

[113/A-43]

Sardar Patel University

M. Sc. Integrated Biotechnology Examination, Sixth Semester

Monday, 10th April, 2017

02:00 to 05:00 p.m.

PS06CIGB01: Immunology

Total Marks: 70

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

Q.I Answer the following Multiple Choice Questions. All are compulsory [08]

1. T lymphocytes are responsible for _____.
(a) Humoral immunity (b) Cell mediated immunity (c) Both a) and b)
(d) none of these
2. Which organ is the site of RBC destruction?
(a) Lymph node (b) Spleen (c) Liver (d) Kidney
3. The class of immunoglobulins which can cross the placenta is
(a) IgM (b) IgG (c) IgA (d) IgD
4. The initial complement component that is bound by complement-fixing antibodies is _____.
(a) C1q (b) C1s (c) C3b (d) C5a
5. _____ amino acids bind to peptide binding cleft of class I MHC molecules.
(a) 13-18 (b) 8-10 (c) 2-9 (d) 1-7
6. More than 90% of T cells have.....receptor
(a) $\alpha\beta$ (b) $\delta\gamma$ (c) $\alpha\gamma$ (d) $\delta\beta$
7. In which of the following case a large lattice is formed?
(a) Antibody is in excess (b) Antigens & antibodies are in optimal proportion (c) Antigen is in excess (d) None of these
8. The major forces linking antigen to antibody are
(a) hydrogen bonds (b) Van der Waals interaction (c) ionic bonds (d) all of the above

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

1. What are toll like receptors?
2. Differentiate between active and passive immune response.
3. Write about Epitopes.
4. What is Immunogenicity? Enlist the properties of an Immunogen.
5. What is the role of antigen presenting cells in immune response?
6. Enlist the types of vaccines.
7. What is ELISA? Enlist the types of ELISA.

8. What is Coomb's test?

Q.III (A) Mention the cells arising from myeloid progenitor. Enlist their distinguishing features and functions. [06]

(B) With the help of diagram explain spleen as a lymphoid organ. [06]

OR

(B) Explain various components of innate immunity. [06]

Q.IV (A) Explain the structure of antibody with suitable diagram. [06]

(B) Explain classical pathway of complement activation. [06]

OR

(B) Describe hybridoma technology. Mention the applications of monoclonal antibody. [06]

Q.V (A) Explain the structure of class I MHC and differentiate between class I and class II MHC. [06]

(B) Describe activation of B lymphocytes. [06]

OR

(B) Discuss thymic selection of thymocytes. [06]

Q.VI (A) What is vaccine? Discuss any two types of vaccine. [06]

(B) Enlist the types of precipitation reaction in gel and explain any two in detail. [06]

OR

(B) Explain Double Diffusion in two dimension precipitation reaction in gel for Antigen-Antibody. What is its application? [06]

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SARDAR PATEL UNIVERSITY

M.Sc. Examination - April 2017

M. Sc. Integrated Biotechnology (IGBT) - 6th Semester

Saturday, 15th April 2017

Session: Evening

Time: 2:00 pm to 5:00 pm

Subject / Course code: - PS06CIGB03

Subject / Course Title: - Industrial Microbiology (NEW)

Total Marks: 70

Note: (1) All the Questions are compulsory.

(2) Figures on the right indicate marks.

Q.1 Choose the correct option

1 x 8 = 08

- (i) A culture system with constant environmental conditions maintained through continual provision of nutrient and removal of wastes is called _____ culture system.
(A) Batch (B) Fed Batch
(C) Continuous (D) Semi continuous
- (ii) Which of the following is a downstream process?
(A) Screening (B) Sterilization of medium.
(C) Recovery of product. (D) Inoculum preparation.
- (iii) In citric acid production by fermentation the stainless steel of _____ grade are used in fermenter construction to prevent vessel corrosion by acid.
(A) AISI 304 (B) AISI 306
(C) AISI 317 (D) AISI 316
- (iv) The majority of enzymes which are of industrial interest are inducible. Induced enzymes are synthesized only in response to the presence in the environment of _____.
(A) an inducer (B) an inhibitor
(C) Both (A) and (B) (D) None of these
- (v) Which one of the following method is used for sterilization of media containing heat labile components?
(A) Dry heat sterilization (B) Steam sterilization
(C) Boiling (D) Filter sterilization
- (vi) Microorganisms produce secondary metabolites like antibiotics usually during _____ phase of growth.
(A) Lag phase (B) Tropophase (C) Idiophase (D) Death phase.
- (vii) Which of the following microorganism is used as a test organism for checking the efficiency of sterilization?
(A) *Bacillus subtilis* (B) *Bacillus megaterium*
(C) *Bacillus stearothermophilus* (D) *Bacillus cereus*
- (viii) Cell lysis becomes an important operation if the product is _____.
(A) extracellular (B) heat labile
(C) toxic (D) intracellular

P.T.O.

Q.2. Attempt any seven of the following:

2 x 7 = 14

1. Enlist the characteristics of industrially important microorganisms.
2. Describe the terms aseptic operations and containment.
3. Explain the terms primary and secondary screening.
4. Write the applications of amylase.
5. Describe the term partition coefficient.
6. Write a brief note on baffles.
7. Define Solid state and submerged fermentation process.
8. Enlist the devices used in pressure measurement.
9. Write the ideal characteristics of fermentation medium.

Q. 3. (A) Discuss in detail the crowded plate technique. [06]

(B) Discuss in detail the preservation of industrially important microorganisms in dehydrated form. [06]

OR

Q. 3. (B) Discuss with suitable examples for the isolation of induced mutant producing improved yields of primary metabolites. [06]

Q. 4. (A) Discuss in detail on Batch sterilization process. [06]

(B) What are antifoams? Write a note on ideal characteristics and examples of antifoams used in fermentation media. [06]

OR

Q. 4. (B) Discuss in detail the various raw materials used as carbon sources in the fermentation medium. [06]

Q. 5. (A) Draw labelled diagram of fermenter. Explain the various functions of fermenter and describe the body construction of a fermenter. [06]

(B) Discuss in detail on impellers and sparger. [06]

OR

Q. 5. (B) What is K_{La} ? Enlist various methods used for determining K_{La} . Explain anyone method in detail. [06]

Q. 6. (A) Explain in detail citric acid production by surface culture fermentation. [06]

(B) Discuss in detail the solvent extraction method for product recovery. [06]

OR

Q. 6. (B) Write a note on ion exchange chromatography method for product recovery with suitable example. [06]

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SEAT No. _____

SARDAR PATEL UNIVERSITY
M. Sc (Int.) Biotechnology 6th Semester Examination
Tuesday, 18th April, 2017
Time: 2:00pm to 5:00pm
PS06CIGB04 : Biosensor and Biocrystallography

Total Marks: 70

Q-1 Give the answer by choosing appropriate option. [8 X 1]

- (1) It is the ability of the sensor to indicate the same output over a period of time for a constant input _____.
 (a) stability (b) resolution (c) error (d) impedance
- (2) Pressure and torque are _____ measurands.
 (a) thermal (b) electrical (c) mechanical (d) chemical
- (3) The first step in protein crystallography is _____.
 (a) data collection (b) structure refinement
 (c) protein purification (d) protein crystallization
- (4) _____ is immiscible with water.
 (a) acetone (b) hexane (c) ethanol (d) none of these
- (5) Which microorganism is used to prepare BOD biosensor?
 (a) *Saccharomyces cerevisiae* (b) *Trichosporon cutaneum*
 (c) *Candida albicans* (d) None of these
- (6) The father of biosensor is _____.
 (a) Clark (b) Guilbault (c) Edward Jenner (d) None of these
- (7) Repeatable entity of a crystal structure is known as _____.
 (a) lattice (b) crystal (c) unit cell (d) miller indices
- (8) X-ray diffraction can only be applied to _____.
 (a) solid, crystalline materials (b) gaseous or vapor materials
 (c) liquids (d) All of these

Q-2 Answer the following questions in short. (Any seven) [7 X 2]

- (1) Give the classification of biosensors.
- (2) State the principal of amperometric biosensor.
- (3) Explain immobilization of microorganisms.
- (4) Enlist the applications of choline biosensor.
- (5) Define precipitation and nucleation
- (6) Explain applications of biosensor in medical diagnostics.
- (7) Write steps of protein crystallization.
- (8) Write the advantages and disadvantages of rotating crystal method.
- (9) List the application of X-rays.

P.T.O.

- Q-3 (A) Describe the thermal and mechanical characteristics of sensors. [06]
(B) Enlist the static characteristics and explain any three in detail. [06]
OR
(B) Discuss the operating principal and working of ion selective membrane electrode with suitable diagram. [06]
- Q-4 (A) Draw a schematic outline of a biosensor. Discuss second and third generation biosensors with examples. [06]
(B) Write a short note on urea biosensor with its applications. [06]
OR
(B) Describe following methods for immobilization of enzymes: [06]
(i) Multienzymatic immobilization (ii) Use of aerosols (iii) Immersion method
- Q-5 (A) What is crystallization? Discuss (i) Micro-batch crystallization technique, [06]
(ii) Hanging drop technique (iii) Free interface diffusion technique.
(B) Discuss the factors affecting the crystallization of protein. [06]
OR
(B) Discuss physical and chemical properties of organic compounds in brief. [06]
- Q-6 (A) State Bragg's law. Explain powder diffraction technique. [06]
(B) Explain the x-ray diffraction technique for protein crystallography. [06]
OR
(B) Discuss the modern Coolidge method for the production of x-rays. [06]

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SARDAR PATEL UNIVERSITY
M.Sc. (Integrated) Biotechnology
Sixth Semester Examination
Thursday, 20th April, 2017
02.00 p.m. to 05:00 p.m.
PS06CIGB05: Bio-analytical Techniques

Total Marks: 70

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

Q. 1 Choose the most appropriate answer from the four alternatives given: [08]

- (i). $\log_{10} I_0/I = abc$, where I_0/I is.....
 (a) Transmitter (b) Concentration (c) Absorbance (d) None of these
- (ii). Which of the following ranges is associated with U.V. spectroscopy?
 (a) 0.8 – 500 μm (b) 400 – 100 nm (c) 380 – 750 nm (d) 0.01-10 nm
- (iii). Which of the following cannot be used as a solvent in IR spectroscopy?
 (a) KBr (b) Water (c) NaBr (d) All of them
- (iv). Which of the following molecules can be studied by ESR?
 (a) Free radicals in the solid, liquid or gaseous phases
 (b) Paramagnetic transition metal complexes
 (c) System with more than one unpaired electron
 (d) All of the above
- (v). Fluorescence spectroscopy deals with phenomenon.
 (a) Emission (b) Absorbance (c) Transmission (d) None of them
- (vi). analyzer may separate ions by the use of either a magnetic or an electric field.
 (a) Mass (b) Atomic absorbance
 (c) Atomic emission (d) None of these
- (vii). Ionization radiation is produced by.....
 (a) Stable atom (b) Unstable atom (c) Both (a) and (b) (d) None of them
- (viii). Light, radio and microwaves are the types of radiation they are called
 (a) Ionization (b) Non ionization
 (c) Infra red (d) All of them

Q.2 Answer any SEVEN from the following: [14]

- (i). What is bathochromic effect?
 (ii). Draw block diagram of a visible spectrometer.
 (iii). How turbidity and temperature affects Beer's law?
 (iv). What do you mean by atomizers?
 (v). Define stoke shifts.

- (vi). What do you mean by resonance in NMR?
- (vii). How ionization taken place in mass spectroscopy.
- (viii). Write the principle of radio ligand assay technique.
- (ix). Write a short note on autoradiography.

- Q.3** (a) Explain wavelength selectors and light sources used in UV visible spectrometer. [6]
(b) Give an account on: (i) Phototubes (ii) Photomultipliers [3+3]

OR

- (b) Discuss applications of UV spectroscopy in detail. [6]
- Q.4** (a) Write a note on principle and sample preparation methods for IR spectroscopy. [6]
(b) Enlist advantages and disadvantages of emission spectroscopy. [6]

OR

- (b) Discuss the role of instrumental components of atomic absorption spectroscopy. [6]

- Q.5** (a) Write in detail about principle and instrumentation of Fluorescence spectroscopy. [6]
(b) Discuss the various applications of mass spectroscopy in details. [6]

OR

- (b) Explain in detail about chemical shift in NMR with suitable examples. [6]

- Q.6** (a) Explain in detail about any one of the method used for radiation detection. [6]
(b) Give a detail account on radiometric titration method. [6]

OR

- (b) Write a detail note on nuclear active analysis. [6]

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

Number of Printed Pages = 2

SEAT No. _____

SARDAR PATEL UNIVERSITY

[21 & A16]

M. Sc. (Integrated) Biotechnology – Sixth Semester Examination

Saturday, 22nd April, 2017

02:00 pm to 5:00 p.m.

PS06CIGB06: ANIMAL PHYSIOLOGY

TOTAL MARKS: 70

Q.1 Tick mark / select the correct answer for the following. (Both correct option and the corresponding answer for a particular option needs to be written in provided answer book) (08 Marks)

- 1) Which of the following enzyme is correctly matched with site of production?
 - a) Amylase- Pancreas
 - b) Trypsin- Salivary glands
 - c) Chymotrypsin- Liver
 - d) Pepsin- Liver

- 2) Glucose stored in the liver as _____
 - a) Glycogen
 - b) Starch
 - c) Fat
 - d) ATP

- 3) _____ blood group is known as universal recipient:
 - a) AB
 - b) A
 - c) B
 - d) O

- 4) Which cells in human blood are enucleated?
 - a) Leukocytes
 - b) Erythrocyte
 - c) Monocyte
 - d) Lymphocyte

- 5) The connection between two neurons is called:
 - a) Node of ranvier
 - b) Synapse
 - c) Grey matter
 - d) White matter

- 6) The functional unit of kidney is called:
 - a) Ureters
 - b) Nephron
 - c) Bowman's capsule
 - d) Urinary bladder

- 7) One of these cells secretes testosterone.
 - a) Sertoli cells
 - b) Leydig cells
 - c) Spermatogenic cells
 - d) Chief cells

- 8) Insulin is secreted by:
 - a) Pancreas
 - b) Liver
 - c) Gall bladder
 - d) Stomach

- Q.2** Answer any seven from the following: 14
- a) List the various types of salivary glands and the constituents of typical saliva
 - b) What is peristalsis? Explain its significance.
 - c) List the cell types that you would observe for differential WBC count.
 - d) What are anticoagulants? Cite few examples of anticoagulants.
 - e) List the various types of ion channels found in nervous system.
 - f) Give the name of neuroglia of CNS and PNS.
 - g) What is glomerular filtration rate (GFR)?
 - h) Write the name and functions of hormones secreted by parathyroid gland.
 - i) Enlist the hormones secreted by adrenal cortex and adrenal medulla.
- Q.3** (A) Describe the structure and functions of liver and gall bladder. 6
- (B) Give a detailed account on gastric digestion. 6
- OR**
- (B) Discuss the processes of digestion and absorptions of carbohydrates and proteins in the small intestine. 6
- Q.4** (A) Give a diagrammatic overview of the blood-clotting cascade and write the important features of intrinsic, extrinsic and common pathway. 6
- (B) Explain the anatomy, physiology and life cycle of erythrocytes. 6
- OR**
- (B) Describe the structure of mammalian heart. 6
- Q.5** (A) Discuss the structural and functional classification of neurons. 6
- (B) Describe the physiological events involved in neuronal transmission of signals across synapses. 6
- OR**
- (B) Describe the organization of nervous system with a flow chart 6
- Q.6** (A) Describe the internal gross anatomical features of the kidneys and enlist the functions of kidney. 6
- (B) Enlist the hormones secreted by the pituitary gland and discuss the hormones of anterior pituitary (adenohypophysis) in detail. 6
- OR**
- (B) Discuss the structure and function of Thyroid gland. 6