

2 Hours 30 minutes

Total Marks: 75

N.B.:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Draw neat labelled diagrams wherever necessary.
- 4) Use of log tables and non-programmable calculators is allowed.

Q.1 Choose the correct option for the following multiple-choice questions: 15
(Any fifteen)

1. Which of the following is a double-membrane structure surrounding the nucleus?
A. Nucleoid B. Nuclear envelope C. Vacuole D. Plasma membrane
2. Membrane surrounding the vacuole is called _____.
A. Tonoplast B. Protoplast C. Outer layer of chloroplast D. Ribosome
3. Giant chromosomes are formed due to:
A. DNA replication without cell division B. Mutation in RNA
C. Protein aggregation D. Meiosis errors
4. Which factor is required for initiation in prokaryotic translation?
A. IF1, IF2, IF3 B. EF-Tu only C. Release factors D. DNA polymerase
5. Termination of translation occurs at:
A. Start codon B. Stop codon C. Promoter D. Operator
6. Which process describes the uptake of water by dry seeds or other solid particles?
A. Osmosis B. Imbibition C. Transpiration D. Diffusion
7. Which of the following is an example of passive transport?
A. Active uptake of K^+ ions B. Diffusion of CO_2 across a membrane
C. Proton pumping by ATPase D. Sodium-potassium pump
8. Phloem sap mainly contains:
A. Water and minerals only B. Sugars, amino acids, and hormones
C. DNA and RNA D. Proteins and lipids only
9. According to the pressure flow hypothesis, phloem transport occurs due to:
A. Cohesion and tension of water
B. Pressure difference between the source and the sink
C. Active transport in xylem
D. Evaporation from leaves
10. Deficiency of magnesium in plants typically results in:
A. Necrosis of leaf tips B. Interveneal chlorosis in older leaves
C. Stunted roots D. Purple spots on fruits
11. Which factor is most crucial for effective microbial bioremediation?
A. High light intensity
B. Presence of suitable microbial population and nutrients
C. Soil colour
D. Leaf area index
12. Phytoremediation of organic pollutants mainly involves:
A. Uptake and degradation by plants
B. Burning the contaminated soil
C. Evaporation of pollutants
D. Physical removal only

13. Xerosere succession begins on:
A. Freshwater ponds
B. Barren lands or bare rocks
C. Marshy wetlands
D. Forest understory
14. The process of ecesis in succession refers to:
A. Final climax formation
B. Establishment and growth of new plant individuals in a habitat
C. Death of pioneer species
D. Soil erosion by wind
15. Poly-climax theory suggests that:
A. Only one climax is possible per region
B. Multiple climax communities can exist due to local factors
C. Climate alone determines climax
D. Succession stops at hydrophytes stage
16. Which is a primary advantage of micropropagation in orchids?
A. Production of genetically variable plants
B. Rapid clonal multiplication of elite varieties
C. Reduction in photosynthetic rate
D. Slower growth compared to conventional propagation
17. Plant cell suspension cultures are useful for producing secondary metabolites because:
A. They increase soil fertility
B. Cells can be grown in liquid medium for large-scale metabolite production
C. They enhance transpiration
D. They replace xylem transport
18. Artificial seeds are developed from:
A. Zygotic embryos
B. Somatic embryos
C. Pollen grains
D. Apical meristems
19. Which of the following is a method of protoplast fusion?
A. Electrofusion
B. Soil inoculation
C. Leaf pressing
D. Seed soaking
20. Somatic hybridization can help in agriculture by:
A. Developing hybrids between sexually incompatible species
B. Increasing transpiration efficiency
C. Enhancing leaf pigmentation only
D. Producing artificial fruits without seeds

Q.2 Answer the following: (Any Two)

- A. Describe the structure and function of the eukaryotic nucleus.
- B. Give an account of the structure of the vacuole in plant cells. Add a note on any two of its functions.
- C. Describe the characteristics of the genetic code.
- D. Describe the process of formation of the peptide bond during the elongation phase of protein synthesis.

Q.3 Answer the following: (Any Two) 15

- A. Explain the process of phloem loading and unloading with a suitable diagram.
- B. Enlist and explain in detail the functions and deficiency symptoms of any two micronutrients studied by you.
- C. What is meant by active transport? Describe the various modes of active transport of solutes in plants.
- D. Explain the Munch hypothesis to explain the process of sieve tube translocation.

Q.4 Answer the following: (Any Two) 15

- A. What is Phytoremediation? Discuss the various processes involved in phytoremediation of metals.
- B. Explain the concept and the principle involved in bioremediation.
- C. Define plant succession. Explain any two stages of a Hydrosere, citing examples of plants in each stage.
- D. What is bioaccumulation? Describe the process of bioaccumulation in an ecosystem.

Q.5 Answer the following: (Any Two) 15

- A. Elaborate on the principle involved in plant tissue culture with reference to Micropropagation.
- B. Describe the steps involved in Shikonin production.
- C. What is protoplast fusion? Explain the technique involved in it.
- D. Explain techniques and factors affecting somatic embryogenesis.

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Total Marks 75

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1. All questions are compulsory.
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- Q. 1 Choose the correct option from the following and rewrite the sentence (any fifteen out of 20) 15
- 1 _____ is known as father of Indian Ethnobotany.
a Dr. Ashok Jain b Dr. P. Sahu c Dr. R.R. Rao d Dr. S.K. Jain
 - 2 Ethnobotany is the study of relationship between _____ and human society.
a nature b environment c animal d plants
 - 3 Information about plants in _____ from various regions has been useful in ethno botanical studies.
a novels b travelogues c poems d autobiographies
 - 4 The _____ of *Typha angustata* is used in the treatment of cuts and wounds.
a inflorescence b bulb c rhizome d corm
 - 5 _____ is commonly known as button mushroom.
a *Volvariella* b *Amanita* c *Agaricus* d *Pleurotus*
 - 6 Which of the following vector cannot be used to construct genomic DNA library?
a Phasmid b Phagemid c Cosmid d Ti plasmid
 - 7 The size of mouse genome is 2.365×10^6 Kb and average cloned fragment size is 50kb. How many minimum number of clones are required to represent a particular sequence?
a 47.3×10^6 b 47.3×10^5 c 23.65×10^5 d 2.36×10^4
 - 8 Which PCR is used to screen the libraries containing recombinant plasmids?
a Gradient PCR b Gradient PCR c Colony PCR d Degenerate PCR
 - 9 What would be the T_m value, for a primer having sequence 5'AGCTGATTGGCTAAC3'?
a 37°C b 44°C c 46°C d 52°C
 - 10 Select the tank buffer used during Southern blotting.
a Tris Glycine b Tris Acetate EDTA c Sodium salt citrate d Phosphate
 - 11 Absorption spectrum is generated mostly by _____.
a Ions b π - electrons c Molecules d Atoms
 - 12 Prisms in UV spectrophotometer is made up of _____.
a Quartz b Plastic c Glass d Acrylic
 - 13 The detector used in infra-red spectrophotometer is _____.
a Photocell b Lithium cell c Goloy cell d Nujol mull
 - 14 In column chromatography, the density of solute can be increased by the addition of _____.
a 1% sucrose b 10% sucrose c glycerol d Distilled water
 - 15 Select the compound separated by Tswett using adsorption chromatography technique.
a Vitamins b Amino acids c Pigments d Carbohydrates
 - 16 Turmeric consists of _____ pigment.
a curcumin b anthocyanins c carotenoids d xanthophyll

- 17 The active constituent of Garlic is obtained from its _____.
a Flower bud b Seed c bulb d Leaf
- 18 The *Strychnos nux-vomica* belongs to the family _____.
a Zingiberaceae b Liliaceae c Myrtaceae d Loganiaceae
- 19 The glycoside sennoside A and B is obtained from _____.
a *Cassia tora* b *Cassia angustifolia* c *Cassia fistula* d *Cassia javanica*
- 20 The common name of *Eugenia caryophyllata* is _____.
a Senna b Clove c Acorus d Turmeric

Q. 2 Answer **Any Two** of the following questions.

- a) Give an account on the methods of study used in ethnobotany. 7.5
- b) Explain the use of traditional medicine used in the treatment of fever and skin ailments with suitable examples. 7.5
- c) Describe the cultivation of any one mushroom studied by you. 7.5
- d) Elaborate the economic importance of mushrooms with suitable examples. 7.5

Q. 3 Answer **Any Two** of the following questions.

- a) What is a c-DNA library? Describe the steps involved in construction of a c-DNA library. 7.5
- b) Describe the identification of genes in libraries using complementation of mutations. 7.5
- c) What is restriction mapping? Explain with an appropriate example, construction of a restriction map. 7.5
- d) Describe the process of southern blotting and southern hybridization. 7.5

Q. 4 Answer **Any Two** of the following questions.

- a) Explain in detail the principle and working of a Spectrophotometer. 7.5
- b) Discuss the applications of colorimeter. 7.5
- c) Elaborate on the principle and working of column chromatography 7.5
- d) Elucidate the applications of ion exchange chromatography. 7.5

Q. 5 Answer **Any Two** of the following questions.

- a) Explain the macroscopic and microscopic characters of *Strychnos* seeds. 7.5
- b) What is the geographic distribution of *Acorus calamus*? Add a note on its chemical constituents. 7.5
- c) Comment on chemical constituents and therapeutic uses of *Allium sativum*. 7.5
- d) Explain macroscopic and microscopic characters of *Senna* leaves. Add a note on its medicinal uses. 7.5

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- Q.1 Attempt any 15 of the following:** 15
- 1 Peptidoglycan is made up of _____
a) N-acetylglucosamine
b) N-acetylmuramic acid
c) N-acetylglucosamine, N-acetylmuramic acid
d) N-acetylglucosamine, N-acetylmuramic acid, amino acids
 - 2 Following is the characteristic features of virus.
a) Virus is made up of fat and carcinogen
b) Virus multiply only in host.
c) Virus is having well developed cell wall
d) Virus contain 80s ribosome
 - 3 Club fungi belongs todivision.
a) Ascomycota b) Basidiomycota
b) Deuteromycota d) Zygomycota
 - 4 During media preparationis used as solidifying agent.
a) HCL b) Yeast extract
b) Peptone c) Agar-agar
 - 5 Colony characters are important for.....
a) Identification of bacteria b) Staining of bacteria
b) Multiplication of bacteria d) All of the above
 - 6 Chantransia stage is found in the life cycle of _____
a) *Vaucheria* b) *Pinnularia*
c) *Batrachospermum* d) *Polysiphonia*
 - 7 Trichoblasts are seen in _____
a) *Batrachospermum* b) *Vaucheria*
c) *Pinnularia* d) *Polysiphonia*
 - 8 *Polysiphonia* exhibit _____ type of life cycle.
a) haplontic b) diplontic
c) diplobiontic d) Haplodiplobiontic
 - 9 The class Centrales in G.M. Smith's classification includes _____
a) Pennate diatoms b) Radially symmetrical diatoms
c) Filamentous diatoms d) Motile diatoms
 - 10 Diatomaceous earth is commonly used for _____
a) Food preservation b) Filtration and abrasive materials
c) Fertilizer production d) Textile dyes
 - 11 Genus *Agaricus* commonly called _____
a) Oyster mushroom b) Button mushroom
c) Dhingri mushroom d) Volvariella mushroom
 - 12 In basidiomycetes, the basidia are borne in fructification, called _____
a) Basidiocarp b) Cleistothecium
c) Apothecium d) Perithecium
 - 13 *Puccinia* belongs to class _____
a) Phycomycetes b) Ascomycetes
c) Basidiomycetes d) Duteromycetes

- 14 Alternate host of *Puccinia graminis tritici* is _____
 a) Maize plant b) Bajra plant
 c) *Berberis* plant d) Wheat plant
- 15 What is mode of nutrition in *Alternaria* _____
 a) Saprophytic b) Symbiotic
 c) Parasitic d) Autotrophic
- 16 Leaf curl is a _____ disease.
 a) Viral b) bacterial c) fungal d) algal
- 17 In _____ disease the infected part of plant becomes soft.
 a) Damping off b) Citrus canker c) Leaf curl d) Tikka
- 18 In _____ disease the curling and thickening of the leaves takes place.
 a) *Albugo candida* b) *Xanthomonas citri*
 c) *Cercospora personata* d) PaLCuV
- 19 The chemical used for killing fungal pathogens are known as
 a) Pesticide b) Bactericides
 c) Nematicides d) Fungicides
- 20 _____ is NOT a biological control method.
 a) Using predatory insects
 b) Applying copper-based fungicides
 c) Introducing parasitic nematodes
 d) Planting trap crops

- Q.2 Attempt any two of the following 15**
- a) Explain the general characters of Bacteria. 7.5
 b) Define sterilization. Explain the methods of chemical sterilization and radiation sterilization. 7.5
 c) Explain the principle and method of Acid fast staining. 7.5
 d) Enlist and explain in briefly the different types media studied by you. 7.5

- Q.3 Attempt any two of the following 15**
- a) Explain the general characters of Rhodophyta. 7.5
 b) Describe the thallus structure of *Polysiphonia*. 7.5
 c) Give an account of asexual reproduction in *Vaucheria*. 7.5
 d) Describe single cell structure of *Pinnularia*. Write classification of *Pinnularia*. 7.5

- Q.4 Attempt any two of the following 15**
- a) Give a brief account of basidiocarp in Basidiomycetes. 7.5
 b) Describe the development of the basidiocarp and basidium in *Agaricus*. 7.5
 c) Describe aecidiospore & pycnidiospore in *Puccinia*. 7.5
 d) Describe the life cycle of *Alternaria*. Add a note on its classification. 7.5

- Q.5 Attempt any two of the following 15**
- a) Describe in detail the causal organism, symptoms and Disease cycle of Tikka disease of Groundnut. 7.5
 b) Describe in detail the causal organism, symptoms, disease cycle & control measures of Citrus canker disease. 7.5
 c) Describe in detail the causal organism, symptoms and control measures of White Rust disease of Cruciferae. 7.5
 d) Give a general account of Physical control of plant diseases. 7.5
