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SEAT No. _____

No. of Printed Pages : _____

SARDAR PATEL UNIVERSITY
M.Sc. Biochemistry (SEMESTER-II)
Paper: PS02CBIC01- Molecular Biology
Date: 10th April, 2017 (Monday)
Time: 10.00 a.m To 1.00 p.m

Total marks: 70

1. Choose the most appropriate answer: (8 marks)

- i) Eukaryotes differ from prokaryotes in mechanism of DNA replication due to:
- a) Different enzyme for synthesis of lagging and leading strand
 - b) Use of DNA primer rather than RNA primer
 - c) Unidirectional rather than bidirectional replication
 - d) Discontinuous rather than semidiscontinuous replication
- ii) Which of the following equation is correct for double stranded DNA?
- a) $A+T= G+C$
 - b) $G/A= T/C$
 - c) $A+C= G+T$
 - d) $A/G= C/T$
- iii) During translation, the ____ site within the ribosome hold the growing amino acid chain while the ____ site holds the next amino acid to be added to the chain.
- a) A, P
 - b) P, A
 - c) A, E
 - d) P, E
- iv) Which of the following best describes the 'cap' modification of eukaryotic mRNA?
- a) A modified guanine nucleotide added to the 3' end of the transcript.
 - b) A modified guanine nucleotide added to the 5' end of the transcript.
 - c) A string of adenine nucleotides added to the 3' end of the transcript.
 - d) A string of adenine nucleotides added to the 5' end of the transcript
- v) The conserved regions recognized during intron splicing include
- a) intron- exon boundaries
 - b) 5' and 3' splice sites only
 - c) 5' and 3' splice sites and Polypyrimidine tract
 - d) only polypyrimidine tract
- vi) The modified base Inosine is formed from Adenine by
- a) Sulfur substitution
 - b) Deamination
 - c) Base isomerization
 - d) Methylation
- vii) The enzyme (made of proteins and RNA) that elongates chromosomes by adding repeat sequences to the end of existing chromosomes is
- a) Telomerase
 - b) Exonuclease
 - c) Endonuclease
 - d) Ribonuclease
- viii) In eukaryotes, transient gene expression is responsible for
- a) growth and development
 - b) response to environmental changes
 - c) both a) and b)
 - d) none of these

2. Write briefly on any seven:

(2x7 = 14 marks)

- a) Processivity and Fidelity of DNA polymerase in DNA replication.
- b) Leucine Zipper proteins.
- c) Promoter clearance during transcription
- d) Eukaryotic promoters.
- e) Mechanism of action of aminoacyl tRNA synthetase.
- f) The roles of -35 and -10 promoters of bacteria
- g) Role of chemical modifications in tRNA
- h) Catabolite repression
- i) Role of Homeotic genes in Drosophila development.

Q.3 (a) What is cot curve? How it is utilized to know the complexity of any organism? (06)

(b) Explain the mechanism of DNA polymerase. Explain how DNA polymerase distinguishes between rNTPS and dNTPs? (06)

OR

(b) Give a brief account on DNA supercoiling and explain the mechanism of action of γ topoisomerase. (06)

Q.4. (a) Explain the role of Tus protein in termination of DNA replication in prokaryotes. (06)

(b) What are histones? Discuss how histone modification regulates the gene expression in Eukaryotes (06)

OR

(b) Describe the properties of rho protein. Give detail account on rho dependent termination of transcription in prokaryotes. (06)

Q.5 (a) Describe the secondary and tertiary structure of tRNA in detail. (06)

(b) Discuss the role of SnRNPs during splicing of introns in eukaryotic mRNAs. (06)

OR

(b) Explain the steps involved in the initiation of translation in eukaryotes. How is this different from initiation in prokaryotes? (06)

Q.6 (a) What is attenuation? Give a detailed account of trp operon. (06)

(b) Enlist the events occurring during post-translational modifications. Explain any two events in detail. (06)

OR

(b) Explain the role of maternal genes in establishment of polarity in embryonic development of Drosophila. (06)

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[24]

Saturday, 15th April 2017

Time: 10.00 a.m. to 1.00 p.m.

SEAT No. _____

Paper: PS02CBIC03 (Enzymology)

Total Marks: 70

- N.B.: (i) Answers of all the questions (including multiple choice questions) should be written in the provided answer book only.
(ii) Figures in the right indicate marks.

Q1. Choose the most appropriate answer for the following multiple choice questions: (8)

- (i) Under normal physiological conditions, the substrate concentration is usually low, which means that the enzymes' rate of reaction is at
(a) V_o (c) V_{max}
(b) $K_{-1}+K_2/K_1$ (d) equilibrium
- (ii) Which of the following does not belong to serine protease family?
(a) Chymotrypsin (c) Trypsin
(b) Elastase (d) Collagenase
- (iii) In which of the following enzyme purification techniques, competitive inhibitors could be used as ligand?
(a) Ion exchange chromatography (c) Affinity chromatography
(b) Hydrophobic interaction chromatography (d) centrifugation
- (iv) The following is the slope of the Eadie-Hofstee plot
(a) V_{max}/K_m (c) K_m/V_{max}
(b) $-K_m$ (d) $1/V_{max}$
- (v) Fractional precipitation of one enzyme requires addition of 2.5 to 3.5 mM salt. Which of the following salts would you choose?
(a) silver chloride, AgCl (c) ammonium perchlorate, NH_4ClO_4
(b) ammonium sulfate, $(NH_4)_2SO_4$ (d) guanidinium chloride, CN_3H_6Cl
- (vi) The fastest enzyme is
(a) Pepsin (c) Carbonic anhydrase
(b) DNA gyrase (d) DNA polymerase
- (vii) Numerical measurement of an enzyme's affinity is represented as
(a) V_{max} (b) K_1 (c) K_m (d) K_{cat}
- (viii) Binding of first molecule of oxygen to hemoglobin increases its affinity, which is termed as
(a) homotropic effect (c) mechanism of action
(b) heterotropic effect (d) specificity

(Contd.....2)

Q2. Answer any SEVEN of the following questions briefly:

(7 X 2 = 14 Marks)

- (i) What is Feedback Inhibition? Give an appropriate example.
- (ii) Explain zymogen activation with appropriate example.
- (iii) Define Turnover number.
- (iv) Name active form of coenzymes required for transaminases and dehydrogenases.
- (v) Differentiate between monomeric and oligomeric enzymes.
- (vi) "Availability of substrate in different compartment of cell regulate enzyme activity"
– Justify statement with example.
- (vii) What are synthetic enzymes?
- (viii) Explain the following terms- Cooperativity, Heterotropic regulation.
- (ix) Who coined the term enzyme? Explain.

Q3. (a) Explain the specificity of enzymes by giving examples. (6)

(b) Explain any one method of homogenization of animal and plant tissue used for isolation of enzymes. (6)

OR

(b) What are the strategies for enzyme purification? Explain affinity chromatography for enzyme purification in detail (6)

Q4. (a) What is the assumption made to derive Michaelis-Menten equation? Derive MM equation and explain the importance of calculation of V_{max} and K_m . (6)

(b) Define Enzyme inhibition and classify it. Explain the competitive inhibition in detail. (6)

OR

(b) Derive an equation for noncompetitive inhibition (6)

Q5. (a) Explain in detail the mechanism of action of chymotrypsin. (6)

(b) What are allosteric enzymes? Explain their kinetic behaviour and physiological importance. (6)

OR

(b) Explain the following mechanism of enzyme catalyzed reaction : Proximity & Acid – base catalysis. (6)

Q.6 (a) Describe irreversible covalent modification of enzymes. Give specific example of irreversible covalent modification as a method of controlling activity. (6)

(b) Explain Enzyme engineering and its applications. (6)

OR

(b) Explain the control of transcription of β -galactosidase in presence and absence of lactose in *E. coli*. (6)

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[29/44/A-18]

SEAT No. _____

No. of Printed Pages : 2

[] SARDAR PATEL UNIVERSITY
M.Sc. (II & III Semester- CBCS) Examination
Subject: Biochemistry/ Microbiology
PS02EBIC02/PS03EMIC01; Plant Biotechnology
Tuesday, April 18, 2017
Time: 10.00 a.m. to 1.00 p.m.

Total Marks: 70

Note: Figures in brackets indicate marks
Answer all the questions in the given answer book

Q1. Choose the appropriate answer for the following multiple choice questions: (8x1=8)

- i) The phenomena of callus formation and further formation of organized structures are called:
a) Differentiation and redifferentiation b) Redifferentiation and dedifferentiation
c) Dedifferentiation and redifferentiation d) Dedifferentiation and differentiation
- ii) Crown galls are often seen on:
(a) Dicot plants (b) Monocot plants
(c) Gymnosperms (d) Both (a) & (b)
- iii) Among different culture systems used to generate in vitro plants _____ culture system show the maximum frequency of somaclonal variation:
(a) Cell suspension cultures (b) Protoplast cultures
(c) Anther cultures (d) Meristem cultures
- iv) Which type of cultures are used for production of homozygous plants in *in vitro*.
(a) Ovule cultures (b) Anther cultures
(c) Both (a) & (b) (d) Meristem cultures
- v) The growth hormone responsible for apical dominance
(a) Ethylene (b) cytokinin
(c) Gibberellin (d) auxin
- vi) The GFP reporter system is advantageous over other systems since
(a) it is a standalone system (b) it is non toxic
(c) expressed in prokaryotic and eukaryotic cells (d) all of these
- vii) Induced resistance in plants against pathogens is a
(a) Energy requiring mechanism (b) gene mediated response
(c) both (a) and (b) (d) none of these
- viii) Which of the following population is not suitable for mapping?
a) BC1 b) RILs
c) Doubled haploids d) F1

Q2. Answer any SEVEN of the following in brief: (7x2=14)

- a) Why sucrose requirement differ for globular stage and cotyledonary stage zygotic embryos?
- (b) Show the theoretical products of protoplast fusion. Which of them are most commonly observed?
- (c) Differentiate between organogenesis and embryogenesis.
- (d) Give a brief note about Biotransformation.
- (e) Explain in brief about Binary vectors.
- (f) Why cultured anthers will permit pollen to develop into pollen embryos whereas cultured isolated pollen grains may not form embryos? Give reasons.
- (g) What are the salient features of Systemic acquired resistance (SAR) ?
- (h) Note on: Patenting.
- (i) Role of Vir genes in Agrobacterium based transformation in plants.

Contd. Page 2

- Q3. (a) Outline the methods for protoplast isolation and fusion. (6)
(b) Explain different stages of in vitro clonal propagation, its advantages and disadvantages. (6)

OR

- (b) Describe in detail various pathways of in vitro morphogenesis. (6)
Q4 (a) Enlist the strategies used for production of disease free plants. Discuss any one in detail. (6)
(b) Explain the technique for the production of synthetic seeds. What are the merits and demerits of synthetic seeds?

OR

- (b) Define the term somaclonal variation. Write a note on somaclonal variation. (6)
Q5 (a) Provide a detailed description of Ti-plasmid mediated gene transfer in plants. (6)
(b) Describe various types of bioreactors used for in vitro production of secondary metabolites.

OR

- (b) Describe the direct DNA delivery systems for genetic transformation in plants. (6)
Q6 (a) Explain the role of Hyper sensitive response in plant defence mechanisms. (6)
(b) What are molecular markers? Explain principle, merits and demerits of RFLP and RAPD.

OR

- (b) Write a descriptive note on IPR. (6)

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