

Botany - Section A

1. Photosynthesis in C_4 plants is relatively less limited by atmospheric CO_2 levels because
 1. The primary fixation of CO_2 is mediated via PEP carboxylase
 2. Effective pumping of CO_2 into bundle sheath cells
 3. Four carbon acids are the primary initial CO_2 fixation products.
 4. Rubisco in C_4 plants has higher affinity for CO_2

2. The electrons needed to replace those removed from PS I are provided by:
 1. The LHC
 2. Water
 3. NADPH
 4. PS II

3. Carbon dioxide tagged with heavy isotope of oxygen was fed to a green alga in the presence of sunlight. Which of the following compounds would not be tagged with this isotope?
 1. Phosphoglycerate
 2. Phosphoglyceraldehyde
 3. Glucose
 4. Oxygen

4. The energy-releasing metabolic process in which substrate is oxidised without an external electron acceptor is called
 1. glycolysis
 2. fermentation
 3. aerobic respiration
 4. photorespiration

5. During which stage in the complete oxidation of glucose is the greatest number of ATP molecules formed from ADP?
 1. Glycolysis
 2. Krebs cycle
 3. Electron transport
 4. Conversion of pyruvic acid to acetyl CoA

6. The correct descending order of the RQ value, when carbohydrates, proteins and fats are used as respiratory substrate would be:
 1. Protein > Fats > Carbohydrates
 2. Protein > Carbohydrates > Fats
 3. Carbohydrates > Protein > Fats
 4. Fats > Carbohydrates > Protein

7. What causes a green plant exposed to the light on only one side, to bend toward the source of light as it grows?
 - (a) Green plants need light to perform photosynthesis
 - (b) Green plants seek light because they are phototropic
 - (c) Light stimulates plant cells on the lighted side to grow faster
 - (d) Auxin accumulates on the shaded side, stimulating greater cell elongation

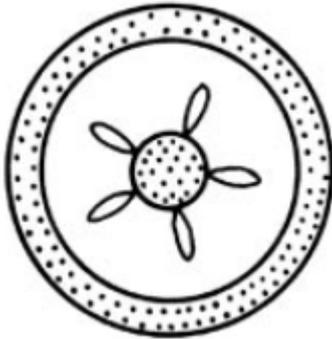
8. Stratification of an ecosystem means:
 1. Vertical distribution of different species occupying different levels
 2. Vertical distribution of different species occupying same levels
 3. Horizontal distribution of different species occupying different levels
 4. Horizontal distribution of different species occupying same levels

9. Decomposition of detritus is rapid when:
 1. It is rich in lignin and chitin
 2. Ambient temperature is low
 3. Environment favors anaerobiosis
 4. It predominantly contains nitrogen and sugars

10. Which of the following pyramids can never be inverted in any ecosystem?
1. Pyramid of numbers
2. Pyramid of biomass
3. Pyramid of energy
4. All ecological pyramids can be inverted
11. Among the following bio-geo-chemical cycles which one does not have losses due to respiration ?(NCERT Exemplar)
1. Phosphorus
2. Nitrogen
3. Sulphur
4. All of the above
12. When a threatened plant needs urgent measures to save it from extinction, the desirable approach is:
1. in-situ conservation
2. ex-situ conservation
3. cryopreservation
4. biopreservation
13. Which of the following is not a reason that accounts for greater biodiversity of tropics?
1. availability of more solar energy
2. more niche specialization
3. more time for species diversification
4. large seasonal variations in environmental factors
14. A plant, that has invaded many forest lands in India and is also known as Spanish Flag or Red sage, is:
1. Lantana camara
2. Eicchornia
3. Parthenium argentatum
4. Argemone mexicana
15. Most abundant protein in the whole of the biosphere is:
1. Collagen
2. Cellulose
3. RUBISCO
4. Keratin
16. Mesosomes, extensions of plasma membrane in bacterial cells, help in all the following except:
1. Cell wall formation
2. DNA replication and distribution to daughter cells
3. Respiration
4. Photosynthesis
17. Identify the incorrect statement regarding chloroplasts:
1. They are double membrane bound organelles
2. Inner chloroplast membrane is relatively more permeable
3. Chlorophyll pigments are present in the thylakoids
4. Stroma contains enzymes required for synthesis of carbohydrates and proteins
18. Algal cell walls are made up of:
1. Cellulose, Galactans, Mannans and Minerals
2. Cellulose, Hemicellulose, Pectins and Proteins
3. Cellulose, Pectins, Mannans and Minerals
4. Cellulose, Hemicellulose, Mannans and Pectins

19.

The placentation shown below will be seen in:



1. Argemone
2. Dianthus
3. Tomato
4. Sunflower

20.

When sepals or petals in a whorl just touch one another at the margin, without overlapping, the aestivation is said to be:

1. Valvate
2. Twisted
3. Imbricate
4. Vexillary

21.

Ovary is one chambered but it becomes two chambered due to the formation of a false septum in:

1. Mustard and Argemone
2. Argemone and Dianthus
3. Mustard and Primrose
4. Argemone and Primrose

22.

Identify the incorrect statement regarding cytokinesis:

1. Animal cells divide by cleavage furrow
2. Cell plate formation takes place during cytokinesis in plant cells
3. The cell wall formation in plant cells starts near the existing lateral walls and grow inwards
4. At cytokinesis mitochondria and plastids are distributed between daughter cells

23.

A plant shows thallus level of organization. It shows rhizoids and is haploid. It needs water to complete its life Cycle because the male gametes are motile. Identify the group to which it belongs to

1. Pteridophytes
2. Gymnosperms
3. Monocots
4. Bryophytes

24.

The correct chronology of the steps seen in the sexual cycle in fungi will be:

1. Plasmogamy – Karyogamy – Meiosis in zygote
2. Karyogamy – Plasmogamy – Meiosis in zygote
3. Plasmogamy – Meiosis in zygote – Karyogamy
4. Karyogamy – Meiosis in zygote – Plasmogamy

25.

As a group the most extensive metabolic diversity is shown by:

1. Bacteria
2. Protista
3. Fungi
4. Animals

26.

Identify the incorrect statement regarding cyanobacteria:

1. They have chlorophyll a similar to green plants
2. Colonies surrounded by pellicle – a protein rich layer
3. Often form blooms in polluted water bodies
4. Fix nitrogen in specialized cells called hetrocysts

27.

Which of the following would best describe a virus?

1. Non cellular organization, crystalline inert structure in a living cell
2. Non cellular organization, crystalline inert structure outside a living cell
3. Cellular organization, crystalline inert structure in a living cell
4. Cellular organization, crystalline inert structure outside a living cell

28. How many of the given features will be true for brown algae:
- I. Presence of xanthophylls
 - II. A gelatinous coating of algin on cell wall
 - III. A centrally placed vacuole in plastids
 - IV. Ribbon shaped biflagellate zoospores
1. 1
 2. 2
 3. 3
 4. 4
29. Evolutionarily the first terrestrial plants to possess vascular tissues are:
1. Bryophytes
 2. Pteridophytes
 3. Gnetales
 4. Cycads
30. Match the following list of bioactive substances and their roles:
- | Bioactive | Substance | Role |
|------------------|-----------|-------------------------------------|
| A. Statin | i. | Removal of oil stains |
| B. Cyclosporin A | ii. | Removal of clots from blood vessels |
| C. Streptokinase | iii. | Lowering of blood cholesterol |
| D. Lipase | iv. | Immuno-suppressive agent |
- Choose the correct match:
1. A-ii, B-iii, C-i, D-iv
 2. A-iv, B-ii, C-i, D-iii
 3. A-iv, B-i, C-ii, D-iii
 4. A-iii, B-iv, C-ii, D-i
31. A particular species of plant produces light, non-sticky pollen in large numbers and its stigmas are long and feathery. These modifications facilitate pollination by:
1. Insects
 2. Water
 3. Wind
 4. Animals.
32. The phenomenon wherein, the ovary develops into a fruit without fertilisation is called:
1. Parthenocarpy
 2. Apomixis
 3. Asexual reproduction
 4. Sexual reproduction
33. When Mendel self hybridized F1 progeny of a dihybrid cross between pure Yellow Round seeded plants and Green Wrinkled plants, he observed that yellow and green colour segregated in a ratio of:
1. 1 : 1
 2. 3 : 1
 3. 9 : 3 : 3 : 1
 4. 1 : 2 : 1
34. A typical angiosperm embryo sac, at maturity, is:
1. 8 celled and 8 nucleate
 2. 8 celled and 7 nucleate
 3. 7 celled and 8 nucleate
 4. 7 celled and 7 nucleate
35. In secondary treatment or biological treatment of sewage water the primary effluent is passed into large aeration tanks where it is constantly agitated mechanically and air is pumped into it. This allows:
1. vigorous growth of useful aerobic microbes into flocs
 2. the decrease in number of aerobes in the water
 3. rapid increase in the count of methanogens
 4. a dramatic decrease in the anaerobic methanogens
36. The ions that play the primary role in basic transport processes in plant cells is:
1. Na⁺
 2. K⁺
 3. H⁺
 4. Cl⁻

Botany - Section B

37. A nitrogen fixing microbe associated with Azolla in rice fields is
1. *Spirulina*
 2. *Anabaena*
 3. *Frankia*
 4. *Tolypothrix*
38. The two elements required for splitting of water to liberate oxygen during photosynthesis are:
1. Manganese and Chlorine
 2. Manganese and Boron
 3. Copper and Chlorine
 4. Molybdenum and Magnesium
39. The C_3 pathway:
1. is common to all plants
 2. takes place in mesophyll cells in C_4 plants
 3. takes place in bundle sheath cells in C_3 plants
 4. does not take place in CAM plants
40. The correct sequence of flow of electrons downhill in the mitochondrial electron transport chain would be:
1. ubiquinone, cytochromes, FMN, Fe-S
 2. cytochromes, FMN, ubiquinone, Fe-S
 3. Fe-S, FMN, cytochromes, ubiquinone
 4. FMN, Fe-S, ubiquinone, cytochromes
41. Which PGR stimulates the closure of stomata in the epidermis and increases the tolerance of plants to various kinds of stress?
- | | |
|--------------|----------------|
| 1. Cytokinin | 2. Giberrellin |
| 3. ABA | 4. Ethylene |
42. Identify the correct statements amongst the following:
- I. When a shoot tip transforms into a flower, it is always solitary
 - II. In racemose inflorescence the main axis continues to grow and flowers and borne in basipetal order
 - III. In cymose inflorescence the main axis terminates in a flower and flowers are borne in basipetal order
1. Only I
 2. Only I and II
 3. Only I and III
 4. Only II and III
43. The vascular bundles in a dicot stem are:
1. conjoint, open with endarch protoxylem
 2. conjoint, closed with endarch protoxylem
 3. conjoint, open with exarch protoxylem
 4. conjoint, closed with exarch protoxylem
44. Deuteromycetes are also called as Fungi imperfecti because:
1. They do not have a thalloid body
 2. They can contain chlorophyll
 3. There are no parasitic members
 4. Sexual phases are not known
45. A difference between a gymnosperm and an angiosperm would be:
1. Lack of a flower
 2. Undeveloped vascular tissue
 3. Xylem is mainly composed of vessels and phloem contains companion cell in angiosperms
 4. Microspore grows into a pollen tube
46. The correct sequence of layers in the wall of an anther from outside to inside is:
1. Tapetum – Middle Layers – Endothecium – Epidermis
 2. Epidermis – Endothecium – Tapetum – Middle layers
 3. Epidermis – Endothecium – Middle layers – Tapetum
 4. Tapetum – Endothecium – Middle layers – Epidermis

47.

Match biofortified crops in Column I with enriched nutrients in Column II and select the correct answer from the codes given:

Column I	Column II
A. Maize hybrids	a. lysine and tryptophan
B. Atlas 66	B high protein content
C. Golden rice	c. Vitamin A

- Code
 A B C
 1. a b c
 2. a c b
 3. b a c
 4. c a b

48.

A thorn of Bougainvillea and a tendril of Cucurbita are an example of :

1. analogous organs
2. vestigial organs
3. homologous organs
4. defense organs

49.

Match vegetative propagules in COLUMN I with plants in COLUMN II and select the correct option from the codes given:

COLUMN I	COLUMN II
A. Rhizome	a. <i>Bryophyllum</i>
B. Bulbil	b. <i>Eichhornia</i>
C. Leaf buds	c. Ginger
D. Offset	d. <i>Agave</i>

- Code
 A B C D
 1. a b c d
 2. d c b a
 3. c d a b
 4. b a d c

50.

What is incorrect regarding organic farming?

1. It relies on controlling pests by natural predation rather than introduced chemicals.
2. A key belief of the organic farmer is that biodiversity furthers health.
3. Pests are totally eradicated.
4. Reduces dependence on toxic chemicals and pesticides.

Zoology - Section A

51.

Which of the following is not a precondition for Hardy-Weinberg Equilibrium?

1. The population should be large
2. The mating should be assortative
3. There is no gene flow into or out of the population
4. All offspring should be equally fertile.

52. The genetically engineered vaccine for prevention of hepatitis B is made with the help of the microbe
- (1) *E.coli*
 - (2) *Agrobacterium*
 - (3) *Saccharomyces*
 - (4) *Psuedomonas*
53. A bacterium adds methyl group to its DNA, by a process known as modification, in order to
1. Clone its DNA
 2. Turns it genes on
 3. Transcribe many genes simultaneously
 4. Protect DNA from its own restriction enzymes
54. A hormonal disorder that develops when pituitary gland produces too much growth hormone during adulthood is known as:
1. cretinism
 2. giantism
 3. Conn's syndrome
 4. acromegaly
55. The uterine layer that undergoes cyclical change during the menstrual cycle is the
1. perimetrium.
 2. myometrium.
 3. endometrium.
 4. fundus.
56. Inhibin in males or females decrease the secretion of:
1. FSH
 2. LH
 3. GnRH
 4. Sex steroids
57. The Leydig cells as found in the human body are the secretory source of
1. progesterone
 2. intestinal mucus
 3. glucagon
 4. androgens
58. A major non contraceptive advantage of barrier contraceptives is that they prevent:
1. Cancer breast
 2. STI
 3. Ectopic pregnancies
 4. Menstrual irregularities
59. Identify a sexually transmitted disease amongst the following that is completely curable.
1. HIV
 2. Hepatitis B
 3. Genital herpes
 4. Trichomoniasis
60. A tricuspid valve will prevent of blood flow from:
- 1 Right atrium to right ventricle
 2. Right ventricle to right atrium
 3. Left atrium to left ventricle
 4. Left ventricle to left atrium
61. The logistic population growth is expressed by the equation
1. $\frac{dN}{dt} = rn \left(\frac{N-K}{N} \right)$
 2. $\frac{dt}{dN} = Nr \left(\frac{K-N}{K} \right)$
 3. $\frac{dN}{dt} = rN \left(\frac{K-N}{K} \right)$
 4. $\frac{dN}{dt} = rN$

62.

Very small animals are rarely found in polar regions mainly because:

1. Being smaller in size makes them highly vulnerable to predation.
2. They have a larger surface area relative to their volume
3. Small size makes long distance migration difficult.
4. Small sized animals lack insulating body layers.

63.

The Montreal Protocol was signed in 1987 to:

1. prevent deforestation around the world
2. control the emission of ozone depleting substances
3. control the greenhouse gases
4. prevent hazards from radioactive nuclear wastes

64.

High concentrations of accumulated DDT in birds:

1. kills pathogens in their blood
2. causes sterility by affecting gametogenesis
3. leads to premature breaking of eggs
4. causes spasticity of the muscles of the body

65.

Genetic drift is

1. random changes in gene frequency in a population
2. generational fluctuations in gene frequencies that produce no effect
3. changes due to interbreeding with other species populations
4. the effect of mutations as they spread through neighbouring populations

66.

The class of immunoglobulins that attach to mast cells and basophils to initiate an inflammatory response are:

1. IgA
2. IgM
3. IgG
4. IgE

67.

Taq polymerase is used in the polymerase chain reaction because:

1. It replicates DNA faster than other enzymes
2. It is the only enzyme that can replicate DNA invitro
3. It does not require an RNA primer to function
4. It is thermostable

68.

Enzymes speed up the chemical reactions by:

1. Getting used up in the reaction
2. Formation of different products
3. Converting endothermic reactions to exothermic
4. Lowering activation energy

69.

Formation of glycosidic bond represents:

1. Dehydration
2. Hydrolysis
3. Dehydrogenation
4. Isomerization

70.

The measure of fluidity of a cell membrane is:

1. the ability of proteins to flip-flop between the two layers of phospholipids
2. the ability of proteins to move laterally within the membrane
3. the ability of lipids to flip-flop between the two layers of phospholipids
4. the ability of lipids to move laterally within the membrane

71.

Which of the following statements would not be applicable to the rough endoplasmic reticulum in a eukaryotic cell?

1. Frequently observed in cells actively involved in protein synthesis and secretion
2. Bear ribosomes on their surface
3. Continuous with the outer membrane of the nucleus
4. Sites of synthesis of steroidal hormones

72. When the centromere in a chromosome is located close to its end, the chromosome is called as:

1. Metacentric
2. Sub-metacentric
3. Acrocentric
4. Telocentric

73. A water vascular is characteristically present in:

1. Annelids
2. Porifers
3. Echinoderms
4. Cartilaginous fishes

74. Match each item in Column I with one in Column II and select the correct answer from the codes given below:

	COLUMN I		COLUMN II
A	Zygotene	a	Pairing of homologous chromosomes
B	Pachytene	b	Appearance of chiasma
C	Diplotene	c	Terminalization of chiasma
D	Diakinesis	d	Crossing over

Codes

- A B C D
1. a c b d
 2. a d b c
 3. a b c d
 4. b c d a

75. What would be true for comparison of Anaphase I and Anaphase II of meiosis?

1. Centromere does not split in Anaphase I and homologues separate but centromere splits in Anaphase II and sister chromatids separate
2. Centromere splits in Anaphase I and homologues separate but centromere does not split in Anaphase II and sister chromatids separate
3. Paired homologues get attached to spindle from opposite poles in Anaphase I while sister chromatids of individual chromosomes get attached to spindle from opposite poles in Anaphase II
4. Paired homologues get attached to spindle from opposite poles in Anaphase II while sister chromatids of individual chromosomes get attached to spindle from opposite poles in Anaphase I

76. Cyclostomes:

1. are fresh water organisms that move to marine water for spawning
2. have an open circulatory system
3. have a sucking and circular mouth without jaws
4. do not have scales on body and paired fins

77. Tendons and ligaments are examples of:

1. Loose connective tissue
2. Dense irregular connective tissue
3. Dense regular connective tissue
4. Specialized connective tissue

78. Golden rice is:

1. A variety of rice grown along the yellow river in China
2. Long stored rice having yellow colour tint
3. A transgenic rice having gene for β - carotene
4. Wild variety of rice with yellow coloured grains

79.

In malignant tumors, the cells proliferate, grow rapidly and move to other parts of the body to form new tumors. This stage of disease is called:

1. metagenesis
2. metastasis
3. teratogenesis
4. mitosis

80.

'Smack' is a drug obtained from the:

1. latex of *Papaver somniferum*
2. leaves of *Cannabis sativa*
3. flowers of *Datura*
4. fruits of *Erythroxyl coca*

81.

A piece of DNA, somehow transferred into an alien organism, will be able to multiply itself in the progeny cells of organism if:

1. It includes the centromere
2. It becomes a part of chromosome
3. It does not contain any intron sequences
4. It is a single stranded polynucleotide

82.

Low Ca^{2+} in the body fluid may be the cause of

1. Angina pectoris
2. Gout
3. Tetany
4. Anemias

83.

Each time the sodium-potassium pump works, it transports:

1. three sodium ions to the outside and brings two potassium ions to the inside
2. two sodium ions to the outside and brings three potassium ions to the inside
3. three potassium ions to the outside and brings two sodium ions to the inside
4. two potassium ions to the outside and brings two potassium ions to the inside

84.

The formation of oxy-hemoglobin at the alveoli is favored by all the following except:

1. High pO_2
2. Low pCO_2
3. Lower H^+ ion concentration
4. Higher temperature

85.

During concentration of urine, NaCl is returned to medullary interstitium by:

1. Ascending limb of Loop of Henle
2. Descending limb of Loop of Henle
3. Ascending limb of Vasa Recta
4. Descending limb of Vasa Recta

Zoology - Section B

86.

For the stability of the organic compounds, Oparin opined that probably:

1. UV radiation never reached the surface of the primeval Earth
2. the primeval Earth was in a molten state
3. the primeval Earth atmosphere was reducing rather than oxidizing
4. plenty of energy sources were available for chemical reactions to occur

87. Some hormones can act on their target cells through second messengers. Identify the one that does not:
1. cortisol
 2. adrenaline
 3. FSH
 4. calcitonin
88. Which of the following causes the second heart sound [dub]?
1. opening of the AV valves at the start of diastole
 2. closing of the AV valves at the start of systole
 3. opening of the semilunar valves at the start of systole
 4. closing of the semilunar valves at the start of diastole
89. The part of the human brain where the main respiratory center is located is:
1. pons varolii
 2. cerebrum
 3. medulla oblongata
 4. thalamus
90. Glomerular ultrafiltrate normally does not contain:
1. formed elements of the blood
 2. glucose
 3. amino acids
 4. electrolytes
91. Corpus callosum:
1. is a part of the ventricular system.
 2. divides the frontal lobe from the parietal lobe.
 3. connects the right and left cerebral hemispheres.
 4. is an extension of the diencephalon.
92. Reissner's membrane is a thin membrane that separates the scala media from the:
1. oval window
 2. scalavestibuli
 3. scala tympani
 4. round window
93. Enterokinase:
1. stimulates bicarbonate secretion by the pancreas
 2. stimulates secretion of gastrin by the stomach
 3. converts trypsinogen into trypsin
 4. converts pepsinogen into pepsin
94. The number of pairs of vertebrochondral ribs in humans are:
1. 3
 2. 2
 3. 7
 4. 10
95. RNA polymerase is able to identify the template strand from the coding strand because of:
1. promoter.
 2. initiator.
 3. transcription factor.
 4. start codon.
96. Ascaris is characterized by:
1. Presence of true coelom but absence of metamerism
 2. Presence of true coelom and of metamerism
 3. Absence of true coelom but presence of metamerism
 4. Presence of neither true coelom nor metamerism

97.

The human chromosome with the highest and least number of genes in them are respectively:

1. Chromosome 21 and Y
2. Chromosome 1 and X
3. Chromosome 1 and Y
4. Chromosome X and Y

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98.

Discontinuous synthesis of DNA occurs in one strand, because:

1. DNA molecule being synthesised is very long
2. DNA dependent DNA polymerase catalyses polymerisation only in one direction (5' → 3')
3. it is a more efficient process
4. DNA ligase joins the short stretches of DNA

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99.

Inbreeding is carried out in animal husbandry because it:

1. increases vigour
2. improves the breed
3. increases heterozygosity
4. increases homozygosity

100.

The lac operon is regarded as:

1. Negative, Inducible
2. Negative, Repressible
3. Positive, Inducible
4. Positive, Repressible