

SEAT No. _____

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SARDAR PATEL UNIVERSITY
M.Sc. Examination - November 2017
M. Sc. Integrated Biotechnology (IGBT) - 5th Semester
Wednesday, 01st November 2017
Session: Evening Time: 02:00 pm to 5:00 pm
Subject / Course code: - PS05CIGB01
Subject / Course Title: - Enzymology

Maximum Marks: 70

Note: (1) All the Questions are compulsory. (2) Figures on the right indicate marks.

Q.1. Choose the correct option

1x8 = 8

- (i) Weakly acidic type of resins used in ion exchange chromatography for the purification of _____
[A] acid and neutral proteins [B] acid proteins
[C] basic and neutral proteins [D] None of these
- (ii) Which of the following enzymes serves as the best indicator of acute myocardial infarction?
[A] CK-MB isoenzyme [B] CK-BB isoenzyme
[C] ALT [D] AST
- (iii) Enzymes may be used as the following, *except*:
[A] Laboratory reagents [B] Diagnostic agents
[C] Therapeutic agents [D] Nutrients
- (iv) Induced fit hypothesis was given by _____
[A] Emil Fischer [B] Daniel Koshland
[C] Wilhelm Friedrich Kuhne [D] James Watson
- (v) An organic substance bound to an enzyme and essential for its activity is called _____.
[A] isoenzyme [B] coenzyme
[C] apoenzyme [D] holoenzyme
- (vi) In competitive inhibition, two things that binds to enzyme active site are ____
[A] substrate [B] inhibitor
[C] catalyst [D] both A and B
- (vii) Functional groups of the nonessential amino acid residues that are suitable for the immobilization process are ____
[A] free α -, β - or γ carboxyl groups [B] α or β amino groups
[C] phenyl, hydroxyl, sulfhydryl or imidazole groups [D] All of these
- (viii) In isoelectric focusing, _____ gradient is created.
[A] Calcium chloride [B] pH
[C] Sephadex [D] All of these

Q.2. Attempt any seven of the following

2x7 = 14

- (a) Differentiate activators and inhibitors with examples.
(b) Write a brief note on dialysis as the method of enzyme purification.
(c) Write the differences between chemical and biological catalysts.

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- (d) Outline the principle of 'salting out' in enzyme purification.
- (e) What is K_M ? Explain its relationship with V_{max}
- (f) What is the function of alkaline phosphatase and creatine phosphokinase.
- (g) Distinguish between metalloenzymes and metal activated enzymes.
- (h) Advantages of immobilized enzymes.

Q. 3. (A) Describe the Lock and Key, induced fit and stabilization state hypotheses for enzyme specificity with suitable illustrations. [06]

(B) Explain first order, second order and zero order reactions with suitable equations. [06]

OR

Q. 3. (B) What is an active center? Discuss the most accepted 3-point interaction theory for explaining stereo-chemical specificity of enzymes. [06]

Q. 4. (A) Describe methods of homogenization for mammalian, plant, fungal and bacterial cells. [06]

(B) Elaborate on affinity chromatography for purification of enzymes. [06]

OR

Q. 4. (B) Explain in the form of flowchart the purification procedures of RNA Polymerase from *E. coli*. [06]

Q. 5. (A) Derive Michaelis-Menten equation in steady state condition for enzyme catalyzed reactions [06]

(B) Derive the Lineweaver-Burk equation for uncompetitive enzyme inhibition. [06]

OR

Q. 5. (B) Write a note on the factors affecting rate of enzyme-catalyzed reaction. [06]

Q. 6. (A) Enlist various methods of immobilization of enzymes and explain in detail the entrapment method of immobilization. [06]

(B) Explain in detail the industrial applications of enzymes with suitable examples. [06]

OR

Q. 6. (B) What are isoenzymes? Give detailed account on Lactate dehydrogenase (LDH) with clinical significance. [06]

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[694A-25]

Sardar Patel University

M. Sc. (Integrated) Biotechnology Examination, Fifth Semester Examination

Friday, 3rd November 2017

02:00 p.m. to 05:00 p.m.

PS05CIGB02: Recombinant DNA technology

Total Marks: 70

- Notes: - 1) Figures to the right indicate marks.
2) Draw neat and labeled diagram, wherever necessary.

Q.1 Choose the Correct Answers of the Following. [08]

- Which chemical protects DNA from damaging by chelating Mg ions?
(a) Ethenol (b) EDTA (c) CTAB (d) Phenol
- Which enzyme is used to synthesize DNA from RNA source?
(a) Topoisomerase (b) RNA polymerase (c) Reverse transcriptase (d) RNase
- Annealing temperature is _____ than the melting temperature.
(a) 5°C less (b) 5°C more (c) equal (d) based on equation
- _____ sequence is utilized for taxonomic identification of bacteria.
(a) 16S DNA (b) ITS (c) 18S DNA (d) 23S DNA
- The variation in the restriction DNA fragment lengths between individuals of a species is called _____.
(a) AFLP (b) RFLP (c) RAPD (d) SNP
- Which of the following is NOT a codominant marker
(a) RAPD (b) RFLP (c) STS (d) All of these
- In gene therapy _____ can be used as vector system.
(a) Retrovirus (b) Adeno-associated virus (c) Adenovirus (d) All of these
- Super mouse created with inserting _____ gene in to genome of mouse.
(a) human insulin promoter gene (b) mouse growth hormone gene
(c) human growth hormone gene (d) cow growth hormone gene

Q.2 Answer the following in short. (Attempt Any Seven) [14]

- Define: Genomic libraries and cDNA libraries.
- Explain the formation and application of klenow fragment.
- Explain the criteria for primer designing.
- Narrate disadvantages of PCR.
- Give properties of *Taq* DNA Polymerase.
- Narrate advantages and disadvantages of AFLP.
- Enlist chemicals used in chemical degradation method.
- Define molecular pharming with example.
- Enlist the different pharmaceutical products developed by r-DNA technique.

- Q.3 (A)** Discuss steps involved in plasmid DNA isolation. [06]
(B) Give the difference between type I, II and III restriction endonuclease. [06]
OR
(B) Explain the procedure for generation of genomic DNA library. [06]
- Q.4 (A)** Give applications of PCR in detail. [06]
(B) Explain the PCR technique to amplify cDNA from mRNA. [06]
OR
(B) Discuss the methodology of PCR in detail. [06]
- Q.5 (A)** Write a note on DNA fingerprinting in detail. [06]
(B) What is a Molecular marker? Discuss methodology, advantages and disadvantages of RFLP. [06]
OR
(B) Discuss chain termination method of sequencing in detail. [06]
- Q.6 (A)** Give application of r DNA technology in improvement of plants using suitable examples. [06]
(B) What is Gene therapy? Discuss the methodology involved in gene therapy. [06]
OR
(B) Write a note on metabolic engineering. [06]

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No. of Printed Pages : 2

Sardar Patel University
M.Sc. Integrated Biotechnology V semester
Biotechnology: Principle and Practices (PS05CIGB03)
Tuesday, 07th November 2017
2:00 pm to 5:00 pm

Total Marks: 70

Note:

- 1) Attempt all the questions (including multiple choice questions) which are to be written in the provided answer book only.
- 2) Draw neat and labeled diagram wherever necessary.

Q.I **Multiple choice questions:** (08)

- 1 The model organism to study prokaryotic genome is _____.
 (a) *C. elegans* (c) *A. thaliana*
 (b) *E. coli* (d) *B. subtilis*
- 2 Which mechanical method use for cell fractionation?
 (a) Ultrasonic (c) Agitation
 (b) Liquid extrusion (d) All
- 3 DNA chip method works on the principle of _____.
 (a) Cloning (c) Centrifugation
 (b) Polymerization (d) None of these
- 4 When the therapeutic gene is transferred to an egg cell is called _____.
 (a) Gamete gene therapy (c) Somatic gene therapy
 (b) Germ line gene therapy (d) All of these
- 5 _____ is used for oxidation of the phosphorous in oligonucleotide synthesis.
 (a) Aqueous starch (c) Aqueous Zinc
 (b) Aqueous cobalt (d) Aqueous iodine
- 6 The vessel used for enzyme production on large scale is known as _____.
 (a) Bioreactor (c) Baffles
 (b) Impeller (d) Sparger
- 7 Wool production in transgenic sheep is depend on _____.
 (a) Tyrosine (c) Cysteine
 (b) Methionine (d) Proline
- 8 Biodiesel cannot be obtained from _____.
 (a) Plant (c) Animal
 (b) Algae (d) All of these

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- Q.II** **Answer the following (Any seven)** **(14)**
1. Write the formula for measurement of nucleic acid purity.
 2. What is cell fractionation technique? Write two essential stages by which cell fractionation technique can be proceed.
 3. Enlist essential requirements for animal tissue culture laboratory.
 4. What is monoclonal antibody?
 5. Write the applications of DNA microarray.
 6. What is Xenotransplantation? Write its any two applications.
 7. Define xenobiotic compounds. Enlist different types of xenobiotic compounds.
 8. What is Bioremediation? Define *Ex situ* and *In situ* bioremediation.
 9. Write the goal of Human genome project.
- Q.III** (a) Discuss about the physical and nonphysical methods of cell disruption. (06)
(b) Give a detailed account on genome of *Arabidopsis* as a model organism. (06)
- OR**
- (b) What do you understand by "Purity of DNA"? Explain in detail. (06)
- Q.IV** (a) Discuss about the chemical synthesis of nucleic acid. (06)
(b) Write the role of Bioinformatics in Biotechnology. (06)
- OR**
- (b) Give a note on DNA chip technology. (06)
- Q.V** (a) Give a detailed account on the methodology of virus based gene therapy. (06)
(b) Write a note on tissue transplantation. (06)
- OR**
- (b) Discuss about the industrial applications of immobilized enzymes. (06)
- Q.VI** (a) Discuss about the production of human insulin. (06)
(b) Write about the production of Ethanol from biomass. (06)
- OR**
- (b) What are transgenic animals? Give a note on transgenic sheep with its applications. (06)

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No. of Printed Pages: 02

SARDAR PATEL UNIVERSITY
M. Sc. (Integrated) Biotechnology, Fifth Semester Examination
Thursday, 9th November 2017
02:00 pm to 05:00 pm
PS05CIGB04: Bioinformatics & Structural Biology

Total Marks: 70

- Q-1 Multiple choice questions (All are compulsory). [8 x 1 = 8]
- (1) Genebank nucleic acid sequence database is maintained by _____
a) DDBJ b) EMBL c) NCBI d) Brookhaven Laboratories
 - (2) PIR was established by _____.
a) NBRF b) NCBI c) SIB d) DDBJ
 - (3) What is PROSITE?
a) A database of protein structures b) A database of protein sequences
c) A database of protein motifs d) option a and b
 - (4) The _____ tool compares nucleotide sequence against DNA databases.
a) blastn b) blastp c) tblastx d) tblastn
 - (5) The _____ loop refers to a structure with two ends of a single-stranded region connecting a base-paired region.
a) bulge b) hairpin c) interior d) multibranch
 - (6) Two amino acids of the standard 20 contain sulfur atoms. They are:
a) cysteine and serine b) cysteine and threonine
c) methionine and cysteine d) methionine and serine
 - (7) The _____ structure is stabilized by hydrogen bonds formed between the main chain atoms of residues i and i +5.
a) 3_{10} helix b) Right handed α -helix c) Pi helix d) None of these
 - 8) CATH was given by?
a) Murzin b) Orengo c) L. Holm d) None
- Q-2 Answer the following questions in short (Any Seven) [7 x 2 = 14]
- i) Give full form of EST, NCBI, PIR and DDBJ.
 - ii) What is biological database? List the classification of biological databases with example.
 - iii) What is EXPASY?
 - iv) Define : hairpin loop and interior loop
 - v) What is Ramachandran plot?
 - vi) Define alignment. Write the types of alignment
 - vii) What do you mean by motifs and domains?
 - viii) Define CATH.
 - ix) Define Affine gap penalties.

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- Q-3 (A) Discuss a brief account on NCBI and its database. [6]
(B) What is DDBJ? Explain resources and data submission tools of DDBJ. [6]
OR
(B) What is PIR? Explain databases and data retrieval in PIR. [6]
- Q-4 (A) Given GAATTCAGTTA (sequence #1) and GGATCGA (sequence #2). Explain simple scoring scheme using Needleman-Wunsch Method for its alignment. [6]
(B) Discuss Basic steps of phylogenetic tree construction with a suitable example. [6]
OR
(B) Explain the heuristic methods used for sequence alignment. [6]
- Q-5 (A) List the levels of protein structural organization and explain any one secondary structure of protein. [6]
(B) Describe in detail the steps for protein structure determination using x-ray crystallography [6]
OR
(B) Give a detailed account on assisted protein folding. [6]
- Q-6 (A) Give a brief account on structural classification of protein (SCOP). [6]
(B) Discuss the process of homology modeling in detail. [6]
OR
(B) Write a short note on any two RNA structure prediction methods. [6]

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Sardar Patel University

M. Sc. Int. Biotechnology, Fifth Semester Examination

Saturday, 11th November, 2017

02:00 p.m. - 05:00 p.m.

PS05CIGB05: Bioinstrumentation

Note:

Max. Marks 70

1. Figures to the right indicate marks.
2. Draw neat and labeled diagram, wherever necessary.

Q-1 Attempt the followings

[01 X 08 = 08]

1. pH of the solution is 4 means _____ molar concentration of H.
a) 10^{-4} b) 10^4 c) 10^{-10} d) 10^{10}
2. The rotors are anodized for the purpose to
a) Save it from mechanical damage b) Save it from corrosion
c) Increase its speed d) Make counter balance
3. The electrons are reflected back during imaging and form image in SEM.
a) Primary electrons b) Secondary electrons
c) Beamed electrons d) Auger electrons
4. If you turn up the light to maximum intensity, then the color of the light will be more towards which end of the spectrum for getting maximum resolution in microscope.
a) Red b) Green c) Yellow d) Blue
5. Ampholytes are complex mixture of _____.
a) Synthetic polyamino-polycarboxylic acids
b) Synthetic polycarboxy-polyamide acids
c) Synthetic polyhydrochloride acids
d) Synthetic polycarboxylic acids
6. Which of the following technique is applicable for separation of whole chromosome?
a) Agarose gel electrophoresis b) 2D gel electrophoresis
c) Pulsed-field gel electrophoresis d) Both a & b
7. Which of the following technique is confined to the volatile and thermo-stable analyte?
a) HPLC b) Gel filtration chromatography
c) GC d) Ion exchange chromatography
8. What is the method for separating protein in a gel having pH gradient?
a) SDS-PAGE b) Native PAGE c) Agarose gel d) IEF

Q-2 Answer the following questions (Any seven)

[02 X 07 = 14]

- i. Give concept of use of reference electrode for pH measurement.
- ii. Write the factors affecting the pH measurement.
- iii. Give principle of phase contrast microscopy.
- iv. What is the basic function of phase plate?
- v. Give idea of suitable stationary and mobile phase selection for chromatography.
- vi. Enlist various applications of TLC.
- vii. What is meant by hydrodynamic focusing?
- viii. Briefly discuss the process of photopolymerization.
- ix. Explain the technique of IEF.

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- Q-3 A) Defining the pH, give schematic representation of pH meter. [06]
B) Write the short note on "Analytical centrifugation" with it's principle and instrumentation. [06]

OR

- B) Calculate the difference in centrifugal acceleration (g value) between the top, middle and bottom of a centrifuge tube. Assuming that the minimum, average and maximum radial distances of a centrifuge tube in a swing-out rotor of a bench centrifuge operating at 6000 r.p.m. are 50 mm, 75 mm and 95 mm respectively. [06]

- Q-4 A) Explain the principle, optical system and working of light microscope. [06]
B) What are the types of fluorescence? Describe the components of fluorescence microscope. [06]

OR

- B) Discuss principle, instrumentation and working of TEM [06]

- Q5 A) Describe the mechanism that allows analytes to separate in size exclusion chromatography. [06]
B) Draw the labeled diagram of a GC assembly. Comment upon the principle and application of Gas chromatography. [06]

OR

- B) Write a note on: Detectors used in HPLC. [06]

- Q6 A) Describe the process of polymerization in PAGE. State various application of PAGE. Explain the principle, method, advantages and disadvantages of 2-D gel electrophoresis. [06]
B) Comment upon the technique of pulse-field gel electrophoresis. [06]

OR

- B) Write a note on 'Gel matrices'. [06]

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SARDAR PATEL UNIVERSITY
M. Sc Integrated Biotechnology (IGBT) - Vth (05) Semester
Subject Code & Subject: PS05CIGB06 - PLANT PHYSIOLOGY

Date: 14-11-2017, Tuesday

Time: 02: 00 P. M TO 05: 0 P.M

Total Marks: 70

Note: (1) All questions are compulsory. (2) Figure to right indicates marks.

Q-1. Answer the following objective questions.

1x8= 08

- Specific heat for 1 gm of pure water is.....
(A) One calorie (B) Two calories (C) Three calories (D) none of the above
- First step in absorption of water by root hair is.....
(A) Imbibitions (B) Simple diffusion (C) Osmotic diffusion (D) none of the above
- All the photosynthesis pigments except chlorophyll-a are called as.....
(A) Accessory pigments (B) Chloroplast Pigments (C) Primary pigments (D) none of the above
- Proper hydration of theis essential for photosynthesis.
(A) Protoplasm (B) Cytoplasm (C) Epidermis (D) none of the above
- Apical meristems are responsible for the increase in
(A) Weight (B) Length (C) Volume (D) Form
- Dormancy of buds can be broken by.....
(A) Auxin (B) Gibberellic acid (C) Kinetin (D) Ethylene
- Ciliary movements observed in.....
(A) Chara (B) Volvox (C) Hydrilla (D) Amoeba
- Characteristic feature of water stress iswater potential.
(A) Medium (B) Low (C) High (D) none of the above

Q-2. Answer the following (Any Seven).

02X07=14

- Explain the root pressure theory for ascent of sap.
- Justify – Plant cell as osmotic systems.
- Define the imbibitions and osmosis.
- Explain the Quantum requirement and quantum yield.
- Write the difference between light reaction and dark reaction.
- Write the practical application of auxin.
- Enlist the different phase of Growth.
- What is seismonastic movement?
- Give the two examples of Thigmonastic movements.

(P.T.O)

Q-1 (A). Enlist the process of movements of materials into and out of cells. Discuss any two processes with advantages. (06)

(B). Discuss the external factors affecting water absorption. (06)

OR

(B). Explain the ion-exchange and carrier concept theory. (06)

Q-2 (A). Discuss the photosynthetic pigments of chlorophyll and carotenoids. (06)

(B). Write a short note on excited states of atoms. (06)

OR

(B). Write a short note on Blackman's law of limiting factors. (06)

Q-3 (A). Discuss the physiological effects and practical application of cytokinin. (06)

(B). Write a short note on Ethylene. (06)

OR

(B). Write a short note on Vernalization. (06)

Q-4 (A). Enlist the different types of the plant movements. Discuss the autonomic movements of curvature. (06)

(B). Write a short note on paratonic movements of curvature. (06)

OR

(B). Discuss the effect of water deficit on growth and metabolism. (06)

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