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Note: Answer to all questions (including multiple choice questions) should be written in the provided answer book only.

Number of Printed Pages = 2

(A-83)

SARDAR PATEL UNIVERSITY
M.Sc (III Semester) Examination (Under CBCS)
Wednesday, 22nd April, 2015
2:30 pm to 5:30 pm
Biochemistry
PS03CBIC02 – Immunology

TOTAL MARKS: 70

Q.1 Tick mark / select the correct answer for the following. (*Both **correct option** against given question **as well as the correct answer** number needs to be written in provided answer book*) **(08 Marks)**

1) Which of the following isotypes of antibodies is the largest?
   a) IgM
   b) IgG
   c) IgA
   d) IgE

2) Receptors that bind the constant regions of antibodies are known as:
   a) B-cell receptors.
   b) T-cell receptors.
   c) toll-like receptors.
   d) Fc receptors.cells

3) Where would you be LEAST likely to find significant levels of defensins?
   a) The liver
   b) The intestine
   c) The lung
   d) The skin

4) Which of the following gene segments is NOT found in the mouse Ig light chain loci?
   a) V
   b) C
   c) J
   d) D

5) Which of the following complement fixation pathways can be initiated by a soluble C3 convertase?
   a) Alternative
   b) Classical
   c) Lectin
   d) All of the above

6) Which of the following types of hypersensitivity reactions includes the transfusion reaction?
   a) Type I hypersensitivity
   b) Type II hypersensitivity
   c) Type III hypersensitivity
   d) Type IV hypersensitivity

7) Which of the following cell types would be LEAST likely to express MHC class II?
   a) B cells
   b) T cells
   c) Dendritic cells
   d) Thymic epithelial cells

8) Monoclonal antibodies can be produced by:
   a) Immunoprecipitation technology
   b) Transgenics technology
   c) Shot gun cloning technology
   d) Hybridoma technology

Q.2 Answer **any seven** from the following: 14

a) What is the significance of the presence of organ specific self peptides in the thymus

b) State two points of difference between primary immunodeficiency and secondary immunodeficiency?

c) Why does a TH1 cells and CTLs undergo programmed cell death by apoptosis after clearance of antigen?

d) State the basic difference between innate and adaptive immunity.

e) How do drugs acting at the level of cAMP prevent type - I hypersensitivity reaction?

f) What is the role of membrane attack complex (MAC) in complement system?

g) Draw the structure of MHC class-I molecule.

h) List the primary and secondary lymphoid organs.

i) Explain the difference between a monocyte and a macrophage?

Q.3 (A) Explain the terms antigenicity and immunogenicity and describe any three properties of the immunogen that contribute to immunogenicity. 6

(B) What is inflammation? Explain the complex cascade of events involved in acute inflammatory response that combats early stages of infection. 6

OR

(B) Write a short note on cells and receptors of innate immunity. 6

Q.4 (A) Write in detail on the processing of exogenous antigens through endocytic pathway and peptide presentation on MHC molecules. 6

(B) State the principle of Enzyme-linked immunosorbent assay and explain in detail chemiluminescence and its advantages over conventional ELISA. 6

OR

(B) Describe the classical pathway of complement activation. 6

Q.5 (A) Discuss the cell adhesions molecules involved in leukocyte migration. 6

(B) Describe experimental evidence for negative selection of self-reactive B cells during maturation. 6

OR

(B) Describe the perforin/granzyme pathway leading to target cell apoptosis

Q.6 (A) Describe the biochemical events leading to mast-cell activation and degranulation. 6

(B) Write a short note on auto immune diseases. 6

OR

(B) Explain steps involved in allograft rejection. 6

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SARDAR PATEL UNIVERSITY

M.Sc., I Semester external examination

BIOCHEMISTRY- PS01CBIC02- Bioinstrumentation

22nd April 2015- 10.30 A.M. to 01.30 P.M.

Max Marks 70 Marks

1. Choose the correct answer (1x8=8)

(i) What must be done to specimen to increase the contrast of the structures viewed under a bright field microscope?

(a) illuminated (c) placed under coverslip

(b) stained (d) thinly sliced

(ii) Microscopes that are _____ will remain nearly focused after the low-power objective lens is changed to high-power objective lens.

(a) Monocular (c) parfocaled

(c) paracentered (d) properly adjusted

(iii) The lens that is within the eyepiece of the light microscope is called the

(a) scanning (b) low power (c) high power (d) ocular

(iv) Which would be the best to separate a protein that binds strongly to its substrate?

(a) Ion exchange chromatography (c) Affinity chromatography

(b) Gel filtration chromatography (d) Paper chromatography

(v) In a native PAGE, proteins are separated on the basis of

(a) net negative charge (c) net positive charge and size

(b) net charge and size (d) net positive charge

(vi) The correct order for the basic features of mass spectrometer is

(a) acceleration, deflection, detection, ionisation

(b) ionization, acceleration, deflection, detection

(c) acceleration, ionization, deflection, detection

(d) acceleration, deflection, ionization, detection

(vii) Which of the following is not an IR vibrational mode?

(a) stretching (b) scissoring (c) rocking (d) rolling

(viii) A Geiger-Muller counter measures

(a) The arrival of individual photons of ionizing radiation or high energy particles

(b) The incident of heat

(c) The incident of light

(d) The electronic pulse

2. Attempt any **seven** **2x7=14**

(a) Define: Lens aberration.

(b) Define: Stoke's shift

(c) Define: isoelectric point

(d) What is meant by planar chromatography?

(e) Define: electroendoosmosis.

(f) Write a note on prism monochromator.

(g) Briefly explain hollow cathode lamp.

(h) What are limitations of IR spectroscopy?

(i) Define: Biosensors.

3. (a) Write a short note on phase contrast microscopy. (06)

(b) Explain the principle of flow-cytometer. (06)

OR

(c) Explain the instrumentation and applications of SEM (06)

4. (a) Explain the process of differential centrifugation. (06)

(b) Write a note on 2-D gel electrophoresis. (06)

OR

(b) Explain ion exchange chromatography. (06)

5. (a) Explain the sources of infrared radiation (06)

(b) Write a brief note on instrumentation of UV-Visible spectroscopy. (06)

OR

(b) Explain briefly the types of atomizers used in atomic absorption spectroscopy. (06)

6. (a) Write an account on applications of radioisotopes. (06)

(b) Explain the methods of scintillation counting. (06)

OR

(b) Explain the basic instrumentation of NMR spectroscopy. (06)

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SARDAR PATEL UNIVERSITY

M. Sc. SECOND SEMESTER BIOCHEMISTRY EXAMINATION

SATURDAY, DATE: 25-04-2015

PS02CBIC03 ENZYMOLOGY

TIME: 2:30 to 5:30 pm **MAX. MARKS: 70**

Q. 1 Choose the correct answer (08)

1. After distrupting the plant cell wall which of the following compound might you add to prevent oxidation of phenolic compound?
   a) buffer b) ATP
   c) NaCl d) polyvinylpyrrolidone

2. When the Vmax and slope change but the Km remains unchanged in presence of a reversible inhibitor, the type of inhibition is
   a) Competitive b) Noncompetitive
   c) Uncompetitive d) allosteric.

3. The important factors that contribute to rate enhancement in serine proteases is
   a) covalent catalysis b) proximity and orientation
   c) oxyanion hole d) All of these

4. Which graphical method is used to determine an enzyme degree of cooperativity?
   a) Hill plot b) Hanes plot
   c) Cornish-Bowden Eisenthal plot d) Dixon plot

5. The general mechanism is that an enzyme act by
   a) Increasing activation energy b) changing local pH
   c) Decreasing activation energy d) all of these

6. Kcat/Km is
   a) efficiency criteria b) proficiency criteria
   c) specificity criteria d) all of these

7. In Cornish-Bowden Eisenthal plot
   a) 1/[S] is plotted against 1/V b) ln V is plotted against 1/T
   c) Vmax is Plotted against Km d) [P] is plotted against time

8. In MM kinetics when velocity is ½ Vmax the substrate concentration is equal to Km. What will be the substrate concentration equal to when velocity is Vmax?
   a) ½ Km b) Infinite
   c) 2Km d) $[E_0]$

Q-2 Attempt: (Any Seven) **[14]**

a. Define Unit and specific activities of Enzyme
b. What is turnover number.
c. Write the original Michaelis Menton equation
d. What is partial inhibition.
e. What is enzyme speficity?
f. Define fold purification.
g. What is rate enhancement?
h. Draw LB plot.
i. Draw the secondary plot for Non-competitive inhibition.

Q. 3 a) What are the strategies for enzyme purification? Explain choice of source of enzyme in detail (06)

b) Explain the Sanger's method for the determination of amino acid sequences

OR

b) Explain one of the separation methods based on the specific binding site of the enzyme molecule (06)

Q. 4 a) Explain uncompetitive inhibition and derive MM equation in presence of an uncompetitive inhibitor (06)

b) Discuss binary and ternary complex mechanisms of two substrate reactions and explain how do we experimentally differentiate them

OR

b) A biochemist studies the properties of a metabolic enzyme she has just isolated. She obtains kinetic data in the presence and in the absence of two different inhibitors (A and B).The following results were obtained:

[S] (mol/L)	Without inhibitor v (µmol/min)	With inhibitor A [I] = 5 x 10-4 M v (µmol/min)	With inhibitor B [I] = 3.2 x 10-6 M v (µmol/min)
5 x 10-4	1.25	0.82	0.48
2.5 x 10-4	0.87	0.49	0.33
1.7 x 10-4	0.67	0.36	0.25
1.2 x 10-4	0.54	0.26	0.20
1 x 10-4	0.45	0.23	0.17

Determine the type of inhibition (06)

Q. 5 a) Explain the factors acid –base catalysis and covalent catalysis with suitable example (06)

b) Explain the MWC and KNF models (06)

OR

b) Discuss the mechanism of Chymotrypsin action (06)

Q. 6 a) Discuss applications of Enzyme engineering giving suitable examples (06)

b) Explain control of enzyme activity by reversible changes in covalent structure of enzyme (06)

OR

b) Explain enzyme induction, repression and feedback inhibition with suitable example (06)

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