

(1) It acts as O_2 scavenger

(2) It imparts pink or red colour to the nodules

(3) It combines with O_2 and protects nitrogenase

(4) It is a Mo-Fe protein

68. BACs, cosmids, phages, plasmids and YACs are all commonly used cloning vectors that differ in their cloning capacities, with a range from approximately 100 bp to 3000 kb. Which of the following is the proper order for these vectors in terms of increasing cloning capacity ?

(1) BAC, cosmid, phage, plasmid, YAC

(2) YAC, BAC, cosmid, phage, plasmid

(3) Plasmid, phage, cosmid, BAC, YAC

(4) Plasmid, cosmid, phage, BAC, YAC

69. A certain purified DNA sample was cut with two restriction endonucleases E1 & E2. The following results were obtained from agarose gel electrophoresis :

Sample cut with E1 alone- two bands of size 35 kb and 15 kb.

Sample cut with E2 alone- two bands of size 40 kb and 10 kb.

Sample cut simultaneously with E1 & E2- three bands of 35 kb, 10 kb & 5 kb.

From these data, it can be inferred that the DNA has :

(1) Two sites for E1 and one site for E2

(2) One site for E1 and two sites for E2

(3) One site each for E1 and E2

(4) Three sites for E1 and one site for E2

70. Border sequences need to be incorporated into the design of plasmid vectors for Agrobacterium- mediated transformation to ensure :
(1) Greater promoter efficiency
(2) Oncogene deactivation
(3) Efficient replication of the plasmid
(4) Integration of the genes of interest into the host gene

71. Which of the following is not a function of the liver ?
(1) Storage of vitamin C
(2) Production of bile
(3) Detoxification of drugs
(4) Storage of glucose

72. During ovulation, all of the following occur except :
(1) Rupture of the Graafian follicle
(2) Estrogen production reaches its lowest point
(3) FSH and LH plasma levels surge
(4) Corpus luteum is formed

73. In which of the following combinations is the name of the hormone, its chemical type, and its tissue of origin correctly matched ?
(1) Aldosterone → Peptide → Pancreas
(2) Glucagons → Peptide → Adrenal Cortex
(3) ACTH → Polypeptide → Adrenal Cortex
(4) Vasopressin → Peptide → Posterior Pituitary

74. The system that controls smooth muscle, cardiac muscle, and gland activity is the :
(1) Somatic nervous system
(2) Autonomic nervous system
(3) Skeletal division
(4) Sensory nervous system

75. The sap of a plant cell has an osmotic potential of -10 bars and there is a wall pressure of 2 bars. When this cell is placed in a solution with an osmotic potential of -3 bars, the force causing water to enter the cell is :
(1) -8 bar
(2) -7 bar
(3) -5 bar
(4) -3 bar

76. A carotenoid-less mutant plant was grown under normal sunlight, it will experience :

(1) Increased photosynthetic rate

(2) Increased chlorophyll biosynthesis

(3) Reduced photorespiration

(4) Increased chlorophyll oxidation and necrosis

77. Following are some statements regarding plant growth hormones :

(a) Ethylene regulates abscission;

(b) Gibberellins do not play any role in flowering;

(c) Auxin and cytokinin promote cell division;

(d) Over-production of cytokinin promotes root growth;

(e) ABA inhibits root growth and promotes shoot growth at low water potential;

(f) ABA promotes leaf senescence independent of ethylene.

Which of the following combination of above statements is correct ?

(1) (a), (c), and (f)

(2) (b), (c), and (d)

(3) (d), (e), and (f)

(4) (b), (d), and (e)

78. Which of the following is not a difference between sugar translocation in phloem and water movement in the xylem ?

(1) Sugar translocation is a metabolically active process, while water movement is entirely passive

(2) Pressure is positive in sieve tubes, while xylem is usually under tension

(3) Sieve tubes are living cells, while mature xylem is dead

(4) All of these are correct

79. Which of the following function is not associated with phytochrome ?

(1) Nyctinastic movement in *Mimosa*

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82. Choose the mismatch :

(1) Polyps :: Coelenterates

(2) First triploblastic :: Flatworms

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(4) Radial symmetry :: Larvae of Echinoderm

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(a) Absence of a trochophore larva;

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86. Which of the following is a matching pair of a body feature and the animal possessing it :
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(3) Aves and Cyclostomata
(4) Pisces and Amphibia

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(4) It remains as usual without any change

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(3) Homodont, Pleurodont, and Polyphyodont
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(3) Red algae – no flagellated stages in life cycle

(4) Brown algae – include the largest seaweeds

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(1) Cyanobacteria are the highest evolved algae

(2) Dominant pigment of blue green algae is haemoerythrin

(3) Sexual reproduction in cyanobacteria is isogamous

(4) No spindle formation occurs in nostoc cell at the time of division

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(b) Number of methionines in the protein;

(c) Molecular weight of the protein;

(d) GC richness of the genomic DNA;

(e) Richness of saturated fatty acids in plasma membranes.

(1) (a) and (e) (2) (b) and (c)

(3) (c) and (d) (4) (a) and (c)

96. Which of the following is true of the Bryophytes ?
(1) It is the only group that shows an alternation of generations
(2) Bryophytes exhibit extensive vascular tissue
(3) The sporophyte (multicellular diploid) is the dominant stage
(4) The gametophye (multicellular haploid) is the dominant stage

97. Which of the following best describes a fern gametophyte ?
(1) Its cells are haploid
(2) It lacks chlorophyll
(3) It is tough and woody
(4) It is larger than the sporophyte

98. The *Riccia* is a bryophyte because :
(1) It occurs mostly on land and has motile sperm.
(2) It has heteromorphic alternation of generation and lacks leaves.
(3) It has multicellular sex organs with a sterile jacket and lacks vascular tissues.
(4) Its sporophyte lacks differentiation and has a single-layered jacket.

99. The aquatic fern which supports the growth of blue-green algae, Anabaena, and used to increase the yield of paddy crop is :
(1) Salvinia
(2) Marsilea
(3) Selaginella
(4) Azolla

100. As we go from species to kingdom in a taxonomic hierarchy, the number of common characteristics :
(1) Will decrease
(2) Will increase
(3) Remain same
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Total No. of Printed Pages : 21

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C

SET-Y

PG-EE-July, 2024

SUBJECT : Life Sciences

Sr. No. 11011

Time : 1¼ Hours | Max. Marks : 100 | Total Questions : 100

Roll No. (in figures)_____ (in words) _____

Name _____ Date of Birth_____

Father's Name _____ Mother's Name _____

Date of Examination _____

_____ _____

(Signature of the Candidate) (Signature of the Invigilator)

SEAL

CANDIDATES MUST READ THE FOLLOWING INFORMATION/INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

1. ***All questions are compulsory.***
2. The candidates ***must return*** the question booklet as well as OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / mis-behaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
4. Question Booklet along with answer key of all the A, B, C & D code shall be got uploaded on the University Website immediately after the conduct of Entrance Examination. Candidates may raise valid objection/complaint if any, with regard to discrepancy in the question booklet/answer key within 24 hours of uploading the same on the University Website. The complaint be sent by the students to the Controller of Examinations by hand or through email. Thereafter, no complaint in any case, will be considered.
5. The candidate ***must not*** do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself. Answers ***must not*** be ticked in the question booklet.
6. ***There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.***
7. Use only **Black** or **Blue Ball Point Pen** of good quality in the OMR Answer-Sheet.
8. *Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained* **30** *minutes after starting of the examination.*

1. Which of the following is not a function of the liver ?
   (1) Storage of vitamin C
   (2) Production of bile
   (3) Detoxification of drugs
   (4) Storage of glucose

2. During ovulation, all of the following occur except :
   (1) Rupture of the Graafian follicle
   (2) Estrogen production reaches its lowest point
   (3) FSH and LH plasma levels surge
   (4) Corpus luteum is formed

3. In which of the following combinations is the name of the hormone, its chemical type, and its tissue of origin correctly matched ?
   (1) Aldosterone → Peptide → Pancreas
   (2) Glucagons → Peptide → Adrenal Cortex
   (3) ACTH → Polypeptide → Adrenal Cortex
   (4) Vasopressin → Peptide → Posterior Pituitary

4. The system that controls smooth muscle, cardiac muscle, and gland activity is the :
   (1) Somatic nervous system
   (2) Autonomic nervous system
   (3) Skeletal division
   (4) Sensory nervous system

5. The sap of a plant cell has an osmotic potential of -10 bars and there is a wall pressure of 2 bars. When this cell is placed in a solution with an osmotic potential of -3 bars, the force causing water to enter the cell is :
   (1) -8 bar
   (2) -7 bar
   (3) -5 bar
   (4) -3 bar

6. A carotenoid-less mutant plant was grown under normal sunlight, it will experience :
   (1) Increased photosynthetic rate
   (2) Increased chlorophyll biosynthesis
   (3) Reduced photorespiration
   (4) Increased chlorophyll oxidation and necrosis

7. Following are some statements regarding plant growth hormones :

(a) Ethylene regulates abscission;

(b) Gibberellins do not play any role in flowering;

(c) Auxin and cytokinin promote cell division;

(d) Over-production of cytokinin promotes root growth;

(e) ABA inhibits root growth and promotes shoot growth at low water potential;

(f) ABA promotes leaf senescence independent of ethylene.

Which of the following combination of above statements is correct ?

(1) (a), (c), and (f)
(2) (b), (c), and (d)
(3) (d), (e), and (f)
(4) (b), (d), and (e)

8. Which of the following is not a difference between sugar translocation in phloem and water movement in the xylem ?

(1) Sugar translocation is a metabolically active process, while water movement is entirely passive

(2) Pressure is positive in sieve tubes, while xylem is usually under tension

(3) Sieve tubes are living cells, while mature xylem is dead

(4) All of these are correct

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(1) A bipolar structure that has no vascular connection with the explant.
(2) A monopolar structure that has a strong connection with the pre-existing vascular tissue of the explant.
(3) A monopolar structure that has no vascular connection with the explant.
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32. Sweet potato is an underground crop/structure which stores food. Where is the food prepared in this plant ?
(1) Leaves
(2) Fruit
(3) Stem
(4) Root

33. Coir of commerce comes from which part of coconut ?
(1) Epicarp
(2) Mesocarp
(3) Seed coat
(4) Endocarp

34. Cereal crop which is staple food in Asia is :
(1) Cold season crop
(2) All weather crop
(3) Temperate crop
(4) Tropical crop

35. Inland fisheries are :
(1) Deep sea fishing
(2) Capturing fishes from sea coast
(3) Raising and capturing fishes in fresh water
(4) Oil extraction from fish

36. Where is the nectar converted into honey ?
(1) In the alimentary canal of the queen
(2) In the alimentary canal of the worker
(3) In royal chamber
(4) In special cell of the hive

37. Mutations in homeotic genes can lead to what type of developmental defect :
(1) The anterior portion of the embryo does not develop.
(2) Several adjacent segments will be missing from an otherwise intact embryo.
(3) The embryo will develop with every other segment failing to form.
(4) The development of segments will be changed completely from their normal identity to that of a different segment.

38. The termination of gastrulation is indicated by :
(1) Closure of neural tube
(2) Closure of blastopore
(3) Obliteration of archenteron
(4) Obliteration of blastocoel

39. During fertilization, polyspermy is prevented by :

(1) Zona pellucida in the presence of Na^+ ions

(2) Vitelline membrane in the presence of Ca^{2+} ions

(3) Cortical granules in the presence of Ca^{2+} and Na^+ ions

(4) Influx of Na^+, Ca^{2+}, and Mg^{2+} ions

40. In Xenopus, a type of frog, and most vertebrates, there is a certain factor that arrests the secondary oocyte in metaphase II of meiosis. What is the name of this factor ?

(1) Mitosis Promoting Factor (MPF)

(2) Vitellogenesis Factor (VF)

(3) Cytostatic Factor (CSF)

(4) Sonic Hedgehog (SH)

41. The molecules in a membrane that limit its permeability are :

(1) Carbohydrates

(2) Phospholipids

(3) Proteins

(4) Water

42. Transport across a membrane is said to be coupled when :

(1) Two molecules are transported across the membrane in the same direction

(2) Membrane transport is coupled to an energy source, such as ATP hydrolysis

(3) Transport of one ion down its gradient provides the energy to transport another molecule against the gradient

(4) Both the concentration gradient and membrane potential determine the rate of transport across the membrane

43. Which statement is false ?

(1) The Golgi complex forms vesicles that fuse to form the endoplasmic reticulum.

(2) If a lysosome bursts, its contents can seriously damage the cytoplasm of a cell.

(3) Secreted proteins are formed by ribosomes attached to the endoplasmic reticulum.

(4) The nucleolus is where ribosomes are assembled.

44. Which of the following show the correct order of the secretory pathway ?
(1) RER → Golgi → Secretory vesicle → Cell exterior
(2) SER → Golgi → Secretory vesicle → Cell exterior
(3) Golgi → SER → Secretory vesicle → Cell exterior
(4) Golgi → Lysosome → SER → Secretory vesicle → Cell exterior

45. If base order in one chain of DNA is "ATCGA", then how many number of H-bond are found in the DNA duplex ?
(1) 20 (2) 12
(3) 10 (4) 11

46. The linkage map of X-chromosome of fruitfly has 66 map units, with yellow body gene (y) at one end and bobbed hair (b) gene at the other end. The recombination frequency between these two genes (y and b) should be :
(1) 60 % (2) Greater than 50 %
(3) Less than or equal to 50 % (4) 100 %

47. Which of the following does not occur when a cell enters M phase ?
(1) Chromatin condenses
(2) Histone H1 is dephosphorylated
(3) The nuclear envelope, the endoplasmic reticulum, and the golgi break down
(4) The spindle is formed

48. All of the following processes occur in the mitochondria of mammalian cells except :
(1) Fatty acid biosynthesis (2) Protein synthesis
(3) DNA synthesis (4) β-oxidation of fatty acids

49. During DNA replication, Okazaki fragments are used to elongate :
(1) The lagging strand towards the replication fork
(2) The leading strand away from the replication fork
(3) The lagging strand away from the replication fork
(4) The leading strand towards the replication fork

50. Pick out the correct statements :

(a) Haemophilia is a sex-linked recessive disease;

(b) Down's syndrome is due to aneuploidy;

(c) Phenylketonuria is an autosomal recessive gene disorder;

(d) Sickle cell anaemia is a X-linked recessive gene disorder;

(1) (a) and (d) are correct (2) (b) and (d) are correct

(3) (a), (c), and (d) are correct (4) (a), (b), and (c) are correct

51. Crocodile and penguin are similar to whale and dogfish in which one of the following features :

(1) Possess a solid single stranded central nervous system

(2) Lay eggs and guard them till they hatch

(3) Possess bony skeleton

(4) Have gill slits at some stage

52. Which of the following is a correct sequence of decreasing order of number of species ?

(1) Aves, pisces, reptiles, amphibians, mammals

(2) Pisces, aves, reptiles, mammals, amphibians

(3) Pisces, mammals, reptiles, amphibians, aves

(4) Amphibians, aves, pisces, mammals, reptiles

53. Which one of the following animals bears hollow and pneumatic long bones ?

(1) Ornithorhyncus (2) Neophron

(3) Hemidactylus (4) Macropus

54. Which of the following groups of animals is correctly matched with its characteristic feature without any exception ?

(1) Reptilia - possess 3-chambered heart with an incompletely divided ventricle

(2) Chordata - possess a mouth with an upper and a lower jaw

(3) Chondrichthyes - possess cartilaginous endoskeleton

(4) Mammalia - Give birth to young ones

55. Which of the following is the correct sequence for the auditory pathway ?
(1) External auditory canal, tympanic membrane, auditory ossicles, oval window, cochlea and spiral organ.
(2) Tympanic membrane, external auditory canal, auditory ossicles, cochlea and spiral organ, round window.
(3) Auditory ossicles, tympanic membrane, cochlea, round window, oval window, external auditory canal.
(4) Auricle, tympanic membrane, round window, cochlea and spiral organ, oval window.

56. Which of the following statements are correct ?
(a) The anterior (ventral) gray horns contain cell bodies of neurons that cause skeletal muscle contraction;
(b) The gray commissure connects the white matter of the right and left sides of the spinal cord;
(c) Cell bodies of autonomic motor neurons are located in the lateral gray horns;
(d) Gray matter in the spinal cord consists of cell bodies of neurons, neuroglia, unmyelinated axons and dendrites of interneurons and motor neurons.
(1) (a) and (b)
(2) (b) and (d)
(3) (b), (c), and (d)
(4) (a), (b), and (d)

57. Which arrangement correctly identifies the type of blood that the four chambers of the heart (RA- Right Atrium; RV- Right Ventricle; LA- Left Atrium; LV- Left Ventricle) collect and pump:
(1) RA- Oxygenated; RV- Deoxygenated; LA- Oxygenated; LV- Deoxygenated
(2) RA- Deoxygenated; RV- Oxygenated; LA- Deoxygenated; LV- Oxygenated
(3) RA- Deoxygenated; RV- Deoxygenated; LA- Oxygenated; LV- Oxygenated
(4) RA- Oxygenated; RV- Oxygenated; LA- Deoxygenated; LV- Deoxygenated

58. On the summit of Mt. Everest, where the barometric pressure is about 250 mm Hg, the partial pressure of O_2 is about:
(1) 0.1 mm Hg
(2) 0.5 mm Hg
(3) 5 mm Hg
(4) 50 mm Hg

59. Which of the following statements about rhodopsin is true ?
(1) Rhodopsin is the primary photoreceptor of both rods and cones.
(2) The prosthetic group of rhodopsin is all-*trans*-retinol derived from β-carotene.
(3) Rhodopsin is located in the cytosol of the cell.
(4) Absorption of a photon by rhodopsin causes an isomerization of 11-*cis*-retinal to all-*trans*-retinal.

60. Drinking which of the following would lead to the highest rate of ADH secretion and release :
(1) Two litters of distilled water
(2) Two liters of sea water (mainly hyperosmotic saline)
(3) Two liters of iso-osmotic (isotonic) saline
(4) Two liters of human blood plasma

61. Inversions are considered as cross-over suppressors because :
(1) Homozygous inversions are lethal and thus they do not appear in next generation.
(2) Inversion heterozygotes, i.e., one copy having normal chromosome and its homologue having inversion, does not allow crossing-over to occur as they cannot pair at all.
(3) Due to inversion present, four chromosomes take part in the pairing and crossing-over events, and make the structure difficult for separation and gamete formation.
(4) The pairing and crossing-overs do occur in inversion heterozygotes, but the gametes having cross-over products are lethal.

62. Rifampicin is a bactericidal antibiotic drug used typically in treating *Mycobacterium* infections. Which of the following statements describes the mechanism of action of rifampicin ?
(1) Rifampicin inhibits DNA-dependent RNA polymerase in bacterial cells by binding its β-subunit, thus preventing transcription to RNA.
(2) Interferes with translation through binding to the 30S ribosomal subunit.
(3) Interferes with the cell wall biosynthesis of growing bacteria.
(4) Interferes with 70S ribosomes resulting in incorrect translation of mRNA.

63. The RNA polymerase holoenzyme transcribes :
(1) The promoter, structural gene, and the terminator region
(2) The promoter and the terminator region
(3) The structural gene and the terminator region
(4) The structural gene only

64. Given below are the steps of protein synthesis :
(a) Codon-anticodon reaction between mRNA and aminoacyl tRNA complex
(b) Attachment of mRNA and smaller sub-unit of ribosome
(c) Charging or aminoacylation of tRNA
(d) Attachment of larger sub-unit of ribosome to the mRNA-$tRNA_{Met}$ Complex
(e) Linking of adjacent amino acids
(f) Formation of polypeptide chain
(1) (b) → (a) → (c) → (e) → (d) → (f)
(2) (e) → (b) → (a) → (c) → (d) → (f)
(3) (c) → (b) → (d) → (a) → (e) → (f)
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65. Under which of the following conditions, there will be no change in the reading frame of the following mRNA: 5' AACAGCGGUGCUAUU 3' :
(1) Deletion of GGU from 7th, 8th, and 9th positions
(2) Insertion of G at the 5th position
(3) Deletion of G from the 5th position
(4) Insertion of A and G at 4th and 5th position, respectively

66. During mismatch repair in *E. coli*, the parental strand is recognized by :
(1) Single-stranded breaks
(2) Glycosylated adenines
(3) Methylated adenines
(4) Methylation of the 6th position of guanine residues

67. Enzymes increase the rate of reaction by :
(1) Increasing the free energy of activation
(2) Increasing the free-energy change of the reaction
(3) Changing the equilibrium constant of the reaction
(4) Decreasing the energy of activation

68. In a Michaelis-Menten enzyme mechanism, what substrate concentration (relative to K_m) is needed for the reaction rate to be 0.5 V_{max}.
(1) 1/9 K_m (2) 1/3 K_m
(3) K_m (4) 1/4 K_m

69. The enzymes where catalysis involves transfer of electrons are named as :
(1) Isomerases (2) Transferases
(3) Oxidoreductases (4) Lyases

70. Which of the following is not an example of allosteric regulation ?
(1) Regulation of phosphofructokinase activity by fructose 2,6-bisphosphate
(2) Inactivation of nitrogenase by ADP-ribosylation .
(3) Regulation of the lac operon by allolactose in *E. coli*
(4) Catabolite repression by CAP in *E. coli*

71. Which of the following is common to both fatty acid synthesis and degradation ?
(1) The oxidation/reduction reactions occur between the α and the β carbons of the fatty acid.
(2) The biochemical nature of the reductant/oxidant.
(3) The intracellular location of the metabolic pathways.
(4) The nature of the two carbon unit.

72. Most of the free fatty acids are transported in the blood :
(1) Inside the red blood cells (2) As lipoproteins
(3) Combined with glucose (4) Bound to albumin

73. The oxidation of 1 mol of glucose by anaerobic glycolysis yields a net of :
(1) 2 mol of lactate and 2 mol of ATP
(2) 2 mol of lactate, 2 mol of NADH, and 2 mol of ATP
(3) 2 mol of lactate, 2 mol of NAD^+, and 6 mol of ATP
(4) 2 mol of acetyl-CoA, and 2 mol of ATP

74. The function of the TCA cycle is characterized by all of the following statements except :
(1) It generates reduced NAD^+ and reduced FAD
(2) It generates guanosine triphosphate
(3) It catalyzes the complete oxidation of acetate to carbon dioxide and water
(4) It causes the net synthesis of oxaloacetate from acetyl-CoA

75. Inside an active mitochondrion, most electrons follow which pathway ?
(1) Krebs cycle → NADH → Electron transport chain → Oxygen
(2) Glycolysis → NADH → Oxidative phosphorylation → ATP → Oxygen
(3) Krebs cycle → $FADH_2$ → Electron transport chain → ATP
(4) Electron transport chain → Krebs cycle → ATP → Oxygen

76. Which one of the following statements is incorrect about the role of oxidative pentose phosphate pathway in plant metabolism ?
(1) Production of NADH to generate ATP
(2) Generation of NADPH required to drive biosynthetic reactions
(3) Production of pentose phosphate for the synthesi of nucleic acids
(4) Formation of erythrose 4-phosphate for biosynthesis of aromatic amino acids

77. Which of the following statements is incorrect about leg-haemoglobin ?
(1) It acts as O_2 scavenger
(2) It imparts pink or red colour to the nodules
(3) It combines with O_2 and protects nitrogenase
(4) It is a Mo-Fe protein

78. BACs, cosmids, phages, plasmids and YACs are all commonly used cloning vectors that differ in their cloning capacities, with a range from approximately 100 bp to 3000 kb. Which of the following is the proper order for these vectors in terms of increasing cloning capacity ?

(1) BAC, cosmid, phage, plasmid, YAC

(2) YAC, BAC, cosmid, phage, plasmid

(3) Plasmid, phage, cosmid, BAC, YAC

(4) Plasmid, cosmid, phage, BAC, YAC

79. A certain purified DNA sample was cut with two restriction endonucleases E1 & E2. The following results were obtained from agarose gel electrophoresis :

Sample cut with E1 alone- two bands of size 35 kb and 15 kb.

Sample cut with E2 alone- two bands of size 40 kb and 10 kb.

Sample cut simultaneously with E1 & E2- three bands of 35 kb, 10 kb & 5 kb.

From these data, it can be inferred that the DNA has :

(1) Two sites for E1 and one site for E2

(2) One site for E1 and two sites for E2

(3) One site each for E1 and E2

(4) Three sites for E1 and one site for E2

80. Border sequences need to be incorporated into the design of plasmid vectors for Agrobacterium- mediated transformation to ensure :

(1) Greater promoter efficiency

(2) Oncogene deactivation

(3) Efficient replication of the plasmid

(4) Integration of the genes of interest into the host gene

81. Which of the following systems for plant classification is not phylogenetic ?

(1) Bentham and Hooker's system
(2) Engler and Prantl's system
(3) Hutchinson's system
(4) Takhtajan's system

82. Which of the following characters is seen in the gymnosperms, but is not seen in other seeded vascular plants ?

(1) Occurrence of alternation of generations
(2) Naked seeds
(3) Dominant sporophyte stage
(4) Formation of pollen grains

83. Root nodules occur in plants of the family :

(1) Fabaceae
(2) Liliaceae
(3) Malvaceae
(4) Compositae

84. Ovule is morphologically equivalent to :

(1) Megaspore
(2) Megasporangium
(3) Microspore
(4) Megasporophyll

85. Which of the following Gymnospermic orders resembles with Angiosperms ?

(1) Cycadales
(2) Coniferales
(3) Gnetales
(4) Ginkgoales

86. A minimum number of meiotic divisions required to produce 50 seeds of an angiosperm is :

(1) 13
(2) 26
(3) 50
(4) 63

87. In the angiosperms, the :

(1) Gametophyte is prominent, and the sporophyte is dependent upon the gametophyte

(2) Sporophyte is prominent, with the sporophyte and the gametophyte living independently

(3) Sporophyte is prominent, and the gametophyte is dependent upon the sporophyte

(4) Gametophyte is prominent, and the sporophyte stage has disappeared

88. Which sequence correctly illustrates the arrangement of layers from outside to inside in a dicot stem ?

(1) Hypodermis → Endodermis → Pericycle → Phloem → Xylem

(2) Endodermis → Hypodermis → Pericycle → Xylem → Phloem

(3) Hypodermis → Endodermis → Pericycle → Xylem → Phloem

(4) Endodermis → Hypodermis → Pericycle → Phloem → Xylem

89. Which of the following statements is incorrect about the companion cell ?

(1) It is a specialized parenchymatous cell

(2) Its nucleus controls the function of sieve tube

(3) It helps in maintaining the pressure gradient in sieve tube

(4) It is present in all vascular plants having phloem

90. Plant cells that are photosynthetically active, are found in which layer of the leaf, and are what type of cells :

(1) Epidermis, Parenchymatous

(2) Mesophyll, Parenchymatous

(3) Mesophyll, Sclerenchymatous

(4) Aerenchyma, Collenchymatous

91. What is the step in photosynthesis that contributes the greatest number of protons to the generation of a concentration gradient across the thylakoid membrane ?

(1) The Q cycle

(2) Reduction of $NADP^+$ to NADPH

(3) Oxidation of water to O_2

(4) None of the above contribute to the proton concentration gradient

92. Production of one molecule of 3-phosphoglyceraldehyde requires how many turns of the Calvin cycle :

(1) 01 (2) 02

(3) 03 (4) 06

93. Which of the following statements best supports the fact that photorespiration commonly occurs in C_3 plants ?

(1) C_3 plants do not possess Kranz anatomy

(2) C_3 plants have usually high CO_2 compensation species

(3) C_3 plants are less efficient in photosynthesis

(4) C_3 plants are characterized by RuBP oxygenase activity under high oxygen supply

94. A cell at incipient plasmolysis, with a solute potential of –2000 kPa, is placed in a solution of water potential –1200 kPa. The direction of flow of water will be :

(1) From cell to solution (2) From solution to cell

(3) Data incomplete (4) No flow of water

95. The greatest amount of free energy is available at which of the following levels ?

(1) Tertiary consumers (2) Secondary consumers

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96. The role of decomposers in nitrogen cycle is to :

(1) Fix N_2 into ammonia

(2) Release ammonia from organic compounds, thus returning it to the soil

(3) Denitrify ammonia, thus returning N_2 into the soil

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97. According to the concept of competitive exclusion :

(1) Two species cannot coexist in the same habitat

(2) Extinction or emigration are the only possible results of competitive interaction

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98. Which of the following are homologous organs ?

(1) Wings of birds, flippers of whales, and forearms of man

(2) Wings of butterfly, pterygium of flying squirrel, and fins of flying fishes

(3) Tails of snake, scorpion, and wall lizard

(4) Lungs of rabbit, trachea of cockroach, and book lungs of scorpion

99. The most likely sequence for the biological evolution of life is :

(1) Aerobic prokaryotes – Photosynthetic prokaryotes – Anaerobic prokaryotes – Eukaryotes

(2) Photosynthetic prokaryotes – Anaerobic prokaryotes – Aerobic prokaryotes – Eukaryotes

(3) Anaerobic prokaryotes – Photosynthetic prokaryotes – Aerobic prokaryotes – Eukaryotes

(4) Aerobic prokaryotes – Eukaryotes – Anaerobic prokaryotes – Photosynthetic prokaryotes

100. Which of these ecosystem has the lowest primary productivity per square meter ?

(1) A salt marsh

(2) A grassland

(3) An open ocean

(4) A tropical rainforest

Total No. of Printed Pages : 21

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D

SET-Y

PG-EE-July, 2024

SUBJECT : Life Sciences

11012

Sr. No. .....

Time : 1¼ Hours | Max. Marks : 100 | Total Questions : 100

Roll No. (in figures)_____ (in words) _____

Name _____ Date of Birth_____

Father's Name _____ Mother's Name _____

Date of Examination _____

_____ _____

(Signature of the Candidate) (Signature of the Invigilator)

SEAL

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2. The candidates ***must return*** the question booklet as well as OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / mis-behaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
4. Question Booklet along with answer key of all the A, B, C & D code shall be got uploaded on the University Website immediately after the conduct of Entrance Examination. Candidates may raise valid objection/complaint if any, with regard to discrepancy in the question booklet/answer key within 24 hours of uploading the same on the University Website. The complaint be sent by the students to the Controller of Examinations by hand or through email. Thereafter, no complaint in any case, will be considered.
5. The candidate ***must not*** do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself. Answers ***must not*** be ticked in the question booklet.
6. ***There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.***
7. Use only **Black** or **Blue Ball Point Pen** of good quality in the OMR Answer-Sheet.
8. *Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained* **30** *minutes after starting of the examination.*

1. Which of the following systems for plant classification is not phylogenetic ?
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   (2) Mesophyll, Parenchymatous
   (3) Mesophyll, Sclerenchymatous
   (4) Aerenchyma, Collenchymatous

11. Shoot organogenesis by tissue culture results into :
   (1) A bipolar structure that has no vascular connection with the explant.
   (2) A monopolar structure that has a strong connection with the pre-existing vascular tissue of the explant.
   (3) A monopolar structure that has no vascular connection with the explant.
   (4) A bipolar structure that has a strong connection with the pre-existing vascular tissue of the explant.

12. Sweet potato is an underground crop/structure which stores food. Where is the food prepared in this plant ?

(1) Leaves
(2) Fruit
(3) Stem
(4) Root

13. Coir of commerce comes from which part of coconut ?

(1) Epicarp
(2) Mesocarp
(3) Seed coat
(4) Endocarp

14. Cereal crop which is staple food in Asia is :

(1) Cold season crop
(2) All weather crop
(3) Temperate crop
(4) Tropical crop

15. Inland fisheries are :

(1) Deep sea fishing
(2) Capturing fishes from sea coast
(3) Raising and capturing fishes in fresh water
(4) Oil extraction from fish

16. Where is the nectar converted into honey ?

(1) In the alimentary canal of the queen
(2) In the alimentary canal of the worker
(3) In royal chamber
(4) In special cell of the hive

17. Mutations in homeotic genes can lead to what type of developmental defect :

(1) The anterior portion of the embryo does not develop.
(2) Several adjacent segments will be missing from an otherwise intact embryo.
(3) The embryo will develop with every other segment failing to form.
(4) The development of segments will be changed completely from their normal identity to that of a different segment.

18. The termination of gastrulation is indicated by :
(1) Closure of neural tube
(2) Closure of blastopore
(3) Obliteration of archenteron
(4) Obliteration of blastocoel

19. During fertilization, polyspermy is prevented by :
(1) Zona pellucida in the presence of Na^+ ions
(2) Vitelline membrane in the presence of Ca^{2+} ions
(3) Cortical granules in the presence of Ca^{2+} and Na^+ ions
(4) Influx of Na^+, Ca^{2+}, and Mg^{2+} ions

20. In Xenopus, a type of frog, and most vertebrates, there is a certain factor that arrests the secondary oocyte in metaphase II of meiosis. What is the name of this factor ?
(1) Mitosis Promoting Factor (MPF)
(2) Vitellogenesis Factor (VF)
(3) Cytostatic Factor (CSF)
(4) Sonic Hedgehog (SH)

21. Inversions are considered as cross-over suppressors because :
(1) Homozygous inversions are lethal and thus they do not appear in next generation.
(2) Inversion heterozygotes, i.e., one copy having normal chromosome and its homologue having inversion, does not allow crossing-over to occur as they cannot pair at all.
(3) Due to inversion present, four chromosomes take part in the pairing and crossing-over events, and make the structure difficult for separation and gamete formation.
(4) The pairing and crossing-overs do occur in inversion heterozygotes, but the gametes having cross-over products are lethal.

22. Rifampicin is a bactericidal antibiotic drug used typically in treating *Mycobacterium* infections. Which of the following statements describes the mechanism of action of rifampicin ?
(1) Rifampicin inhibits DNA-dependent RNA polymerase in bacterial cells by binding its β-subunit, thus preventing transcription to RNA.
(2) Interferes with translation through binding to the 30S ribosomal subunit.
(3) Interferes with the cell wall biosynthesis of growing bacteria.
(4) Interferes with 70S ribosomes resulting in incorrect translation of mRNA.

23. The RNA polymerase holoenzyme transcribes :

(1) The promoter, structural gene, and the terminator region

(2) The promoter and the terminator region

(3) The structural gene and the terminator region

(4) The structural gene only

24. Given below are the steps of protein synthesis :

(a) Codon-anticodon reaction between mRNA and aminoacyl tRNA complex

(b) Attachment of mRNA and smaller sub-unit of ribosome

(c) Charging or aminoacylation of tRNA

(d) Attachment of larger sub-unit of ribosome to the mRNA-$tRNA_{Met}$ Complex

(e) Linking of adjacent amino acids

(f) Formation of polypeptide chain

(1) (b) → (a) → (c) → (e) → (d) → (f)

(2) (e) → (b) → (a) → (c) → (d) → (f)

(3) (c) → (b) → (d) → (a) → (e) → (f)

(4) (c) → (b) → (a) → (d) → (e) → (f)

25. Under which of the following conditions, there will be no change in the reading frame of the following mRNA: 5' AACAGCGGUGCUAUU 3' :

(1) Deletion of GGU from 7th, 8th, and 9th positions

(2) Insertion of G at the 5th position

(3) Deletion of G from the 5th position

(4) Insertion of A and G at 4th and 5th position, respectively

26. During mismatch repair in *E. coli*, the parental strand is recognized by :

(1) Single-stranded breaks

(2) Glycosylated adenines

(3) Methylated adenines

(4) Methylation of the 6th position of guanine residues

27. Enzymes increase the rate of reaction by :
(1) Increasing the free energy of activation
(2) Increasing the free-energy change of the reaction
(3) Changing the equilibrium constant of the reaction
(4) Decreasing the energy of activation

28. In a Michaelis-Menten enzyme mechanism, what substrate concentration (relative to K_m) is needed for the reaction rate to be 0.5 V_{max}.
(1) 1/9 K_m
(2) 1/3 K_m
(3) K_m
(4) 1/4 K_m

29. The enzymes where catalysis involves transfer of electrons are named as :
(1) Isomerases
(2) Transferases
(3) Oxidoreductases
(4) Lyases

30. Which of the following is not an example of allosteric regulation ?
(1) Regulation of phosphofructokinase activity by fructose 2,6-bisphosphate
(2) Inactivation of nitrogenase by ADP-ribosylation .
(3) Regulation of the lac operon by allolactose in *E. coli*
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39. The most likely sequence for the biological evolution of life is :
(1) Aerobic prokaryotes – Photosynthetic prokaryotes – Anaerobic prokaryotes – Eukaryotes
(2) Photosynthetic prokaryotes – Anaerobic prokaryotes – Aerobic prokaryotes – Eukaryotes
(3) Anaerobic prokaryotes – Photosynthetic prokaryotes – Aerobic prokaryotes – Eukaryotes
(4) Aerobic prokaryotes – Eukaryotes – Anaerobic prokaryotes – Photosynthetic prokaryotes

40. Which of these ecosystem has the lowest primary productivity per square meter ?
(1) A salt marsh
(2) A grassland
(3) An open ocean
(4) A tropical rainforest

41. Crocodile and penguin are similar to whale and dogfish in which one of the following features :
(1) Possess a solid single stranded central nervous system
(2) Lay eggs and guard them till they hatch
(3) Possess bony skeleton
(4) Have gill slits at some stage

42. Which of the following is a correct sequence of decreasing order of number of species ?
(1) Aves, pisces, reptiles, amphibians, mammals
(2) Pisces, aves, reptiles, mammals, amphibians
(3) Pisces, mammals, reptiles, amphibians, aves
(4) Amphibians, aves, pisces, mammals, reptiles

43. Which one of the following animals bears hollow and pneumatic long bones ?

(1) Ornithorhyncus (2) Neophron

(3) Hemidactylus (4) Macropus

44. Which of the following groups of animals is correctly matched with its characteristic feature without any exception ?

(1) Reptilia - possess 3-chambered heart with an incompletely divided ventricle

(2) Chordata - possess a mouth with an upper and a lower jaw

(3) Chondrichthyes - possess cartilaginous endoskeleton

(4) Mammalia - Give birth to young ones

45. Which of the following is the correct sequence for the auditory pathway ?

(1) External auditory canal, tympanic membrane, auditory ossicles, oval window, cochlea and spiral organ.

(2) Tympanic membrane, external auditory canal, auditory ossicles, cochlea and spiral organ, round window.

(3) Auditory ossicles, tympanic membrane, cochlea, round window, oval window, external auditory canal.

(4) Auricle, tympanic membrane, round window, cochlea and spiral organ, oval window.

46. Which of the following statements are correct ?

(a) The anterior (ventral) gray horns contain cell bodies of neurons that cause skeletal muscle contraction;

(b) The gray commissure connects the white matter of the right and left sides of the spinal cord;

(c) Cell bodies of autonomic motor neurons are located in the lateral gray horns;

(d) Gray matter in the spinal cord consists of cell bodies of neurons, neuroglia, unmyelinated axons and dendrites of interneurons and motor neurons.

(1) (a) and (b) (2) (b) and (d)

(3) (b), (c), and (d) (4) (a), (b), and (d)

47. Which arrangement correctly identifies the type of blood that the four chambers of the heart (RA- Right Atrium; RV- Right Ventricle; LA- Left Atrium; LV- Left Ventricle) collect and pump:

(1) RA- Oxygenated; RV- Deoxygenated; LA- Oxygenated; LV- Deoxygenated

(2) RA- Deoxygenated; RV- Oxygenated; LA- Deoxygenated; LV- Oxygenated

(3) RA- Deoxygenated; RV- Deoxygenated; LA- Oxygenated; LV- Oxygenated

(4) RA- Oxygenated; RV- Oxygenated; LA- Deoxygenated; LV- Deoxygenated

48. On the summit of Mt. Everest, where the barometric pressure is about 250 mm Hg, the partial pressure of O_2 is about:

(1) 0.1 mm Hg

(2) 0.5 mm Hg

(3) 5 mm Hg

(4) 50 mm Hg

49. Which of the following statements about rhodopsin is true ?

(1) Rhodopsin is the primary photoreceptor of both rods and cones.

(2) The prosthetic group of rhodopsin is all-*trans*-retinol derived from β-carotene.

(3) Rhodopsin is located in the cytosol of the cell.

(4) Absorption of a photon by rhodopsin causes an isomerization of 11-*cis*-retinal to all-*trans*-retinal.

50. Drinking which of the following would lead to the highest rate of ADH secretion and release :

(1) Two litters of distilled water

(2) Two liters of sea water (mainly hyperosmotic saline)

(3) Two liters of iso-osmotic (isotonic) saline

(4) Two liters of human blood plasma

51. Which one of the following statement is not correct ?

(1) Pollen tube grows by cell elongation

(2) Endosperm is always triploid

(3) Pseudoembryo sac is formed by the breakdown of nucellar tissue

(4) Development of egg without fertilization is termed as parthenogenesis

52. Choose the mismatch :

(1) Polyps :: Coelenterates

(2) First triploblastic :: Flatworms

(3) Free-living flatworm :: Planaria

(4) Radial symmetry :: Larvae of Echinoderm

53. Characteristics which distinguish arthropods from annelids and molluscs are :

(a) Absence of a trochophore larva;

(b) An external skeleton made of chitin;

(c) Subdivision of the legs into movable segments;

(d) Distinct mandibles

(1) (a) and (b)

(2) (b) and (c)

(3) (a), (b), and (c)

(4) (a), (b), (c), and (d)

54. Member of Echinodermata has a specific system, which is not found in other phylum, it is :

(1) Canal system

(2) Water vascular system

(3) Respiratory system

(4) Jointed appendages

55. Which of the following phyla is correctly matched with its general characteristics :

(1) Porifera - Cellular level of organization and external fertilization

(2) Coelenterata - Diploblastic and mostly asymmetric

(3) Aschelminthes - Pseudocoelomates and dioecious

(4) Hemichordata - Coelomates and closed circulatory system

56. Which of the following is a matching pair of a body feature and the animal possessing it :

(1) Canal system :: Asterias

(2) Metagenesis :: Obelia

(3) Dorsal nerve cord :: Pheretima

(4) Muscular pharynx :: Taenia

57. Which of the following group of animals has a constant body temperature ?

(1) Aves and Mammalia
(2) Reptiles, Aves and Mammalia
(3) Aves and Cyclostomata
(4) Pisces and Amphibia

58. If an "Axolotl larva" is placed in water containing sufficient iodine, then :

(1) Larva will die soon
(2) Its skin pigmentation will change
(3) It will start metamorphosis
(4) It remains as usual without any change

59. Teeth in Amphibia are :

(1) Homodont, Pleurodont, and Diphyodont
(2) Thecodont, Heterodont, and Diphyodont
(3) Homodont, Pleurodont, and Polyphyodont
(4) Homodont, Thecodont, and Polyphyodont

60. Which of the following statements is incorrect about the occurrence of notochord ?

(1) It is present only in larval tail in ascidian
(2) It is replaced by a vertebral column in adult frog
(3) It is absent throughout life in humans from the very beginning
(4) It is present throughout life in Amphioxus

61. Which of the following is not a function of the liver ?

(1) Storage of vitamin C
(2) Production of bile
(3) Detoxification of drugs
(4) Storage of glucose

62. During ovulation, all of the following occur except :

(1) Rupture of the Graafian follicle
(2) Estrogen production reaches its lowest point
(3) FSH and LH plasma levels surge
(4) Corpus luteum is formed

63. In which of the following combinations is the name of the hormone, its chemical type, and its tissue of origin correctly matched ?

(1) Aldosterone → Peptide → Pancreas

(2) Glucagons → Peptide → Adrenal Cortex

(3) ACTH → Polypeptide → Adrenal Cortex

(4) Vasopressin → Peptide → Posterior Pituitary

64. The system that controls smooth muscle, cardiac muscle, and gland activity is the :

(1) Somatic nervous system

(2) Autonomic nervous system

(3) Skeletal division

(4) Sensory nervous system

65. The sap of a plant cell has an osmotic potential of -10 bars and there is a wall pressure of 2 bars. When this cell is placed in a solution with an osmotic potential of -3 bars, the force causing water to enter the cell is :

(1) -8 bar

(2) -7 bar

(3) -5 bar

(4) -3 bar

66. A carotenoid-less mutant plant was grown under normal sunlight, it will experience :

(1) Increased photosynthetic rate

(2) Increased chlorophyll biosynthesis

(3) Reduced photorespiration

(4) Increased chlorophyll oxidation and necrosis

67. Following are some statements regarding plant growth hormones :

(a) Ethylene regulates abscission;

(b) Gibberellins do not play any role in flowering;

(c) Auxin and cytokinin promote cell division;

(d) Over-production of cytokinin promotes root growth;

(e) ABA inhibits root growth and promotes shoot growth at low water potential;

(f) ABA promotes leaf senescence independent of ethylene.

Which of the following combination of above statements is correct ?

(1) (a), (c), and (f)

(2) (b), (c), and (d)

(3) (d), (e), and (f)

(4) (b), (d), and (e)

68. Which of the following is not a difference between sugar translocation in phloem and water movement in the xylem ?

(1) Sugar translocation is a metabolically active process, while water movement is entirely passive

(2) Pressure is positive in sieve tubes, while xylem is usually under tension

(3) Sieve tubes are living cells, while mature xylem is dead

(4) All of these are correct

69. Which of the following function is not associated with phytochrome ?

(1) Nyctinastic movement in *Mimosa* (2) Seed germination in lettuce

(3) Stomatal opening (4) Circadian rhythms

70. During non-cyclic photophosphorylation, the reduction of "chlorophyll *a*" to its original forms is effected by :

(1) Electron stored within "cytochrome *a*"

(2) Electron released following irradiation of "cytochrome *b*"

(3) Electron carried by NADH

(4) Electron released by photolysis of water

71. The molecules in a membrane that limit its permeability are :

(1) Carbohydrates (2) Phospholipids

(3) Proteins (4) Water

72. Transport across a membrane is said to be coupled when :

(1) Two molecules are transported across the membrane in the same direction

(2) Membrane transport is coupled to an energy source, such as ATP hydrolysis

(3) Transport of one ion down its gradient provides the energy to transport another molecule against the gradient

(4) Both the concentration gradient and membrane potential determine the rate of transport across the membrane

73. Which statement is false ?
(1) The Golgi complex forms vesicles that fuse to form the endoplasmic reticulum.
(2) If a lysosome bursts, its contents can seriously damage the cytoplasm of a cell.
(3) Secreted proteins are formed by ribosomes attached to the endoplasmic reticulum.
(4) The nucleolus is where ribosomes are assembled.

74. Which of the following show the correct order of the secretory pathway ?
(1) RER → Golgi → Secretory vesicle → Cell exterior
(2) SER → Golgi → Secretory vesicle → Cell exterior
(3) Golgi → SER → Secretory vesicle → Cell exterior
(4) Golgi → Lysosome → SER → Secretory vesicle → Cell exterior

75. If base order in one chain of DNA is "ATCGA", then how many number of H-bond are found in the DNA duplex ?
(1) 20 (2) 12
(3) 10 (4) 11

76. The linkage map of X-chromosome of fruitfly has 66 map units, with yellow body gene (y) at one end and bobbed hair (b) gene at the other end. The recombination frequency between these two genes (y and b) should be :
(1) 60 % (2) Greater than 50 %
(3) Less than or equal to 50 % (4) 100 %

77. Which of the following does not occur when a cell enters M phase ?
(1) Chromatin condenses
(2) Histone H1 is dephosphorylated
(3) The nuclear envelope, the endoplasmic reticulum, and the golgi break down
(4) The spindle is formed

78. All of the following processes occur in the mitochondria of mammalian cells except :
(1) Fatty acid biosynthesis (2) Protein synthesis
(3) DNA synthesis (4) β-oxidation of fatty acids

79. During DNA replication, Okazaki fragments are used to elongate :

(1) The lagging strand towards the replication fork

(2) The leading strand away from the replication fork

(3) The lagging strand away from the replication fork

(4) The leading strand towards the replication fork

80. Pick out the correct statements :

(a) Haemophilia is a sex-linked recessive disease;

(b) Down's syndrome is due to aneuploidy;

(c) Phenylketonuria is an autosomal recessive gene disorder;

(d) Sickle cell anaemia is a X-linked recessive gene disorder;

(1) (a) and (d) are correct

(2) (b) and (d) are correct

(3) (a), (c), and (d) are correct

(4) (a), (b), and (c) are correct

81. Which algal group is mismatched with its descriptions ?

(1) Dinoflagellates – glassy, two-part shells

(2) Green algae – closest relatives of land plants

(3) Red algae – no flagellated stages in life cycle

(4) Brown algae – include the largest seaweeds

82. Identify the correct statement :

(1) Cyanobacteria are the highest evolved algae

(2) Dominant pigment of blue green algae is haemoerythrin

(3) Sexual reproduction in cyanobacteria is isogamous

(4) No spindle formation occurs in nostoc cell at the time of division

83. In case of viruses, an envelope is acquired during which of the following steps :

(1) Penetration

(2) Release

(3) Lysis

(4) Assembly

84. Which of the following cells or structures are associated with asexual reproduction in fungi ?

(1) Ascospores
(2) Basidiospores
(3) Conidiophores
(4) Zygosporangia

85. What properties is/ are not expected to be significantly different between hot spring bacteria (that live at 120 degree Celsius) and regular intestinal *E.coli* :

(a) Number of cysteines in the proteins;
(b) Number of methionines in the protein;
(c) Molecular weight of the protein;
(d) GC richness of the genomic DNA;
(e) Richness of saturated fatty acids in plasma membranes.

(1) (a) and (e)
(2) (b) and (c)
(3) (c) and (d)
(4) (a) and (c)

86. Which of the following is true of the Bryophytes ?

(1) It is the only group that shows an alternation of generations
(2) Bryophytes exhibit extensive vascular tissue
(3) The sporophyte (multicellular diploid) is the dominant stage
(4) The gametophye (multicellular haploid) is the dominant stage

87. Which of the following best describes a fern gametophyte ?

(1) Its cells are haploid
(2) It lacks chlorophyll
(3) It is tough and woody
(4) It is larger than the sporophyte

88. The *Riccia* is a bryophyte because :

(1) It occurs mostly on land and has motile sperm.
(2) It has heteromorphic alternation of generation and lacks leaves.
(3) It has multicellular sex organs with a sterile jacket and lacks vascular tissues.
(4) Its sporophyte lacks differentiation and has a single-layered jacket.

89. The aquatic fern which supports the growth of blue-green algae, Anabaena, and used to increase the yield of paddy crop is :

(1) Salvinia
(2) Marsilea
(3) Selaginella
(4) Azolla

90. As we go from species to kingdom in a taxonomic hierarchy, the number of common characteristics :

(1) Will decrease
(2) Will increase
(3) Remain same
(4) May increase or decrease

91. Which of the following is common to both fatty acid synthesis and degradation ?

(1) The oxidation/reduction reactions occur between the α and the β carbons of the fatty acid.
(2) The biochemical nature of the reductant/oxidant.
(3) The intracellular location of the metabolic pathways.
(4) The nature of the two carbon unit.

92. Most of the free fatty acids are transported in the blood :

(1) Inside the red blood cells
(2) As lipoproteins
(3) Combined with glucose
(4) Bound to albumin

93. The oxidation of 1 mol of glucose by anaerobic glycolysis yields a net of :

(1) 2 mol of lactate and 2 mol of ATP
(2) 2 mol of lactate, 2 mol of NADH, and 2 mol of ATP
(3) 2 mol of lactate, 2 mol of NAD^+, and 6 mol of ATP
(4) 2 mol of acetyl-CoA, and 2 mol of ATP

94. The function of the TCA cycle is characterized by all of the following statements except :

(1) It generates reduced NAD^+ and reduced FAD
(2) It generates guanosine triphosphate
(3) It catalyzes the complete oxidation of acetate to carbon dioxide and water
(4) It causes the net synthesis of oxaloacetate from acetyl-CoA

95. Inside an active mitochondrion, most electrons follow which pathway ?

(1) Krebs cycle → NADH → Electron transport chain → Oxygen

(2) Glycolysis → NADH → Oxidative phosphorylation → ATP → Oxygen

(3) Krebs cycle → $FADH_2$ → Electron transport chain → ATP

(4) Electron transport chain → Krebs cycle → ATP → Oxygen

96. Which one of the following statements is incorrect about the role of oxidative pentose phosphate pathway in plant metabolism ?

(1) Production of NADH to generate ATP

(2) Generation of NADPH required to drive biosynthetic reactions

(3) Production of pentose phosphate for the synthesi of nucleic acids

(4) Formation of erythrose 4-phosphate for biosynthesis of aromatic amino acids

97. Which of the following statements is incorrect about leg-haemoglobin ?

(1) It acts as O_2 scavenger

(2) It imparts pink or red colour to the nodules

(3) It combines with O_2 and protects nitrogenase

(4) It is a Mo-Fe protein

98. BACs, cosmids, phages, plasmids and YACs are all commonly used cloning vectors that differ in their cloning capacities, with a range from approximately 100 bp to 3000 kb. Which of the following is the proper order for these vectors in terms of increasing cloning capacity ?

(1) BAC, cosmid, phage, plasmid, YAC

(2) YAC, BAC, cosmid, phage, plasmid

(3) Plasmid, phage, cosmid, BAC, YAC

(4) Plasmid, cosmid, phage, BAC, YAC

99. A certain purified DNA sample was cut with two restriction endonucleases E1 & E2. The following results were obtained from agarose gel electrophoresis :

Sample cut with E1 alone- two bands of size 35 kb and 15 kb.

Sample cut with E2 alone- two bands of size 40 kb and 10 kb.

Sample cut simultaneously with E1 & E2- three bands of 35 kb, 10 kb & 5 kb.

From these data, it can be inferred that the DNA has :

(1) Two sites for E1 and one site for E2

(2) One site for E1 and two sites for E2

(3) One site each for E1 and E2

(4) Three sites for E1 and one site for E2

100. Border sequences need to be incorporated into the design of plasmid vectors for Agrobacterium- mediated transformation to ensure :

(1) Greater promoter efficiency

(2) Oncogene deactivation

(3) Efficient replication of the plasmid

(4) Integration of the genes of interest into the host gene

Answer keys of M.Sc. (Life Sciences Group) entrance exam dated 14.07.2024				
Q. NO.	A	B	C	D
1	1	4	1	1
2	4	1	2	2
3	2	4	4	1
4	3	4	2	2
5	2	1	3	3
6	4	3	4	4
7	1	4	1	3
8	3	3	4	1
9	4	3	3	4
10	1	2	4	2
11	1	1	2	2
12	2	3	4	1
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37	3	3	4	4
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42	2	1	3	2
43	4	2	1	2
44	2	4	1	3
45	3	3	2	1
46	4	2	3	4
47	1	4	2	3
48	4	4	1	4
49	3	3	3	4
50	4	3	4	2

14/7/24

14/7/24

Answer keys of M.Sc. (Life Sciences Group) entrance exam dated 14.07.2024				
Q. NO.	A	B	C	D
51	1	2	4	2
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92	1	4	3	4
93	2	2	4	1
94	4	3	2	4
95	3	2	4	1
96	2	4	2	1
97	4	1	4	4
98	4	3	1	3
99	3	4	3	3
100	3	1	3	4

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