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BOTANY

(Major)

Paper : 6.1

(Molecular Biology and Plant Biochemistry)

Full Marks : 60

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

1. Fill in the blanks with appropriate words : 1×7=7

   (a) The theory of inheritance was proposed by _____ in 1941.

   (b) Left handed helical coiling of DNA molecules is characteristic of _____.

   (c) Conversion of nitrate to ammonia is a _____ process.

   (d) Cloned DNA sequence can be physically mapped by _____.

(e) _____ is the smallest unit of DNA capable of recombination.

(f) Carbohydrates are _____ of substances that yield such compounds on hydrolysis.

(g) Nomenclature of enzymes are done by the _____.

2. Define the following in brief : 2×4=8

(a) Selfish genes

(b) Nucleotides and nucleosides

(c) Pleiotrophic mutation

(d) Stereoisomerism in carbohydrates

3. Write short notes on any *three* of the following : 5×3=15

(a) Tautomerisation

(b) Genetic code

(c) Structural organization of nitrogenase enzyme

(d) Pribnow box

(e) Nitrate reductase

4. Answer any *three* of the following : 10×3=30

(a) What is promoter gene? Explain the mechanism involved in the positive control system for the regulation of gene activity in *E. coli* lac operon. 2+8=10

(b) Explain briefly the point-mutation. Describe the meiotic behaviour of frame-shift mutation. 2+8=10

(c) What are amino acids? Give an account of synthesis of amino acids in plants. 2+8=10

(d) What are the family of D-ketoses? Explain briefly the physical and chemical properties of mono-saccharides. 2+8=10

(e) What is leader sequence or Shine-Dalgarno (SD) sequence? Describe the differences between transcription and translation. 2+8=10

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BOTANY

(Major)

Paper : 6.2

(Bioinformatics, Computer Application and Biotechnology)

Full Marks : 60

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Choose the correct answer/Fill in the blank :

$1 \times 7 = 7$

(a) Which of the following is not a nucleotide sequence database?

(i) PDB

(ii) DDBJ

(iii) GenBank

(iv) EMBL

(b) WWW stands for _____.

(Turn Over)

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(c) 1 megabyte is equal to

    (i) 1000 bytes

    (ii) 1024 bytes

    (iii) 1024 kilobytes

    (iv) 1000 kilobytes

(d) Which technique is used for generation of haploid plant?

    (i) Meristem culture

    (ii) Pollen culture

    (iii) Both (i) and (ii)

    (iv) None of the above

(e) Who among the following is popularly known as the Father of Indian DNA Fingerprinting?

    (i) Lalji Singh

    (ii) P. K. Gupta

    (iii) Alec John Jeffreys

    (iv) M. S. Swaminathan

(f) Flavr Savr is genetically modified

    (i) rice

    (ii) potato

    (iii) tomato

    (iv) soybean

(g) Linux is a

    (i) malware

    (ii) firmware

    (iii) operating system

    (iv) application program

    2×4=8

2. Define the following :

    (a) BLAST

    (b) GenBank

    (c) Neighbour joining method of molecular phylogeny

    (d) Windows operating system

    5×3=15

3. Write on any three of the following :

    (a) Somatic embryogenesis

    (b) Computer aided drug design

    (c) Distinction between micro-injection and electroporation

    (d) Sequence retrieval system

    (e) Role of DNA sequencing in modern biotechnology

4. Answer any three of the following :   10×3=30

    (a) Define Bioinformatics. Mention the different branches of Bioinformatics and their importance in Biology. Discuss the importance of Biological databases in present context of Biological research.

    2+4+4=10

(b) Describe briefly the principle of Sanger's dideoxynucleotide chain termination method. Discuss how DNA sequencing technology can be used for crop improvement programmes. 7+3=10

(c) Explain Agrobacterium mediated gene transfer method. Describe briefly the achievements already made in the production of transgenic plants for improvement of agriculturally important traits. 4+6=10

(d) What is the basic difference between genomic and cDNA library? Describe the method for construction of genomic or cDNA library. Mention some importance of cDNA libraries in genomic research. 2+5+3=10

(e) What are the different components used in plant tissue culture media? Explain the methodology for haploid production from anther and pollen culture. 5+5=10

(f) Define genomics and proteomics. Discuss how genomics and proteomics research can be utilized for crop improvement. 3+7=10

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BOTANY

(Major)

Paper : 6.3

(Plant Physiology)

Full Marks : 60

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Answer the following questions : 1×7=7

   (a) What is photoinhibition?

   (b) What do you mean by chemical potential?

   (c) Define permanent wilting percentage.

   (d) What is apoplast?

   (e) Name the plant hormone discovered from rice field.

(*Turn Over*

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(f) What is the element present in middle lamella?

(g) Who proposed Z scheme and suggested that two-pigment system operates in series?

2. Answer the following questions in brief : $2 \times 4 = 8$

(a) During day time, why does pH of guard cell increase?

(b) What is Kranz anatomy? Give an example of plant having Kranz anatomy.

(c) What is apical dominance?

(d) Why is translocation process bidirectional?

3. Answer/Write on any *three* of the following :

$5 \times 3 = 15$

(a) Phloem loading and unloading

(b) Florigen concept

(c) "Transpiration is a necessary evil." Justify.

(d) Write a short note on any one of the vital theories of ascent of sap.

(e) Explain briefly glycolytic pathway.

4. (a) How is water translocated in plants— describe the mechanism with modern theory. Justify the acceptability of the theory. $7+3=10$

Or

What are inner space and outer space? Work out the active mechanism of mineral salt absorption. $3+7=10$

(b) Discuss the roles of P_{680} and P_{700} in cyclic and non-cyclic electron transport pathways. 10

Or

What do you understand by gibberellins and cytokinins? Give an account of their physiological role and mechanism of their actions. $3+7=10$

(c) Define photoperiodism. What is unique feature of phytochrome, which differentiates it from other pigments? Define LDP, SDP and DNP according to their photoperiodic response with at least two examples. $2+2+6=10$

Or

Explain the different abiotic stresses in plants. How do the plants defend themselves against these stresses? $2+8=10$

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BOTANY

(Major)

Paper : 6.4

(Plant Resource Utilization)

Full Marks : 60

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

1. Fill in the blanks : 1×7=7

   (a) _____ is the most important drug obtained from *Cinchona officinalis* which is used in the cure of malaria.

   (b) _____ is known as pioneer of Green Revolution.

   (c) Pineapple belongs to the family _____.

   (d) Major alkaloid of periwinkle plant is _____.

   (e) Scientific name of Cocoa is _____.

(f) Lint and fuzz fibres are found in _____ seeds.

(g) 'Taxol' is obtained from the plant _____.

2. Answer the following in brief : 2×4=8

(a) What is 'Traditional Knowledge'?

(b) Mention the scientific name and economically important parts of (i) turmeric and (ii) clove.

(c) Write the chemical composition of castor seed.

(d) Define 'Ethnobotany' and write its importance.

3. Answer any *three* of the following questions : 5×3=15

(a) Discuss the economic importance of (i) Andrographis and (ii) Rauvolfia plant.

(b) Mention the botanical names, parts used and importance of (i) Bixa and (ii) Henna plant.

(c) Write about the processing of tea.

(d) Give an account of centre of origin of crop plants as proposed by N. I. Vavilov.

(e) Write a note on crop domestication.

4. Answer in detail the following : 10×3=30

(a) Elucidate the term 'crop improvement'. Describe how crop improvement brings out 'Green Revolution' in India.

Or

Write scientific name, botanical description, products and uses of the following economically important plants :

(i) Mustard

(ii) Sugar beet

(b) What is pharmacognosy? Give an account of pharmacognosy with respect to the importance of uses of medicinal plants.

Or

What are non-timber plant resources? Write a note on the non-timber plant resources of North-East India.

(c) What do you mean by 'leguminous plant resources'? Give an account of soya bean and pea.

Or

What are fibres? Discuss the details of botanical characters, method of extraction and economic importance of cotton.

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