Roll No. .....

D–1034

M. Sc. (Fourth Semester) (Main/ATKT) EXAMINATION, 2020

BIOSCIENCE

Paper First

(Seed Science)

Time : Three Hours] [*Maximum Marks : 80*

Note : Fifteen minutes extra time to be given to the examinee for reading the questions. All questions are compulsory.

Section—A 1 each

(Objective/Multiple Choice Questions)

Note : Attempt all questions.

Choose the correct/the most appropriate answer and write in your answer book :

1. Enzymes that increase during priming includes :

   (i) Beta amylase

   (ii) Isocitrate lyase

   (iii) Endo-beta-mannose

   (iv) PIMT

   Choose the correct pairs :

   (a) (i), (ii) and (iii)

(b) (ii) and (iv)

(c) (i), (iii) and (iv)

(d) (i), (ii), (iii) and (iv)

2. The regulation of CTS function seems to be a major control point for the switch between dormancy and germination as it encodes :

(a) a peroxisomal protein of the GTP-binding cassette (GBC) transporter class

(b) a peroxisomal protein of the ATP-binding cassette (ABC) transporter class

(c) a mitochondrial protein of the ATP-binding cassette (ABC) transporter class

(d) a peroxisomal protein of the GTP-binding cassette (GBC) transporter class

3. The key factors involved in GA signalling during seed germination are :

(a) mitochondrial proteins of ABC transporters

(b) SLY1 and CTS proteins

(c) Lea and sHSP

(d) None of the above

4. Cryoprotectant is a substance used to protect biological tissue from :

(a) Desiccation damage i. e. due to water loss

(b) High temperature damage i. e. due to solute release

(c) Freezing damage i. e. due to ice formation

(d) Freezing damage i. e. due to chilling temperature

5. Group of chemicals that are known for releasing dormancy :

(i) KCN, H_2O_2

(ii) Methyl viologen, Thiourea

(iii) ABA, GA inhibitor

(iv) Nitric oxide, Ethylene

Choose the correct set of answer :

(a) i, ii, iii

(b) ii, iii, iv

(c) i, ii, iv

(d) i, ii, iii, iv

6. The oxidation of histidine yields .....

(a) 1-oxohistidine

(b) 2-oxohistidine

(c) 1-ketohistidine

(d) 2-hydroxyhistidine

7. Inhibition of GA_3 Oxidase 1 ($GA_3O\ x_1$) and GA_3 Oxidase 2 (GA_3Ox_2) pomotes :

(a) Seed priming

(b) Seed desiccation

(c) Seed germination

(d) Seed dormancy

8. Which of the following repairing system repair 8-oxoguanine (8-oxoG) in DNA ?

(a) Base excision repair

(b) Nucleotide excision repair

(c) Homologous repairing system

(d) Non-homologous repairing system

9. Which of the following processes occurs during activation of pre-germination metabolic phase ?
   (a) DNA replication
   (b) Ribosome synthesis
   (c) Mitochondrial repair
   (d) Ethylene transport

10. Which of the following is not a function of LEA proteins ?
   (a) Protein stabilization
   (b) Protein re-folding
   (c) Membrane stabilization
   (d) Protein transport

11. Which of the following statements is true regarding base excision repair ?
   (i) AP site is created by DNA glycosylase
   (ii) DNA glycosylase remove modified base
   (iii) Deoxyribose phosphodiesterase create 3' OH
   (iv) AP endonuclease create nick within strand to remove damages base

   Choose the correct pairs :
   (a) (i), (ii) and (iii)
   (b) (ii), (iii) and (iv)
   (c) (i), (iii) and (iv)
   (d) (i), (ii) and (iv)

12. Which of the following is not a permeating cryoprotectant ?
   (a) Glycerol
   (b) DMSO
   (c) Sucrose
   (d) Glycine

13. The deteriorative changes in cells could be due to :
   (a) Hydroxyl radical
   (b) Malonyldialdehyde
   (c) Carbonylated proteins
   (d) All of the above

14. Endosperm-specific β-Glul expression and endosperm rupture are inhibited by :
   (a) GA
   (b) Kinetin
   (c) ABA
   (d) Ethylene

15. Which of the following repairs ageing induced damage of cellular proteins ?
   (a) L-isoaspartyl methyltransferase
   (b) L-aspartyl L-phenylalanine methyl ester
   (c) Both (a) and (b)
   (d) None of these

16. Which of the following mechanisms is negatively affected by seed dormancy ?
   (a) Increased expression of NCED
   (b) Down-regulation of GA_2Ox_1
   (c) Up-regulation of GA_2Ox_1 and 2
   (d) Decreased PIL5 level

17. The Global Genomic NER (GG-NER) is a :
   (a) transcription independent process
   (b) translational dependent process
   (c) transcription dependent process
   (d) translational independent process

18. Which of the following processes is promoted by ABA synthesis and signalling ?
    (a) GA anabolism
    (b) ABA catabolism
    (c) GA catabolism
    (d) CYP707A2 expression

19. Which of the cyclin-CDK complex rise during M-phase of cell cycle ?
    (a) Cyclin A-CDK2
    (b) Cyclin B-CDK1
    (c) Cyclin E-CDK4
    (d) Cyclin B-CDK2

20. Pre-sowing treatment that involves exposure of seeds to a low external water potential that limits hydration is called :
    (a) Seed priming
    (b) Cryotreatment
    (c) Synthetic seeds
    (d) None of the above

Section—B 2 each

(Very Short Answer Type Questions)

Note : Answer in **2–3** sentences.

1. What is Hydrotime Concept ?
2. What are the biochemical markers of seed ageing ?
3. What is primary dormancy ?
4. Describe role of DOG1 in seed dormancy ?
5. Give any *two* differences between orthodox and recalcitrant seeds.

6. What is the similarity and dissimilarity between synthetic seeds and natural seeds.
7. Classify dormancy based on the timing of onset of dormancy.
8. What is meant by resumption of metabolic activity during germination ?

Section—C 3 each

(Short Answer Type Questions)

Note : Answer in **75** words.

1. Longevity of recalcitrant seeds is shorter than orthodox seeds. Explain the reason.
2. What is osmotic priming ?
3. Give difference between global genomic NER and transcription coupled NER.
4. Describe ROS induced enzymes synthesized in aleurone layer during PCD.
5. Give an account on function of PIMT.
6. What are the types of explants used to prepare artificial seeds ?
7. Explain role of protein oxidation in seed dormancy.
8. What is exogenous seeds dormancy ?

Section—D 5 each

(Long Answer Type Questions)

Note : Answer in **150** words.

1. Discuss interaction of GA, ABA and Ethylene during the regulation of seed dormancy release and germination.

   Or

   Describe important biochemical events occurring during maturation phase of seed development.

2. Molecular mechanism of GA induced alpha-amylase synthesis during seed germination.

Or

Describe the DNA damage repair during germination on the basis of single and double strand breakage.

3. How ROS and lipid peroxidation affects seeds viability and vigour ?

Or

What is desiccation tolerance ? Describe desiccation tolerance molecules.

4. What are the biochemical and molecular changes occurring during priming ?

Or

Explain the following :

(a) What is vitrification and why is it important in cryostorage ?

(b) What is encapsulation ? Explain, how is it done.