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3 (Sem-6/CBCS) BOT HC 1

2023

**BOTANY**

(Honours Core)

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 the following questions :  $1 \times 7 = 7$ 
  - (a) How many ATPs are consumed for synthesis of one hexose sugar in C3 cycle ?
  - (b) Name the cellular organelle where ATP synthetase works.
  - (c) MAP kinase are \_\_\_\_\_ proteins.  
*(Fill in the blank)*
  - (d) Write *two* roles of uncouplers.

Contd.

(e) Metallic part of an enzyme is called \_\_\_\_\_.  
(Fill in the blank)

(f) Name *one* enzyme responsible for transamination reaction.

(g) What is the cellular location of glycolysis?

2. Answer the following questions in brief :

2×4=8

(a) Discuss briefly about Bayer's conformational model on ATP synthesis.

(b) Distinguish between co-enzyme and co-factors.

(c) Discuss briefly about the process of transamination.

(d) What are the classes of enzymes according to the recent classification of IUB?

3. Write brief answer on *any three* of the following :

5×3=15

(a) Elucidate the role of temperature and  $CO_2 : O_2$  ratio during photosynthetic  $CO_2$  fixation.

(b) Describe the systematic infection of root by *Rhizobium* bacteria during biological nitrogen fixation.

(c) Illustrate the mechanisms of enzyme inhibition with proper examples.

(d) Elucidate the process of formation of pyruvic acid during glycolysis.

(e) Write shortly about antenna molecules and reaction centres involved in photosynthetic light reactions.

4. Answer *any three* from the following :

10×3=30

(a) Elucidate with proper representation of reactions involved in the process of conversion of nitrate to ammonia. Write briefly about GS/GOGAT system.

7+3=10

(b) Elucidate the role of calcium calmodulin cascade in signal transduction mechanism. What do you understand by receptor ligand interaction?

7+3=10



- (c) Describe the process of gluconeogenesis and its role in mobilisation of lipids during seed germination. What is  $\alpha$ -oxidation? 7+3=10
- (d) Elucidate with proper diagram the biosynthesis of ATP and  $NAOPH_2$  involving PS-I and PS-II. What is the role of metalloproteins in photolysis of water? 7+3=10
- (e) With proper representation of chemical reactions describe the TCA cycle. Discuss the energy balance of the process. 7+3=10
- (f) Give a detailed account on synthesis and degradation of starch in plant body. 5+5=10
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3 (Sem-6/CBCS) BOT HC 2

2023

**BOTANY**

(Honours Core)

Paper : BOT-HC-6026

**(Plant Biotechnology)**

Full Marks : 60

Time : Three hours

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

1. Fill in the blanks :  $1 \times 7 = 7$

(a) Molecules having new combination of sequences that were not present before are called as \_\_\_\_\_.

(b) A single stranded, radiolabelled molecule of nucleic acid is called as \_\_\_\_\_.

(c) Golden rice is a bioengineered crop with yellow coloured endosperm that contains \_\_\_\_\_.

Contd.



- (d) Digestion of DNA using two restriction enzymes in a single reaction is called as \_\_\_\_\_.
- (e) The two antibiotic resistant genes of vector p<sup>BR322</sup> imparts resistance against \_\_\_\_\_ and \_\_\_\_\_.
- (f) \_\_\_\_\_ is the first commercially produced human hormone using r-DNA technology.
- (g) \_\_\_\_\_ vectors are designed to replicate in cells of two different host species.

2. Answer the following very briefly :  $2 \times 4 = 8$

- (a) What is the role of DMSO in cryopreservation ?
- (b) What are cosmids ?
- (c) What is the source of Luciferase gene ?
- (d) State the difference between somatic and zygotic embryogenesis.

3. Answer **any three** of the following :  $5 \times 3 = 15$

- (a) Discuss the practical applications of somatic embryogenesis.
- (b) Write a note on Lambda phage vector.

(c) Describe an engineered DNA molecule used to clone DNA sequences stating the common gene components present in it.

(d) What is an adaptor molecule ? How does it differ from linkers ?

(e) Why thermostable polymerase is used in PCR ? Mention *one* disadvantage of taq polymerase.

4. Answer **any three** of the following :

$10 \times 3 = 30$

(a) What are restriction endonuclease enzymes ? Describe the specific properties of type I and type II restriction endonucleases enzymes. Why are they so important for recombinant DNA technology ?  $1 + 6 + 3 = 10$

(b) Describe various steps for the construction of cDNA library.

(c) Discuss elaborately the direct methods of gene transfer by electroporation and microinjection.  $5 + 5 = 10$

(d) What are organic supplements ? Give an account of organic supplements used in tissue culture media.

- (e) What are secondary metabolites ? Describe a tissue culture strategy for the production of secondary metabolites.
- (f) Give an account of role of transgenics in bioremediation.