**3 (Sem–6/CBCS) BOT HC 1**

**2022**

**BOTANY**

( Honours )

Paper : BOT–HC–6016

***( Plant Metabolism )***

*Full Marks : 60*

Time : Three hours

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

1. Answer ***any seven*** questions from the following : 1×7=7

   *(a)* What are the *two* types of enzyme regulation ?

   *(b)* Name a cellular organelle containing cytochrome oxidase.

   *(c)* Cytochromes are _____ proteins.
   *(Fill in the blank)*

   *(d)* What are accessory pigments ?

(e) Name a copper containing protein acting as an electron carrier in thylakoid membrane.

(f) Why is TCA cycle amphibolic?

(g) What are the types of second messengers?

(h) Photorespiration is completed in _____, _____, and _____. *(Fill in the blanks)*

(i) Name the component of the enzyme nitrogenase.

(j) Protein part of the enzyme is called as _____. *(Fill in the blank)*

2. Answer ***any four*** questions from the following : 2×4=8

(a) What do you mean by oxidative decarboxylation of pyruvate? Where does it occur?

(b) What are the roles of uncouplers in ATP synthesis?

(c) Distinguish between apoenzyme and prosthetic group.

(d) Differentiate between RuBP and RUBISCO.

(e) What regulates the PDH complex?

(f) Photosynthesis is driven by two photochemical processes which are associated with two groups of photosynthetic pigments. Name them.

(g) What is oxidative phosphorylation? Mention the *two* components of oxidative phosphorylation.

(h) What is NADH shuttle? Name the *two* types of NADH shuttle.

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

(a) Crassulacean acid metabolism (ACM)

(b) Synthesis and degradation of sucrose

(c) Allosteric inhibition

(d) Co-enzymes and co-factors

(e) Cyanide-resistant respiration

(f) Photorespiration

(g) Biological nitrogen fixation

(h) Receptor-ligand interactions

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

(a) What is photophosphorylation ? Give an account of cyclic and non-cyclic photophosphorylation.

(b) Describe the $\beta$-oxidation pathway of fatty acids.

(c) What are the fates of pyruvate in glycolysis ? Explain briefly.

(d) Describe mitochondrial electron transport.

(e) What are enzymes ? How are they classified ? Give a brief account of classification and nomenclature of enzymes.

(f) What are second messengers ? Mention the types of second messengers. Describe the mechanism of receptor mediated activation and inhibition of cyclic AMP.

(g) Describe C4 pathway and compare it with Calvin cycle.

(h) Explain glyoxylate cycle. What is its significance ?

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**3 (Sem–6/CBCS) BOT HC 2**

**2022**

**BOTANY**

( Honours )

Paper : BOT–HC–6026

***( Plant Biotechnology )***

*Full Marks : 60*

Time : Three hours

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

1. Answer ***any seven*** of the following : 1×7=7

   *(a)* Who invented PCR technique in 1985 ?

   *(b)* Define phagemids.

   *(c)* Is GUS a Reporter gene ?

   *(d)* What is somaclonal variation ?

   *(e)* What kind of plant growth regulator can be used in plant tissue culture technique ?

(f) The term 'restriction endonuclease' was coined by ___ and ___ (1964) to describe the nuclease enzymes that destroy ('restrict') any foreign DNA entering the host cell. *(Fill in the blanks)*

(g) ____ utilizes overlapping fragments of a particular chromosome to isolate gene of interest which may be present upstream and downstream from the original DNA fragment. *(Fill in the blanks)*

(h) What do you understand by 'gene construct' ?

(i) The use of very low temperatures to preserve structurally intact living cells and tissues is known as _____. *(Fill in the blanks)*

(j) Mention *at least one* feature of a type II restriction enzyme useful in recombinant DNA technology.

2. Answer very briefly ***any four*** of the following : 2×4=8

(a) What are retroviruses ?

(b) Define organogenesis.

(c) "The plasmids are named on the basis of certain criteria." Explain by citing an example.

(d) What are the *two* aspects that are considered while using a cosmid for gene cloning in *E.coli* ?

(e) Why is selectable marker very essential ?

(f) What is the role of media in plant tissue culture ?

(g) What are shuttle vectors ?

(h) What is the purpose of microinjection ?

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

(a) Advantages of germplasm storage

(b) Role of transgenics in bio-remediation

(c) Application of restriction endonucleases

(d) Distinction between yeast artificial chromosomes (YACs) and bacterial artificial chromosomes (BACs) vectors.

(e) Ti plasmid

(f) Totipotency

(g) cDNA library

(h) Gene therapy

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

(a) What are haploid plants ? Give an account of different methodologies that could be employed for production of haploid plants. State their applications. 2+6+2=10

(b) What is protoplast fusion ? Discuss the techniques involved in protoplast isolation, purification and fusion. 2+8=10

(c) What are genetically modified crops ? Discuss their advantages and disadvantages. 2+4+4=10

(d) "Transgenic plants are plants whose DNA is modified using genetic engineering techniques." Explain the steps involved in the production of transgenic plants.

(e) Describe in detail the direct methods of gene transfer by electroporation and microprojectile bombardment. 5+5=10

(f) What is PCR ? What are the requirements of PCR ? Add a note on the applications of PCR. 2+5+3=10

(g) "Vectors are the DNA molecules that act as a vehicle for carrying a foreign DNA fragment when inserted into a host cell." Explain with the help of examples. Discuss about pUC 18, pUC 19, and pBR322.

(h) Which media is commonly used in plant tissue culture ? Describe the process involved in the preparation of tissue culture media.

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