

(3 Hours)

Total Marks: 100

- N.B.: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat and labelled diagrams wherever necessary.

Q.1). Attempt ANY TWO of the following. (20)

- Explain Hutchinson's system of classification in brief. State the merits and demerits of Hutchinson's system of classification.
- Classify the family Combretaceae with reasons, and give the distinguishing characters and economic importance of any one plant from the same family.
- Explain with neat labelled diagrams, the morphological features of the family Cannaceae. Give its economic importance and floral formula.
- Write a note on the working of Botanical Survey of India.

Q.2). Attempt ANY TWO of the following. (20)

- What are Sciophytes? With suitable examples describe the modifications seen therein.
- Describe the morphological and anatomical adaptations shown by succulent xerophytes.
- Citing suitable examples, describe the morphological and anatomical adaptations shown by submerged hydrophytes towards the aquatic ecosystem.
- Highlight the various ecological adaptations of epiphytes observed in them.

Q.3). Attempt ANY TWO of the following. (20)

- Describe the structure and development of microsporangium.
- What is double fertilization? Describe the process with the help of a neat labelled diagram.
- Explain with a neat labelled diagram the various types of ovules studied by you.
- Describe the development of a Female Gametophyte in angiosperms.

Q.4). Attempt ANY TWO of the following. (20)

- What is phytogeography? Describe any 3 phytogeographical regions of India.
- Define Biodiversity. With the help of suitable examples, describe any two types of forest found in India.
- Describe the importance and Status of Biodiversity.
- Discuss various approaches by which biodiversity can be conserved.

Q.5). Write short notes on ANY FOUR of the following. (20)

- Inflouescence of family Lamiaceae
- Lalbaugh Botanical Garden, Bengaluru
- Pneumatophores
- Types of Fertilization
- DNA-based marker
- Levels of Biodiversity

(3 Hour)

[Total Marks: 100]

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 Attempt ANY TWO of the following: 20

- A. Explain the chemical structures of amylose and amylopectin.
- B. What are enzymes? Classify them according to IUB classification with examples
- C. What are fatty acids? Give a concise account of the structure of different fatty acids.
- D. Describe the action of enzymes with the help of Michaelis - Menten's equation

Q.2 Attempt ANY TWO of the following: 20

- A. Explain in detail the steps involved in the formation of root nodules.
- B. Describe the mechanism of ammonia assimilation in plants.
- C. Describe the Physiological effects and commercial applications of Gibberellins.
- D. Write in detail the physiological effect and commercial applications of Abscisic acid.

Q.3 Attempt ANY TWO of the following: 20

- A. What are molecular mutations? Explain missense and nonsense mutations with examples.
- B. What are mutagens? Explain the role of radiations as mutagens.
- C. Explain the molecular basis and effects of PKU.
- D. Following are the results of a three-point test cross. Calculate cross over percentage and draw a chromosome map for the genes A, B, and C:

ABC – 71	aBC – 18
abc – 64	AbC – 14
abC – 2	Abc – 17
aBc – 11	ABc – 3

Q.4 Attempt ANY TWO of the following: 20

- A. Calculate regression coefficients b_{xy} and b_{yx} for the following data:

X	1	3	5	7	9
Y	2	4	6	8	10

B. The mean life of a sample of 10 bulbs used in a Plant tissue culture laboratory A1 was found to be 1456 hours with a standard deviation of 423 hours. A second sample of 17 bulbs chosen from Plant tissue culture laboratory B1 showed a mean life of 1280 hours with a standard deviation of 398 hours. Is there a significant difference between the means of the two laboratories? Use unpaired t-test. (Given $t_{0.05, 25} = 2.06$)

C. The systolic blood pressure of 9 individuals who had been recumbent for 5 minutes was taken. Then 2ml of 0.5% solution of hypotensive drug was given and the blood pressure was recorded again. Did the injection of the drug lower the blood pressure? Use paired t-test (Given $t_{0.05, 8} = 2.31$)

Patient no	1	2	3	4	5	6	7	8	9
Before (BP)	122	121	120	115	126	130	120	125	128
After (BP)	120	118	115	110	122	130	116	124	125

D. Four brands of flashlight batteries are to be compared by testing each brand in five flashlights. Twenty flashlights are randomly selected and divided randomly into four groups of five flashlights each. Then each group of flashlights uses a different brand of battery. The lifetimes of the batteries, to the nearest hour, are as follows.

Brand A	Brand B	Brand C	Brand D
42	28	24	20
30	36	36	32
39	31	28	38
28	32	28	28
29	27	33	25

Preliminary data analyses indicate that the independent samples come from normal populations with equal standard deviations. At the 5% significance level, does there appear to be a difference in mean lifetime among the four brands of batteries? Use the ANOVA test. Each sample size is 5, and the total number of pieces of data is 20. (Given $F_{0.05, df1=3, df2=16} = 3.24$)

Q 5 Write a short note on ANY FOUR of the following

- Monosaccharide
- Competitive inhibitor
- Leg- haemoglobin
- Incomplete linkage
- 5BU as a mutagen
- Differentiate between unpaired t-test and paired t-test.

20

[Time: 3 Hours]

[Marks: 100]

Note:.. All questions are compulsory.
 Figures to the right indicate full marks.
 Draw diagrams wherever necessary.

- Q. I Attempt **any three**. 21
- 1) With the help of structures and enzymes represent oxidation of propionyl CoA by methylcitrate pathway.
 - 2) Write energy balance sheet to show the number of ATP molecules produced when a mole of Palmitic acid is oxidized to acetyl coenzyme A.
 - 3) Write a detailed note on omega oxidation in *Corynebacterium* spp.
 - 4) i) Explain the role of fatty acids in bacteria. (4)
 ii) Explain the action of lipase on triglycerides. (3)
 - 5) Describe in detail biosynthesis of even carbon saturated fatty acids.
 - 6) With the help of structures and enzymes represent biosynthesis of PHB in bacteria.
- Q. II Attempt **any three**. 21
- 1) Write brief note on i) Amino acid oxidase (4)
 ii) Glutamate dehydrogenase (3)
 - 2) Write a note on proteolytic enzymes.
 - 3) Schematically represent Stickland reaction for fermentation of a pair of amino acids. Specify the electron donor and the electron acceptor in the reaction.
 - 4) Using chemical structures, enzymes and coenzymes, write the pathway for biosynthesis of amino acids from 3 phosphoglycerate as the precursor molecule.
 - 5) Using chemical structures, enzymes and coenzymes, write the pathway for biosynthesis of UDP.
 - 6) Schematically represent degradation of purine nucleotides.
- Q. III Attempt **any three**. 21
- 1) Briefly explain major modes of metabolic regulation with a suitable diagram.
 - 2) i) Write a brief note on allosteric enzymes. (4)
 ii) Explain allosteric inhibition of glutamine synthetase activity. (3)
 - 3) Explain concerted and sequential feed-back inhibitions with examples.
 - 4) With a suitable example explain "negative control of transcription".
 - 5) Discuss the mechanism and significance of stringent response.
 - 6) Schematically represent regulation of PDH and TCA cycle.
- Q. IV Attempt **any three**. 21
- 1) Describe location and structure of photosynthetic apparatus in bacteria.
 - 2) Schematically represent light reaction in cyanobacteria.
 - 3) Explain assimilation of nitrate in bacteria.
 - 4) Schematically represent dissimilatory reduction of sulfate.
 - 5) Discuss various methods for protection of nitrogenase.
 - 6) Schematically represent Calvin Cycle.

Q.V

A Do as directed **any twelve.**

12

- 1) State true or false- *Mycobacterium* species utilizes short chain hydrocarbons.
- 2) Name a lipid which contains fatty acids esterified to amino sugar.
- 3) Name the co-substrate used by *Pseudomonas* in monooxygenase reaction.
- 4) Give one example of an unsaturated fatty acid.
- 5) State a metabolic function of CTP.
- 6) Define a nucleoside.
- 7) Lysine is a ketogenic amino acid. State true or false.
- 8) Write a word equation for the reaction catalyzed by cysteine desulphydrase.
- 9) Define operon
- 10) Write an example of regulatory enzyme of glycolysis.
- 11) State true/false: Major groove in DNA is the main site for protein binding.
- 12) Write an example of DNA binding protein.
- 13) Write an example of anoxygenic phototroph
- 14) Name the enzyme used for assimilation of N₂.
- 15) Which special structure is present in Cyanobacteria for N₂ fixation?
- 16) Write an example of Hydrogen oxidizing bacteria.

Q.V

B Do as directed **any two.**

4

- 1) Write the general structure of a phosphoglyceride and give an example of the same.
 - 2) Explain the significance of Phosphoribosyl transferase.
 - 3) Explain 'glucose effect'.
 - 4) Enlist any two functions of carotenoid pigments in bacteria.
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(DURATION: 3 HOURS)

(TOTAL MARKS: 100)

- NOTE: 1 ALL QUESTIONS ARE COMPULSORY.
2 FIGURES TO THE RIGHT INDICATE FULL MARKS.
3 DRAW DIAGRAMS WHEREVER NECESSARY.

Q 1 ATTEMPT ANY THREE

21

- Explain in detail the immunoprophylaxis with respect to Polio.
- Give an account of CSF examination used for detection of meningitis and add a note on its pathogenesis.
- Write a short note on pathogenicity of HIV infection.
- Explain culture based techniques in diagnosis of Tetanus.
- Write a short note on microscopy based methods used in diagnosis of syphilis.
- Explain the pathology and pathogenesis of malaria parasite.

Q 2 ATTEMPT ANY THREE

21

- Explain Extended Spectrum Penicillin.
- Write a note on a) Carbapenems b) Cephalosporin
- Elaborate on MRSA and its detection.
- Write a short note on Tetracycline.
- Discuss antibiotic that affect cell membrane function.
- Explain in detail the Kirby Bauer method.

Q 3 ATTEMPT ANY THREE

21

- Write a short note on Primary humoral response.
- Describe T cell differentiation.
- Give the Properties of Thymus dependent (TD) and Thymus independent (TI) antigens.
- Diagrammatically represent TCR-CD3 complex.
- Describe perforin/granzyme mediated pathway of target cell destruction.
- Explain the antibody dependent killing mechanism of natural killer cells.

Q 4 ATTEMPT ANY THREE

21

- Briefly explain live attenuated vaccines.
- Discuss the characteristics of ideal vaccine.
- Describe in brief alternate pathway for complement activation.
- Briefly explain biological functions of complement system.

- (e) Explain in brief HDNB.
- (f) Write a short note on clinical uses of Monoclonal antibody.

Q 5 A ATTEMPT ANY TWELVE

12

- 1 HIV is a non-enveloped virus, state true or false.
- 2 Fulminant meningococemia was formerly called Waterhouse Friderichsen syndrome, state true or false.
- 3 All forms of malaria cannot be transmitted by blood transfusion. State true or false.
- 4 Reagin antibody tests are used for diagnosis of infection caused by Treponema, state true or false.
- 5 In semi synthetic penicillins, the core group (nucleus) is produced by _____.
A]Bacteria B]Fungus C]Chemical method
- 6 Name the antibiotic that interferes with the attachment of amino acyl tRNA to the 30 S ribosomal subunit.
- 7 Give the full form of ESBL.
- 8 Streptomycin is effective against Mycobacteria. State True or False
- 9 Define: Secondary humoral response.
- 10 Give the full form of FADD.
- 11 Name any one professional APCs.
- 12 What is affinity maturation?
- 13 What are Polyclonal antibodies?
- 14 Name the medium used to select hybridomas.
- 15 Give one example of live attenuated vaccine.
- 16 State the composition of DPT vaccine.

Q 5 B DO AS DIRECTED ANY TWO

04

- 1 Explain Surgical prophylaxis in *Clostridium tetani* infection.
- 2 What are second generation Cephalosporin? Give an example.
- 3 Give any two events takes place in the germinal centre.
- 4 Give any two advantages of DNA vaccines.

(3 Hours)

[Total Marks : 100]

- N.B.:** 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labelled diagrams wherever necessary.

Q. 1) Answer ANY TWO of the following: (20)

- Explain the sequencing of DNA by chemical degradation method.
- Give the applications of polymerase chain reaction technique.
- Describe the nuclear genome sequences used in plant DNA barcoding. Add a note on their merits and demerits.
- Write a note on "Present status of DNA barcoding in plants."

Q. 2) Answer ANY TWO of the following: (20)

- Explain the classification and organisation of Biological Database.
- Explain the principles and applications of BLAST in the context of bioinformatics and molecular biology research?
- Give the classification of homologs. How does the study of these proteins help to distinguish between proteins?
- How does phylogenetic analysis contribute to our understanding of evolutionary relationships among different species?

Q. 3) Answer ANY TWO of the following: (20)

- Give an account on source and extraction of Rose oil, add a note on its uses.
- Write on the source, plant part used, method of extraction and uses of Citronella oil.
- Define the term drying oil, add a note on source, extraction process and uses of any one drying oil you had studied.
- Explain the source, useful plant part, method of extraction and uses of Coconut oil.

Q. 4) Answer ANY TWO of the following: (20)

- With reference to hot air drying, discuss the technique of drying.
- Define freezing. Explain the different freezing methods used in food preservation techniques.
- Discuss the technique of canning for food preservation.
- Define food preservative. Explain the various types of preservative used for food preservation

Q. 5) Write Short Notes on ANY FOUR of the following: (20)

- Steps of Sangers methods
- DNA barcoding in Plants
- GenBank
- Source and uses of Olive oil
- Methods of extraction of essential oils
- Role of Brine and vinegar in pickling
