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**M.Sc. (Semester – II) (Old) Examination, 2014
BIOTECHNOLOGY
Enzymology (Paper – I)**

Day and Date : Saturday, 15-11-2014
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 100

SECTION – I

1. Rewrite the following sentence by choosing the correct answer. **10**
- 1) A Holoenzyme is
 - A) Functional unit
 - B) Apo enzyme
 - C) Coenzyme
 - D) All of these
 - 2) An example of lyases is
 - A) Glutamine synthetase
 - B) Fumarase
 - C) Cholinesterase
 - D) Amylase
 - 3) Enzymes, which are produced in inactive form in the living cells, are called
 - A) Papain
 - B) Lysozymes
 - C) Apoenzymes
 - D) Proenzymes
 - 4) A Sigmoidal plot of substrate concentration ($[S]$) verses reaction velocity (V) may indicate
 - A) Michaelis-Menten kinetics
 - B) Co-operative binding
 - C) Competitive inhibition
 - D) Non-competitive inhibition
 - 5) In reversible non-competitive inhibition enzyme activity
 - A) V_{max} is increased
 - B) K_m is increased
 - C) K_m is decreased
 - D) Concentration of active enzyme is reduced
 - 6) The pH optima of most of the enzymes is
 - A) Between 2 and 4
 - B) Between 5 and 9
 - C) Between 8 and 12
 - D) Above 12



- 7) The enzyme glucose 6-phosphatase is present in
 A) Liver B) Muscle
 C) Adipose tissue D) Brain
- 8) The fatty acid synthase complex catalyses
 A) 4 sequential enzymatic steps B) 6 sequential enzymatic steps
 C) 7 sequential enzymatic steps D) 8 sequential enzymatic steps
- 9) A coenzyme required in carboxylation reactions is
 A) Lipoic acid B) Coenzyme A
 C) Biotin D) All of these
- 10) In Lineweaver-Burk plot, the y-intercept represents
 A) V_{max} B) K_m C) $1/K_m$ D) None of the above

2. Explain in detail enzyme inhibition with their kinetics. **20**

OR

Explain in detail structure function relationship of enzyme pyruvate dehydrogenase. **20**

3. A) Derive Michaelis-Menten equation. Add a note on transition state of enzyme. **10**
 B) Write short note on follows (**any two**) : **10**
 a) Hill plot
 b) Active site
 c) Biosensore.

SECTION – II

4. Rewrite the following sentence by choosing the correct answer. **10**
- 1) Feedback inhibition of enzyme action is affected by
 A) Enzyme B) Substrate
 C) End products D) None of these
- 2) _____ is the inhibitor of ATCase.
 A) ATP B) GTP C) CTP D) TTP
- 3) Isoenzyme of lactate dehydrogenase predominantly present in kidney is

 A) LDH1 B) LDH2 C) LDH3 D) LDH4



- 4) Phosphorylase b is converted to phosphorylase a by _____
A) Adenylation B) Phosphorylation
C) Methylation D) None of these
- 5) The subunit composition of aspartate transcarbamylase is
A) c₂r₁₀ B) c₅r₁₁ C) c₆r₆ D) c₈r₄
- 6) Key and lock hypothesis of enzyme action was given by
A) Fischer B) Koshland C) Buchner D) Kuhne
- 7) An enzyme which brings about lysis of bacterial cell wall is
A) Amylase B) Lysozyme C) Trypsin D) Lipase
- 8) _____ is the inhibitor of Na⁺K⁺ ATPase.
A) Methotrexate B) Digitoxigenin
C) Na⁺ D) K⁺
- 9) _____ inhibitor binds to the active site of enzyme.
A) Competitive B) Non-competitive
C) Allosteric D) All of these
- 10) Ribozymes
A) RNA enzyme B) Non-protein enzymes
C) Catalyst function D) All of these

5. Write the methods of enzyme immobilization and add a note on its industrial use. **20**

OR

Explain in detail structure function relationship of enzyme glycogen phosphorylase. **20**

6. A) Explain in detail the classes of enzymes each with suitable example. **10**

B) Write short note on follows (**any two**) : **10**

- a) Units of enzyme activity
 - b) Hill plot
 - c) Feed back inhibition.
- _____



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**M.Sc. (Semester – II) (Old) Examination, 2014
BIOTECHNOLOGY (Paper – II)
Molecular Biology**

Day and Date : Tuesday, 18-11-2014
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 100

Instructions : 1) Question No. 1 is **compulsory**.
2) **Draw** appropriate figures **wherever** necessary.

1. Answer in **one** sentence :

20

- 1) Which Enzyme removes RNA Primer ?
- 2) What is Primary Transcript ?
- 3) What are Okazaki fragments ?
- 4) Name of the Histone which is not part of Nucleosome.
- 5) What is TATA Box ?
- 6) What is the T_m when G-C content is 50% ?
- 7) What is Degeneracy of Genetic Code ?
- 8) Name the Test for Carcinogens.
- 9) Name the cavities present in the Ribosomes.
- 10) What is the auto-somal recessive disease caused due to Nucleotide excision repair ?
- 11) The following are melting temperature for five DNA molecules 73°C , 69°C , 84°C , 78°C , 82°C . Arrange these DNA in increasing order of percentage of GC pair.
- 12) What is Denaturation ?
- 13) What are Palindromic sequences ?
- 14) How many radial loops should be there in a human chromosome with 140 million bp ?
- 15) How many kilobases make one megabase ?
- 16) What Technique was used by M. Meselson and F. W. Stahl to verify semi conservative nature of DNA Replication ?

P.T.O.



- 17) Define TM.
- 18) ABCDEFGHijklmnop shows what type of Recombination ?
- 19) What does large $cot \frac{1}{2}$ value indicate ?
- 20) Who discovered Human Telomeres ?

SECTION – I

2. Explain the bacterial Genome organization and the characteristics of DNA molecule with a neat labeled diagram.

OR

Explain the process of Replication in prokaryotes with enzymes involved in Replication.

20

3. A) Write **any one** of the following 10
 - a) Packaging and organization of chromatin.
 - b) Replication of single standard circular DNA.
- B) Write short notes on **any two** of the following : 10
 - a) RecA Protein.
 - b) Genomic Imprinting.
 - c) Frame shift Mutation.

SECTION – II

4. With a neat labeled diagram explain the process of transcription in Prokaryotes.

OR

Describe the mechanism of Translation with a neat labeled diagram.

20

5. A) Write **any one** of the following 10
 - a) Promoters.
 - b) Salient features of Genetic code.
 - B) Write short notes on **any two** of the following : 10
 - a) Lac operon.
 - b) Molecular chaperons.
 - c) Ribosomes.
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M.Sc. (Semester – II) Examination, 2014
BIOTECHNOLOGY (Old)
Tools and Techniques in Biosciences (Paper – IV)

Day and Date : Saturday, 22-11-2014
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 100

1. Multiple choice questions :

20

- 1) Cuvettes are mainly made up of Silica and quartz because
 - A) They absorb UV light
 - B) They do not absorb UV light
 - C) Both A) and B)
 - D) None of these
- 2) The maximum speed of ultra centrifuge is
 - A) 10000 rpm
 - B) 50000 rpm
 - C) 1000000 rpm
 - D) 100000 rpm
- 3) Electrophoresis is discovered by Tiselius in
 - A) 1927
 - B) 1937
 - C) 1947
 - D) 1957
- 4) During electrophoresis cathode region are _____ in nature.
 - A) Acidic
 - B) Alkaline
 - C) Both A) and B)
 - D) None of these
- 5) In IEC, anion exchanger carry which charge and the charge of counter ion that is replace is
 - A) Positive and negative charge respectively
 - B) Negative and positive charge respectively
 - C) Positive and neutral charge respectively
 - D) Negative and neutral charge respectively
- 6) The pH difference for discontinuous buffer system in PAGE is by
 - A) 2
 - B) 1
 - C) 3
 - D) 4
- 7) In equation $V_t = V_0 + V_m + V_i$, ' V_0 ' denotes what ?
 - A) Total bed volume
 - B) Internal volume of gel
 - C) Matrix volume of gel
 - D) External volume of gel



- 8) The heart of HPLC is
- | | |
|-------------|-------------------|
| A) Detector | B) Recorder |
| C) Column | D) Pumping system |
- 9) GC is widely utilized for the separation of
- | | |
|----------------------|--------------------------|
| A) Polar compound | B) Non-polar compound |
| C) Volatile compound | D) Non-volatile compound |
- 10) Metabolomics study is widely done by which technique ?
- | | | | |
|--------|-------|---------|----------|
| A) NMR | B) MS | C) HPLC | D) GC-MS |
|--------|-------|---------|----------|
- 11) Commonly used agent in dehydration of tissue for electron microscopy is
- | | |
|---------------------|----------------|
| A) N-butyl alcohol | B) Isopropanol |
| C) Absolute alcohol | D) Methanol |
- 12) In electron microscope, what material is used as an objective lense ?
- | | |
|-------------------|--------------------|
| A) Magnetic coils | B) Superfine glass |
| C) Aluminium foil | D) Electrons |
- 13) Electron microscope gives magnification upto
- | | | | |
|----------|-----------|-------------|---------------|
| A) 100 X | B) 2000 X | C) 50,000 X | D) 2,00,000 X |
|----------|-----------|-------------|---------------|
- 14) Magnification range of light microscope is
- | | |
|--------------------|--------------------|
| A) 1000 x – 5000 x | B) 1000 x – 2000 x |
| C) 500 x – 1000 x | D) None of these |
- 15) Which of these things do both plant and animal cells have ?
- | | | | |
|--------------|-----------------|--------------|------------|
| A) Cell wall | B) Chloroplasts | C) Cytoplasm | D) Vacuole |
|--------------|-----------------|--------------|------------|
- 16) α -helix, β -sheet and random coil in proteins are studied by which technique ?
- | | |
|-------------------|-----------|
| A) CD | B) ORD |
| C) Both A) and B) | D) UV-VIS |
- 17) A spectroscopic method capable of yielding information on the structure of molecules, interactions between molecules and molecular motion
- | | | | |
|-------|--------|--------|--------|
| A) CD | B) ESR | C) NMR | D) ORD |
|-------|--------|--------|--------|
- 18) A common technique used in biological sciences to monitor the fluidity of membranes is.
- | | | | |
|-------|--------|--------|--------|
| A) CD | B) ESR | C) NMR | D) ORD |
|-------|--------|--------|--------|



- 19) Photomultiplier tubes, also called photoelectric cells, convert light intensity into
- A) Chemical energy
 - B) Electrical current
 - C) Both A) and B)
 - D) None of above
- 20) Isotopes are species of the same chemical element but differ in
- A) Atomic mass
 - B) Atomic weight
 - C) Molecular weight
 - D) All of these

SECTION – I

2. Explain principle, theory and application of GC. 20

OR

Explain the principle, methodology, application of Mass Spectroscopy.

3. A) Enlist the various methods that are widely utilized to study cells and organelles. 10
- B) Write notes on (**any two**) : (2×5)
- a) Cation and Anion exchanger
 - b) Agarose
 - c) Ultracentrifugation.

SECTION – II

4. Explain principle, application and theory of PAGE. 20

OR

Principle and application of TEM.

5. A) Explain principle and application of CD and ORD spectroscopy. 10
- B) Write notes on (**any two**) : (2×5)
- a) Glutaraldehyde
 - b) Partition coefficient
 - c) Cesium chloride.
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M.Sc. (Part – I) (Semester – II) Examination, 2014
BIOTECHNOLOGY
Paper – I : Cell Biology (New)

Day and Date : Saturday, 15-11-2014
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

- Instructions:** 1) Part – I, Question 1 is **compulsory**.
2) Attempt **any four** questions from Part – II.
3) Figures to the **right** indicate **full** marks.
4) Answers to the Part – I and Part – II are to be written in **same** answer booklet only.

PART – I

1. A) Rewrite the sentence after choosing the correct answer from the given alternatives :

7

- 1) Vacuole is present in _____
a) Plant cell b) Animal cell c) Algae d) Fungi
- 2) Totipotency is associated with _____ cell.
a) Bacterial b) Plant c) Animal d) Virus
- 3) Diffusion is _____ type of membrane transport.
a) Passive b) Active c) Facilitated d) Osmosis
- 4) _____ is involved in intracellular trafficking.
a) Endoplasmic reticulum b) Lysosomes
c) Mitochondria d) Microtubules
- 5) Actin is major component of _____
a) Microfilament b) Microtubule
c) Both a) and b) d) Chloroplast
- 6) Cell death occurs in _____ phase.
a) S b) G1 c) G2 d) G0
- 7) _____ is one of the primary messenger.
a) Hormone b) Cyclic AMP c) ATPase d) Sterol



B) Definitions :

7

- 1) Lysosomes
- 2) Cilia
- 3) Vesicle
- 4) Kinesin
- 5) Cyclin
- 6) G-protein
- 7) Integrin.

PART – II

Answer **any four** of the following :

2. Explain in detail the structural organization of eukaryotic cell. **14**
 3. Write a detailed note on membrane transport. **14**
 4. Define microfilament. Add a note on its structure and functions. **14**
 5. What is cell cycle ? Write a note on phases of cell cycle. **14**
 6. Answer **any two** from the following : **14**
 - a) Write a note on GPCR signal transduction pathway.
 - b) Explain the functions of Endoplasmic Reticulum and Golgi Apparatus.
 - c) Add a note on motor proteins.
 7. Write short notes on **(any two)** : **14**
 - a) Chloroplast
 - b) Fluid Mosaic Model
 - c) Extracellular Matrix.
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M.Sc. (Part – I) (Semester – II) Examination, 2014
BIOTECHNOLOGY (New)
Paper – II : Enzyme Technology

Day and Date : Tuesday, 18-11-2014
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) **All** questions of Part – I are **compulsory**.
 - 2) Answer **any four** questions from Part – II.
 - 3) **All** questions carry **equal** marks.
 - 4) **Draw** neat and labelled diagrams **wherever** necessary.

PART – I

1. A) Rewrite the following sentences by choosing the most correct alternative given below : 7
- i) In digit enzyme commission number the second place indicates _____
 - a) class
 - b) sub-class
 - c) sub sub-class
 - d) serial number
 - ii) The catalysts enhance reaction rates by lowering _____ energies.
 - a) activation
 - b) binding
 - c) Gibb's free
 - d) free
 - iii) K_m represents the _____
 - a) substrate concentration at maximum velocity
 - b) substrate concentration in active site
 - c) substrate concentration at half of maximum velocity
 - d) substrate specificity of an enzyme
 - iv) _____ is equivalent to the number of substrate molecules converted to product in a given unit of time on a single enzyme molecule when the enzyme is saturated with substrate.
 - a) Specific activity
 - b) Enzyme activity
 - c) Turnover number
 - d) Percent purity
 - v) _____ enzyme catalyzes the first step of pyrimidine biosynthesis.
 - a) Aspartate transcarbamoylase
 - b) Ribonuclease
 - c) Carboxypeptidase
 - d) Phosphorylase



- vi) Receptor ligand interaction can be determined by _____ Plot.
 a) Hill b) Scatchard
 c) Lineweaver burk d) Eadie-Hofstee
- vii) In biosensor device _____ converts detection event into a measurable signal.
 a) analyte b) electrolyte c) condenser d) transducer

1. B) Define the following terms : **7**
- i) Enzyme activity
 - ii) Allosteric site
 - iii) Biosensor
 - iv) Abzymes
 - v) Competitive inhibitor
 - vi) Binding energy
 - vii) International unit.

PART – II

Answer **any four** questions from the following :

2. Illustrate in detail the factors affecting reaction rate of enzyme. **14**
3. Write an essay on various methods of enzyme immobilization. Add a note on its use in industries. **14**
4. Describe in detail protein ligand interactions with its quantitative measurement. **14**
5. Derive Michaelis-Menten equation. Add a note on graphical procedures in enzymology. **14**
6. Answer **any two** of the following : **14**
- a) Explain the structural and functional relationship of lysozyme.
 - b) Give a brief account of metabolic engineering.
 - c) Write a note on feedback regulation of enzyme.
7. Answer **any two** of the following : **14**
- a) Discuss the end point kinetic assay.
 - b) Write a note on isoenzymes.
 - c) Describe the structural and functional relationship of Na⁺ – K⁺ ATPase.



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**M.Sc. (Biotechnology) (Part – I) (Semester – II) Examination, 2014
MOLECULAR CELL PROCESSING (Paper – III) (New)**

Day and Date : Thursday, 20-11-2014
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

- Instructions:** 1) *Part – I, Question 1 is compulsory.*
2) *Attempt **any four** questions from Part – II.*
3) *Figures to the **right** indicate **full** marks.*
4) *Answers to the Part – I and Part – II are to be written in **same** answer booklet **only**.*

PART – I

1. A) Rewrite the sentence after choosing the correct answer from the given alternatives :

7

- 1) A “TATA box” is _____
a) The translation termination sequence
b) An important base sequence in the promoters of bacteria
c) The site where the RNA polymerase II binding complex is assembled
d) An example of one of the translation stop codons
- 2) In prokaryote, the ribosomal binding site on mRNA is _____
a) Hogness sequence
b) Shine-Dalgarno
c) Eukarya
d) Kozak sequence
- 3) Amino acids are held together by _____ bonds.
a) Hydrogen
b) Peptide
c) Ionic
d) High energy



- 4) RNA primer necessary for DNA replication _____
- a) The RNA primer is necessary for the activity of DNA ligase
 - b) The RNA primer creates the 5' and 3' ends of the strand
 - c) DNA polymerase can only add nucleotides to RNA molecules
 - d) DNA polymerase can only add nucleotides to an existing strand
- 5) The type of mutation most commonly associated with exposure to UV light is _____
- a) Thymine dimerization
 - b) Base deamination
 - c) Depurination
 - d) A base deletion
- 6) DNA replication involves the breaking of bonds between
- a) Bases
 - b) Sugars and bases
 - c) Phosphates and bases
 - d) Sugars and phosphates
- 7) DNA repair mechanism is absent in _____
- a) Nuclear genome
 - b) Mitochondrial genome
 - c) Chloroplast genome
 - d) Both b) and c)

B) Definitions :

7

- 1) Transcription factors
- 2) Activators
- 3) SOS operon
- 4) 16S rRNA
- 5) –10 and –35 regions in gene
- 6) Glycosylation
- 7) Rec A protein.



PART – II

Answer **any four** of the following :

2. Explain the process of replication in prokaryote and add a note on proof reading mechanism. **14**
 3. Explain the mechanism of post translation modifications and add a note on protein folding. **14**
 4. Write a note on different types of intron splicing and add a note on spliceosome. **14**
 5. Write a note on different DNA polymerases of *E. coli*. **14**
 6. Answer **any two** from the following : **14**
 - a) What are consensus sequences ? Describe the process of transcription in prokaryotes.
 - b) Explain the recombination process.
 - c) Explain the structure of prokaryotic and eukaryotic ribosomes.
 7. Write short notes on (**any two**) : **14**
 - a) Cell cycle
 - b) Central Dogma
 - c) Genetic code.
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**M.Sc. (Part – II) (Semester – III) Examination, 2014
BIOTECHNOLOGY (Old)
Genetic Engineering (Paper – I)**

Day and Date : Friday, 14-11-2014

Total Marks : 100

Time : 3.00 p.m. to 6.00 p.m.

Instruction : All questions carry equal marks.

SECTION – I

I. Multiple Choice Questions :

- 1) Northern Blotting was developed by _____
 - a) Southern
 - b) Northern
 - c) Alwine
 - d) Burnette
- 2) _____ first reported the use of bacterial plasmids as molecular cloning vector.
 - a) Stanlay Cohen
 - b) Stanley Watson
 - c) James Cohen
 - d) Watson and Crick
- 3) The filamentous Coliphages containing a circular SS DNA molecule is _____
 - a) Phage
 - b) M13
 - c) E.Coli
 - d) R gt.
- 4) Taq DNA polymerase has the highest DNA polymerase activity at a Ph of _____
 - a) 7
 - b) 8
 - c) 9
 - d) 6
- 5) FISH technique can be applied to _____
 - a) Interphase nuclei
 - b) Mitochondria
 - c) Chromatidis
 - d) Golgi complex



- 6) Fluorochrome Fluorescein when excited by u.v. light emits _____
a) Green Fluorescein b) Red Fluorescein
c) Blue Fluorescein d) Yellow Fluorescein
- 7) Use of Animal organs for Human transplantation is called _____
a) Bone Marrow Transplantation b) Stem cell transplantation
c) Xeno transplantation d) Organ transplantation
- 8) Plasmids should be _____
a) Compatible b) Incompatible
c) Self compatible d) Oligonucleotide compatible
- 9) Restriction enzymes are regarded as _____
a) Molecular Sieve b) Molecular Scissors
c) Molecular Glue d) None of the above
- 10) Number of basepairs/Turn in B-DNA is _____
a) 11 b) 12
c) 10 d) 9
- 11) Sequences recognized by Restriction Enzymes are _____
a) Inverted b) Direct
c) Tandem d) Palindromic
- 12) Digoxigenin is a _____
a) Steroid b) Prostaglandin
c) Lectin d) Antioxidant
- 13) Arctic Shrimp Alkaline Phosphatase gets inactivated by heating at _____ temperature.
a) 40 c b) 65 c
c) 52 c d) 68 c
- 14) The optimal length of PCR Primers is _____
a) 15-20 nucleotides b) 18-30 nucleotides
c) 4-20 nucleotides d) 13-30 nucleotides
- 15) The TEL sequences of YAC vectors are derived from _____
a) Yeast b) *Cacnorabiditis*
c) *Tetrahymena* d) *E.coli*



- 16) *Pichia pastrois* is able to use _____ as a carbon source.
- a) Glucose
 - b) Ethanol
 - c) Methanol
 - d) Galactose
- 17) The common pore size for nitrocellulose used in blotting is _____
- a) 10 μ m
 - b) 0.45 μ m
 - c) 3 μ m
 - d) 0.20 μ m
- 18) The fusion partner of the pMAL series of vector system is _____
- a) MBP
 - b) GST
 - c) Histag
 - d) GST tag
- 19) The T-DNA of Riplasmid lacks genes for _____ synthesis.
- a) Auxin
 - b) Cytokinin
 - c) Gibberellins
 - d) Kinetin
- 20) The ratio of A-260/A-280 for preparation of pure RNA is _____
- a) 1.1
 - b) 2.0
 - c) 1.8
 - d) 1.6

SECTION – II

2. Describe in detail about P.C.R. steps in P.C.R. and different types of P.C.R. with examples. 20

OR

- 2. Give detail account of application of r-DNA technology in medicine and agriculture. 20
- 3. Explain in detail the different Hybridization Techniques. 20

SECTION – III

4. Give an account on **any two** of the following : (10×2=20)
- a) FISH and its application
 - b) Chromosome walking and chromosome jumping.
 - c) Electron microscopy in analysis of DNA structures.



4. Write short notes on **any four** of the following : **(5×4=20)**
- a) mcr/mrr genotypes
 - b) Negative contrast technique
 - c) Replacement vectors
 - d) Chromosome walking
 - e) Linkers and adaptors.
5. Discuss **any four** of the following : **(5×4=20)**
- a) CIP and BAP
 - b) Generation of Restriction mapping
 - c) Purification of Glutathione-S-transferase
 - d) Gene knockout
 - e) Invivo Gene Therapy.
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M.Sc. – II (Semester – III) Examination, 2014
BIOTECHNOLOGY (Old) (Paper – II)
Immunology

Day and Date : Monday, 17-11-2014
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- N. B. :**
- 1) Figures to the **right** indicate **full** marks.
 - 2) **Draw diagram wherever necessary.**
 - 3) **Section I is compulsory.**
 - 4) **From Section II attempt any four.**
 - 5) **Answers to the Section I and Section II should be written in the same answer book.**

SECTION – I

1. A) Choose the correct alternative and write the sentence : **10**
- I) Grafting carried out in between twins is an example of _____
- | | |
|--------------|----------------|
| 1) isograft | 2) heterograft |
| 3) autograft | 4) homograft |
- II) _____ is the primary lymphoid organ.
- | | |
|---------------|--------------------|
| 1) Thymus | 2) Spleen |
| 3) Lymph node | 4) Peyer's patches |
- III) _____ is not component of HAT medium used for monoclonal antibody production.
- | | |
|-----------------|--------------|
| 1) Aminopterin | 2) Thymidine |
| 3) Hypoxanthine | 4) Peptone |
- IV) Immunoglobulins are chemically _____
- | | |
|------------------------|------------------|
| 1) Carbohydrates | 2) Lipids |
| 3) Lipopolysaccharides | 4) Glycoproteins |



- V) Contact dermatitis is an example of _____ hypersensitivity reaction.
- 1) type I 2) type III 3) type IV 4) type II
- VI) Hapten is _____
- 1) incomplete antigen 2) complete antigen
3) an example of adjuvant 4) reagenic antibody
- VII) Complement component C₃ deficiency is associated with _____
- 1) Neisserial infections 2) Pyogenic infections
3) Wiskott Aldrich syndrome 4) Job's syndrome
- VIII) The presentation of Lipid and glycolipids antigen by APCs is done by _____ molecules.
- 1) MHC class I 2) MHC class II
3) MHC class III 4) CD₁
- IX) Positive complement fixation test is indicated by _____
- 1) Lysis of sheep RBCS
2) No lysis of sheep RBC
3) Absence of antibodies in patient's serum
4) Presence of flocculation of antigen-antibody
- X) Atopy is _____ hypersensitivity reaction.
- 1) localized type I 2) Systemic type I
3) type III localized 4) systemic type III

B) Define the following terms :

10

- 1) Isograft
- 2) Adjuvant
- 3) Monoclonal antibodies
- 4) Innate immunity
- 5) Mitogen.



SECTION – II

Attempt **any four** of the following questions :

2. Write an essay on 'Regulation of Immune Response'. 20
 3. Discuss in detail about 'Active Immunization'. 20
 4. Describe in detail 'Type I Hypersensitivity Reactions'. 20
 5. Write short notes on (**any 2**) : 20
 - A) Immunity to diphtheria infection
 - B) Synthetic peptide vaccines
 - C) Tumor antigens.
 6. Answer in short the following questions (**any 4**) : 20
 - 1) Compare and contrast between IgG and IgM.
 - 2) Describe the structure of lymph node.
 - 3) Discuss the principle and applications of ELISA test.
 - 4) Comment on development of vaccines against AIDS.
 - 5) Discuss in short 'rheumatoid arthritis'.
 - 6) Write a note on B lymphocytes.
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**M.Sc. – II (Semester – III) Examination, 2014
BIOTECHNOLOGY (Paper – III) (Old)
Fermentation Technology – I**

Day and Date : Wednesday, 19-11-2014
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- N.B. :** 1) Section 1 is **compulsory**.
2) From Section II attempt **any four**.
3) Figures to **right** indicate **full** marks.
4) Answer to the Section I and II should be written in the **same** answer book.

SECTION – I

1. A) Rewrite the following sentences by using correct alternatives :

- 1) The μ_{max} value for Penicillium Chrysogenum is _____
1) 4.24 2) 0.36 3) 0.12 4) 0.53
- 2) _____ etal in 1973 introduced the term fed-batch culture to describe batch cultures which are fed continuous or sequentially, with medium without the removal of culture fluid.
1) Wood ward 2) Meyrath 3) Pasteur 4) Yoshida
- 3) The major culture collection of industrial important microorganisms in Japan is _____
1) IMI 2) JCM 3) IFO 4) CNCM
- 4) Feed back inhibition acts by the end product binding to the enzyme at an _____ site which results in interference with the attachment of the enzyme to its substrate.
1) active 2) allosteric
3) complementary 4) inhibitory



- 5) Kinoshita et al in 1957 isolated a _____ requiring auxotroph of C-glutamicum which would accumulate ornithine at a molar yield of 367 from glucose in the presence of limiting arginine and excess biotin.
- 1) glutamate 2) ornithine 3) biotin 4) citrulline
- 6) The sucrose contain of beet molasses is _____ % of total w/v.
- 1) 33.4 2) 48.5 3) 50 4) 5.6
- 7) _____ is the inducer used to produce enzyme pullulanase by Aerobacter aerogens industrially.
- 1) Alpha amylase 2) pullullin
3) maltose 4) glucose
- 8) The main function of a fermenter is to provide a _____ for the growth of microorganisms or animal cells, to obtain a desired product.
- 1) Luxury 2) Conditional environment
3) Controlled environment 4) Acceptable environment
- 9) _____ centrifugal counter current extractor is used for extraction of penicillin from the broth.
- 1) Soxhlet 2) Pod bielniak
3) Netzsch 4) Retriot
- 10) _____ chromatography is used to purify vaccines like tetanus and diphtheria from broths.
- 1) Affinity 2) Reverse phase
3) Ion exchange 4) Gel exclusion
- B) Define/Explain **any five** of the following :
- 1) Upstream processing
2) Genetic improvement
3) Maintenance of microbes
4) Synthetic media
5) Online monitoring
6) Auxiliary equipments
7) Agitation
8) Continuous fermentation
9) Scale down
10) Precipitation.



SECTION – II

Attempt **any four** questions :

2. Give the various methods of growth measurements. **20**
 3. Give the ideal characteristics of a fermentor. **20**
 4. Give an brief account on process and fermentation economics. **20**
 5. Write short answers (**any two**) : **20**
 - 1) Fed batch fermentation
 - 2) Liquid-liquid extraction processing
 - 3) Gel filtration.
 6. Write short notes on (**any four**) : **20**
 - 1) Various metabolites from fermentation media
 - 2) Scale up processing
 - 3) Solid state fermentation
 - 4) Role of computers in fermenter operation
 - 5) Metabolic routines
 - 6) Stoichiometry.
-



Seat No.	
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**M.Sc. (Part – II) (Semester – III) (New) Examination, 2014
BIOTECHNOLOGY (Paper – I)
Advanced Analytical Techniques**

Day and Date : Friday, 14-11-2014
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- N. B. :** 1) Section – I is **compulsory**.
2) From Section – II attempt **any four**.
3) **All** questions carry **equal** marks.
4) Figures to the **right** indicate **full** marks.
5) Draw **neat** and labeled diagram.

SECTION – I

1. A) Complete the sentences by selecting correct answer from given alternatives : **7**
- In centrifugation _____ is a self forming gradient.
a) Sucrose b) CsN c) Maltose d) Ficoll
 - Emission of fluorescence occurs very rapidly after _____
a) Reaction b) Excitation c) Effect d) Emission
 - In column chromatography for high efficiency separation a large number of _____ is needed.
a) Theoretical plates b) Resin
c) Buffer d) Sample
 - The staining reagent used in protein electrophoresis is _____
a) Silver stain b) Amido black
c) Coomasie Brilliant Blue d) All of the above
 - The technique of _____ is very sensitive and responsive to the conformational changes.
a) CD and ORD b) UV-Vis
c) near and far IR d) X-rays
 - In atomic absorption spectroscopy the concentration of _____ is measured.
a) Biomolecules b) Metallic ions c) Salts d) Ions

P.T.O.



vii) To measure radioactive decay by gas ionization method _____ counter is used.

- a) Geiger muller
b) Liquid Scintillation
c) Fluorescence
d) All of the above

B) Define the following :

7

- ii) Biosensors
iii) Radioactivity
iv) PAGE
v) Chromatofocusing
vi) RCF (Relative Centrifugal Force)
vii) Resolving power of a lens.

SECTION – II

Attempt **any four** :

2. Explain how centrifugation is useful in determining the molecular weight of biomolecules. **14**
3. What is HPLC ? State its principle, working, instrumentation and applications. **14**
4. State the general principle and factors affecting the migration rates of biomolecules in an electrophoresis. **14**
5. Write down the advantages and disadvantages of Radiotracer techniques. **14**
6. Write short notes on (**any two**) : **14**
- A) Instrumentation of a Nephelometer
B) X-ray Crystallography
C) Confocal microscopy.
7. Answer **any two** : **14**
- A) Technique of GC-MS
B) DNA sequencing gels
C) Flowcytometry.
-



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M.Sc. (Part – II) (Semester – III) Examination, 2014
BIOTECHNOLOGY (New)
Fermentation Technology (Paper – II)

Day and Date : Monday, 17-11-2014
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :** 1) **All** questions of Section – I are **compulsory**.
2) Answer **any four** questions from Section – II.
3) **All** questions carry **equal** marks.
4) Draw **neat** and labelled diagrams **wherever** necessary.

SECTION – I

1. A) Rewrite the following sentences by choosing the correct alternative given below :

7

- 1) The objective of mixing in fermentor are to
 - a) Disperse the air bubbles
 - b) To suspend the micro organism
 - c) To entrance heat and mass transfer
 - d) All of the above

- 2) Industrial production of citric acid requires _____
 - a) Oxygen sugars and *Saccharomyces cerevisiae*
 - b) Oxygen sugars and *Escherichia coli*
 - c) Oxygen sugars and *Aspergillus niger*
 - d) Oxygen sugars and *Acetobacter suboxydane*

- 3) Cell population is maintained in steady state in which type culture _____
 - a) Batch
 - b) Fed batch
 - c) Continuous
 - d) All of these

- 4) _____ of the following is not used as antifoaming agent.
 - a) Lard oil
 - b) Silicon derivatives
 - c) Vegetable oils
 - d) Citric acid

P.T.O.



- 5) _____ agar is used for screening antibiotic producers and acid producer.
 a) Simmson's b) Nutrient c) Wilkins d) Sabaroud's
- 6) _____ technique is used to isolate vitamin producers.
 a) Isolation b) Autography
 c) Chromatography d) Bioautography
- 7) Molasses contain _____ sugar.
 a) Fructose b) Glucose c) Dextrin d) Invert

B) Define the following terms :

7

- 1) Sparger
- 2) Log phase
- 3) Lyophilization
- 4) Cell disruption
- 5) Inoculums
- 6) Solid state fermentations
- 7) Cell Lysis.

SECTION – II

Answer **any four** :

2. Give an brief account on ideal characters of fermentor. 14
 3. Give an account of microbial growth. 14
 4. Give an account on aeration and agitation of fermentation media. 14
 5. Give an account on product recovery by using filtration. 14
 6. Answer **any two** of the following : 14
 - a) Short note on kinetics in fermentation.
 - b) Short note on methods and instruments used in fermentation gas analysis.
 - c) Give the characteristics of biosensors.
 7. Answer **any two** of the following : 14
 - a) Short note on design of protein purification.
 - b) Short note on computer control systems in fermentors.
 - c) Short note on crude media.
-



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**M.Sc. (Biotechnology) (Part – II) (Semester – III) Examination, 2014
RESEARCH METHODOLOGY AND IPR (New) (Paper – III)**

Day and Date : Wednesday, 19-11-2014

Total Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

- Instructions:** 1) *Section – I is compulsory.*
2) *From Section – II attempt any four.*
3) **All questions carry equal marks.**
4) *Figures to **right** indicate **full** marks.*
5) **Draw neat and labelled diagrams.**

SECTION – I

1. A) Complete the sentences by selecting correct answer from the given alternatives. **7**

- 1) Characteristics of research is _____
- Inter-disciplinary team approach
 - Objectivistic approach
 - Economical in nature
 - All of these
- 2) _____ of the following is not specifically protected by intellectual property legislation.
- Trade marks
 - Patents
 - Copyright
 - Trade secrets
- 3) _____ is not a method of data collection.
- Questionnaires
 - Interviews
 - Experiments
 - Observations

P.T.O.



4) _____ is not one of the seven major parts to the research report.

- a) Results
- b) Abstract
- c) Method
- d) Footnotes

5) What is the opposite of Variable ?

- a) A constant
- b) An extraneous variables
- c) A dependent variable
- d) A data set

6) _____ biological material is granted patent in India.

- a) Basmati rice
- b) Turmeric
- c) Both a) and b)
- d) None

7) Research that is done to understand an event from the past is known as

- a) Experimental Research
- b) Historical Research
- c) Replication
- d) Archival Research

B) Define the following :

- i) Impact factor
- ii) Research report
- iii) Chi square test
- iv) Correlation
- v) Copyright
- vi) Trade Mark
- vii) Pure Research.



SECTION – II

Attempt **any four** :

2. Explain in detail the title and abstract guidelines for preparation manuscript. **14**
 3. What is sampling theory ? Explain in detail the types of sampling. **14**
 4. What is IPR ? Give a detailed account on patenting biological materials with case study. **14**
 5. What is the meaning of research ? Explain in detail the characteristics of research. **14**
 6. Answer **any two** : **14**
 - a) Write a note on criteria for selecting research problem.
 - b) Give a detailed account on types patenting.
 - c) Explain data collection methods.
 7. Write short notes on (**any two**) : **14**
 - a) ANOVA
 - b) Research design
 - c) Geographical indications.
-



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M.Sc. – II (Semester – III) Examination, 2014
BIOTECHNOLOGY (New)
Paper – IV : Plant Biotechnology

Day and Date : Friday, 21-11-2014
Time : 3.00 p.m. to to 6.00 p.m.

Max. Marks : 70

- Instructions :** 1) Section – I is **compulsory**.
2) From Section – II attempt **any four**.
3) **All** questions carry **equal** marks.
4) Figures to right indicate **full** marks.
5) **Draw** neat and labeled diagrams.

SECTION – I

1. A) Rewrite the following sentences by using correct alternative. 7
- 1) The cell without cell wall is called _____
 - a) Germplasm
 - b) Chromosome
 - c) Protoplast
 - d) DNA
 - 2) The fusion of nucleated cell with enucleated cell leads to form _____
 - a) Chromosome
 - b) Cybrid
 - c) Hybrid
 - d) Symmetric hybrid
 - 3) *Agrobacterium* infection in plant causes _____ disease.
 - a) Mosaic pattern
 - b) Autosomal
 - c) X linked
 - d) Crown gall
 - 4) _____ cryoprotectants is widely used in cryopreservation to avoid crystallization of cells.
 - a) DMSO
 - b) Dry CO₂
 - c) Glycerol
 - d) Liquid N₂



6. Answer **any two** of the following :

14

- 1) Explain in detail protoplast isolation by enzymatic method.
- 2) Write a note on embryo rescue.
- 3) Write a note on molecular farming of antibodies.

7. Answer **any two** of the following :

14

- 1) Write a note on biodegradable plastic.
 - 2) Write in detail about edible vaccines and their applications.
 - 3) Explain the artificial seed synthesis in detail.
-



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**M.Sc. (Biotechnology) (Semester – IV) Examination, 2014
ANIMAL CELLS IN BIOTECHNOLOGY (Paper – I)**

Day and Date : Saturday, 15-11-2014
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 100

- Note :** 1) **All questions are compulsory.**
2) **Figures to the right indicate marks.**
3) **Draw diagrams wherever necessary.**

1. Answer the following in **one** sentences : **20**
- 1) What is primary culture ?
 - 2) What are continuous cell lines ?
 - 3) Name three types of cells used for culture ?
 - 4) Write property of precursor cells.
 - 5) Name various kinds of substrates.
 - 6) What is finite cell lines ?
 - 7) What is continuous flow culture ?
 - 8) Name the cryoprotective agent used in freeze preservation of animal cells in cell banks ?
 - 9) What is HAT ?
 - 10) Give the importance of bicarbonate buffer in the medium ?
 - 11) What is perfusion ?
 - 12) What is function of PBS ?
 - 13) What is batch culture ?
 - 14) Which enzyme is commonly used in enzymatic disaggregation ?
 - 15) What is cell cloning ?
 - 16) Name any two culture vessels used in monolayer culture.

P.T.O.



- 17) What is sparging ?
- 18) Name any two agents which enhances cell fusion.
- 19) What is feeding ?
- 20) What is anchorage dependent growth ?

SECTION – I

2. Describe in detail the physical and nutritional requirements of cell cultures. **20**

OR

Describe the preparation of primary cell culture and add a note on its maintenance.

3. A) Describe in detail the synchronization of cultures and add a note on its applications. **10**
- B) Write short notes on (**any two**) : **10**
- 1) Natural media
 - 2) Microcarrier cultures
 - 3) Serum dependent defined media.

SECTION – II

4. Describe in detail the toxicity testing, karyotyping and cytogenetic characterization of animal cell culture. **20**

OR

Describe in detail the process of reconstituted basement membrane rafts and feeder layer ? Add a note on its applications.

5. A) “Animal cell cultures are a good source of biochemicals”. Comment with the help of suitable examples. **10**
- B) Write short notes on following (**any 2**) : **10**
- 1) Role of HAT in hybridoma technology.
 - 2) Mutant cell preparation.
 - 3) ESC applications.
-



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M.Sc. (Part – II) (Semester – IV) Examination, 2014
BIOTECHNOLOGY (Paper – II)
Industrial and Environmental Biotechnology

Day and Date : Tuesday, 18-11-2014
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 100

- Instructions:** 1) Section – I is **compulsory**.
2) From Section – II attempt **any four**.
3) Figures to the **right** indicate **full** marks.
4) Answers to the Section – I and Section – II should be written in the **same** answer book.

SECTION – I

1. A) Rewrite the following sentences by selecting correct answer from given alternatives :

10

- i) Classical inhibitors of glycolytic pathway (fluorides and iodoacetates) stop the accumulation of _____
a) Glutamic acid b) Lipase c) Acylase d) Bacteriocin
- ii) Cyanogen bromide activation, acid azide derivation and carbodiimide coupling, these are the methods of _____ in immobilization.
a) Covalent linkage b) Microencapsulation
c) Micelle entrapment d) Liposomal encapsulation
- iii) In anaerobic sludge digestion _____ is the major gas released.
a) Hydrogen b) Methane c) Nitrogen d) Oxygen
- iv) Regular polyhedrons, nuclear polyhedrosis and cytoplasmic polyhedrosis are used in bioinsecticide production and belongs from _____
a) Bacteria b) Fungi c) Algae d) Viruses



- v) _____ coating is essential to protect the rhizobia from acid fertilizers and acidic soil.
- a) Xanthum gum b) Citric acid c) Glutamate d) Lime
- vi) Better storage stability of Bacitracin peptide antibiotics are prepared for animal feed by addition of _____
- a) Zinc b) Methylene-isocyanate
c) Phenyl pyruvic acid d) None of these
- vii) Lower growth rate, hydrolysis by alkali, use of pancreatic juice and activation of endogenous RNA; these methods are practiced in SCP to reduce the toxic effects of _____
- a) Protein b) DNA c) RNA d) Lipids
- viii) *Bacillus licheniformis* is used for production of _____
- a) Cloxacillin b) Streptomycin
c) Penicillin d) Bacteriocin
- ix) Atropine and tropine are bio-transformed from _____
- a) Nucleic acids b) Polysaccharides
c) Proteins d) Steroids
- x) Immobilized microbial cells are used to produce citrulline by the deamination of _____
- a) Penicillin b) Fumarate c) Arginine d) Histidine

B) Answer the following :

10

- i) Give one example of B-lactum antibiotic.
- ii) Define bioleaching.
- iii) Define Transgenic Animals.
- iv) Give two examples of Bioinsecticides.
- v) What is Bioremediation ?



SECTION – II

Attempt **any four** from following :

2. Write an essay on upstream and downstream processes in lactum antibiotic production with its application. 20
 3. Explain in detail methods of immobilization of enzymes with its merits and demerits. 20
 4. Describe stepwise in detail the different methods with their mechanisms used in Effluent Treatment Plant (ETP) and its significance. 20
 5. Write answers to **(any two)** : 20
 - i) What is Patent ? Explain in detail process of patent filing with its significance.
 - ii) Write an essay on 'Acetone fermentation'.
 - iii) Write in detail the Biotransformation of Antibiotics.
 6. Write short notes on **(any four)** : 20
 - i) Hybrid antibiotics
 - ii) Bioleaching-Organism used and Applications
 - iii) Microbial Biochips
 - iv) Trade mark
 - v) Patenting of Biological Materials
 - vi) Biofertilizers.
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M.Sc. – II (Semester – IV) Examination, 2014
BIOTECHNOLOGY
Bioinformatics (Paper – III)

Day and Date : Thursday, 20-11-2014
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 100

- Instructions :** 1) *Question 1 compulsory.*
2) *Section – I and II should be written in **separate** answer books.*
3) *Figures to the **right** indicates **full** marks.*

1. Multiple choice :

20

- 1) The equation $H\psi = E\psi$ is discovered by _____
 - a) Schrodinger
 - b) Newton
 - c) C.V. Raman
 - d) None of the above
- 2) CDS means _____
 - a) Conserved domains
 - b) Coding sequences
 - c) Both a) and b)
 - d) None
- 3) _____ is sequence retrieval system.
 - a) BLAST
 - b) CLUSTAL W
 - c) ENTREZ
 - d) DASTY
- 4) Structure files in PDB are stored with _____ extension.
 - a) .pdb
 - b) .php
 - c) .jpg
 - d) both a) and c)
- 5) PubMed is _____ database.
 - a) Structural
 - b) Protein
 - c) Literature
 - d) None



- 6) Following is one of primary protein sequence database.
- a) NRL_3D
 - b) GenBank
 - c) PROSITE
 - d) None of the above
- 7) Following are all secondary protein sequence databases except _____
- a) PRINTS
 - b) PROSITE
 - c) EMBL
 - d) None of the above
- 8) PDB is _____ database.
- a) Composite
 - b) Specialized
 - c) Secondary
 - d) Structural
- 9) ESI means _____
- a) Electro Spray Ionization
 - b) Electro Spray Induction
 - c) Electro Spray Inhibition
 - d) All of these
- 10) A biological retrieval system used by NCBI is _____
- a) SRA
 - b) FASTA
 - c) ENTREZ
 - d) OMIM
- 11) _____ tool is used in Phylogenetic analysis.
- a) DASTY
 - b) BLAST
 - c) PHYLIP
 - d) PANDIT
- 12) Among following _____ software is used to build 3-D model in homology modeling process.
- a) RasMol
 - b) KineMage
 - c) Modeller
 - d) Phylip
- 13) ClustalW tool is used in _____
- a) Phylogenetic analysis
 - b) Secondary structure prediction
 - c) Measurement of dihedral angles
 - d) None



- 14) GenBank is _____ database.
- a) Nucleotide
 - b) Amino acid
 - c) Secondary
 - d) Composite
- 15) Smith-Waterman algorithm is used in _____ alignment.
- a) Local
 - b) Global
 - c) Random
 - d) Heuristic
- 16) _____ is sequence retrieval system in EMBL.
- a) FASTA
 - b) OMIM
 - c) SRS
 - d) ENTREZ
- 17) AutoDock is _____ software.
- a) Modelling
 - b) Alignment
 - c) Simulation
 - d) Docking.
- 18) Human genome project was completed in _____
- a) 2008
 - b) 2003
 - c) 2001
 - d) 1998
- 19) _____ is a spectroscopic technique.
- a) MALDI-TOF
 - b) BioEdit
 - c) AutoDock
 - d) ELISA
- 20) UPGMA is _____
- a) DOT matrix
 - b) Server
 - c) Phylogenetic tree method
 - d) Scoring matrices

SECTION – I

2. Define database. Explain secondary protein sequence databases in detail. **20**

OR

2. What is molecular modeling ? Discuss various functions of molecular modeling. **20**



3. A) Write short answer (**any one**) : **10**
- a) PDB and NDB
 - b) BLAST.
- B) Write short notes (**any two**) : **10**
- a) EST
 - b) Local and Global Sequence analysis.
 - c) ESI.

SECTION – II

4. What is Phylogenetic tree ? Discuss various phylogenetic methods in detail. **20**
- OR
4. Explain nucleic acid sequence databases in detail.
5. A) Write short answer (**any one**) : **10**
- a) Scoring matrices.
 - b) Energy calculation methods.
- B) Write short answer (**any two**) : **10**
- a) MALDI-ToF.
 - b) Peptide Fingerprinting.
 - c) ClustalW.
-



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**M.Sc. (Part – II) (Semester – IV) Examination, 2014
BIOTECHNOLOGY
Paper – IV : Microbial Fermentation Technology**

Day and Date : Saturday, 22-11-2014
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 100

- Instructions:** 1) *Part I, Q. 1 is compulsory.*
2) *Attempt **any 4** questions from Part II.*
3) *Figures to the **right** indicate **full** marks.*
4) *Answer to the Part I and Part II are to be written in **same** answer booklet only.*

PART – I

1. A) Rewrite the sentences after choosing the correct answer from the given alternatives. **10**

- 1) A bioreactor in which only the flow rate is used to control the rate of cell or product productivity is called _____
 - a) Turbidostat
 - b) Chemostat
 - c) Levelstat
 - d) None of above
- 2) Batch fermentation is also called as _____
 - a) Closed system
 - b) Open system
 - c) Fed-batch system
 - d) None of these
- 3) When the product formation is approximately equal to the rate of cell growth, the pattern of product formation is termed as _____
 - a) uncoupled
 - b) growth associated
 - c) non-growth associated
 - d) metabolically uncouple
- 4) Submerged fermentations are _____
 - a) Batch fermentation
 - b) Continuous fermentation
 - c) Batch as well as continuous fermentation
 - d) None of these



- 5) Stationary phase is described as _____
- a) no further increase in the cell population after a maximum value
 - b) deceleration of growth and division rate after the growth rate reaches a maximum
 - c) acceleration of growth and division rate after the growth rate reaches a maximum
 - d) deceleration of growth and division rate after the growth rate reaches a minimum
- 6) Upto the production of desirable production in the fermentor is called _____
- a) Upstream process
 - b) Downstream process
 - c) Surface fermentation
 - d) None of these
- 7) If more than one microorganism is used to obtain the required product, that type of fermentation is called _____
- a) Batch
 - b) Continuous
 - c) Dual
 - d) Fed-batch
- 8) The number of baffles in a standard stirred tank bioreactor is _____
- a) 8
 - b) 6
 - c) 4
 - d) 2
- 9) Which of the following is described as best secondary metabolite ?
- a) Acetic acid produced from the oxidation of ethanol
 - b) Ethanol from the fermentation of glucose
 - c) Penicillin
 - d) Citric acid from the partial oxidation of glucose
- 10) The purification and recovery of the production after fermentation is called _____
- a) Upstream process
 - b) Downstream process
 - c) Surface fermentation
 - d) None of these
- B) Define or answer the following questions.
- 1) Screening
 - 2) Artificial Neural Networks (ANN)
 - 3) Fermentation
 - 4) Baffles and spargers
 - 5) Genetic Algorithm (GA).



PART – II

Attempt **any four** of the following :

2. Describe the various criteria used when a process of formulation media is going on and add a note on rheology. **20**
 3. Define screening process. Describe in detail primary and secondary screening. **20**
 4. Describe in detail the basic design of fermentor. **20**
 5. Attempt **any two** of the following : **20**
 - a) Explain in brief approaches and techniques of mathematical modeling in fermentation process.
 - b) Discuss in short growth kinetics and yield kinetics in fermentation.
 - c) Significance of biosensors in fermentation industry.
 6. Write short notes on **any four** of the following : **20**
 - a) Quality assurance
 - b) Preservation methods used for improved strains
 - c) Flux control analysis
 - d) Acetator and cavitator
 - e) Upstream processing
 - f) Antifoaming agents.
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SLR-KK – 1

Seat No.	
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M.Sc. (Part – I) (Semester – I) Examination, 2014
BIOTECHNOLOGY
Microbiology (Paper – I)

Day and Date : Friday, 14-11-2014
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- N. B. :**
- 1) *Section – I is compulsory.*
 - 2) *From Section – II attempt **any four**.*
 - 3) ***All** questions carry **equal** marks.*
 - 4) *Figures to the **right** indicate **full** marks.*
 - 5) ***Draw** neat and labeled diagram.*

SECTION – I

1. A) Complete the sentences by selecting correct answer from given alternatives : **7**
- i) Microorganisms belonging to the same _____ would be expected to have the most characteristics in common with each other.
 - a) Order
 - b) Species
 - c) Family
 - d) Genus
 - ii) What is being compared during DNA Hybridization studies of two bacteria ?
 - a) Similarity of base sequences
 - b) Rate of DNA replication
 - c) Mechanism of RNA synthesis from DNA
 - d) Nature of the 16S RNA component
 - iii) All of the following produce oxygen as a product of photosynthesis except _____
 - a) Cyanobacteria
 - b) Purple sulfur bacteria
 - c) Algae
 - d) Phytoplankton

P.T.O.



iv) Which of the following pH levels would probably be lethal to an alkaliphile ?

- a) pH 14
- b) pH 8
- c) pH 10
- d) pH 4

v) The infectious substance of prions is _____

- a) Protein
- b) Glycoprotein
- c) RNA
- d) None of the above

vi) The phages that show lysogenic cycle are called _____

- a) Lytic phages
- b) Virulent phages
- c) Temperate phages
- d) None of these

vii) The function of the drug AZT is to _____

- a) Disable reverse transcription
- b) Block production of envelope protein
- c) Block HIV replication
- d) Block capsid protein formation

B) Define the following :

- I) Taxonomic rank
- II) Acidophilic bacteria
- III) Chemoorganotrophs
- IV) NCIM
- V) Lytic cycle
- VI) Hepatitis B
- VII) Prokaryotes.



SECTION – II

Answer **any four** :

2. Discuss in detail on modern methods for the identification of Prokaryotes. **14**
 3. Write an essay on “Isolation and cultivation of Bacteriophages”. **14**
 4. Explain about the Photodynamic inactivation of viruses by chemical agents. **14**
 5. Comment on “Methanogenic archaeobacteria” and its biotechnological applications. **14**
 6. Write short notes on (**any two**) : **14**
 - A) Major Bacterial culture collection units.
 - B) Oxygenic Photosynthetic microbes.
 - C) Antiviral Chemotherapeutics.
 7. Answer **any two** : **14**
 - A) Thermophilic bacteria
 - B) Lysogenic Cycle of Lambda Phage
 - C) Reproduction of TMV viruses.
-



vii) _____ are the regulatory fragment of *nif* genes of *Klebsiella pneumoniae*.

a) *nif A* and *nif L*

b) *nif H* and *nif D*

c) *nif B* and *nif Q*

d) *nif T* and *nif Y*

B) Define the following terms :

7

- i) Non-symbiotic nitrogen fixation
- ii) Menstrual cycle
- iii) Chemiosmotic theory
- iv) Oxidative phosphorylation
- v) Uncouplers
- vi) Photorespiration
- vii) Pheromones.

SECTION – II

Answer **any four** :

2. Explain in detail synthesis, structure, secretion, transport, metabolism and mechanism of insulin hormone secreted from pancreas. 14
3. Illustrate in detail about the nitrogen cycle. 14
4. Describe in detail about Calvin cycle. Add a note on Rubisco enzyme. 14
5. With neat and labelled diagram describe the structure of ATP synthetase complex. Add a note on ATP synthesis. 14
6. Answer **any two** of the following : 14
 - a) Discuss in detail about heme iron and non heme iron proteins in respiratory chain.
 - b) Illustrate the fractionation and reconstitution of respiratory chain complexes.
 - c) Write a note on assimilation of ammonia.
7. Answer **any two** of the following : 14
 - a) Describe the hormonal control of spermatogenesis.
 - b) Write a note on plant growth hormones.
 - c) Discuss in detail about photosystem I and II.



Seat No.	
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M.Sc. – I (Semester – I) Examination, 2014
BIOTECHNOLOGY
Paper – III : Inheritance Biology

Day and Date : Wednesday, 19-11-2014
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) *Section – I is compulsory.*
 - 2) *From Section – II attempt any four.*
 - 3) *All questions carry equal marks.*
 - 4) *Figures to the right indicate full marks.*
 - 5) *Draw neat and labelled diagrams.*

SECTION – I

1. A) Rewrite the following sentences by using correct alternative : 7
- 1) In complementary gene action F_2 remains in _____
 - a) 9:7
 - b) 9:3:4
 - c) 12:3:1
 - d) 15:1
 - 2) When both dominant and recessive express phenotypically is called _____
 - a) Dominance
 - b) Co dominance
 - c) Incomplete dominance
 - d) Super dominance
 - 3) The bacterial process in which genetic material is carried by some external agent _____
 - a) Translation
 - b) Transformation
 - c) Transduction
 - d) Conjugation
 - 4) _____ mutation results in death of the cell or organism.
 - a) Lethal
 - b) Vital
 - c) Sub vital
 - d) Super vital
 - 5) In inversion when inverted segment not contains centromere is called _____
 - a) Duplication
 - b) Paracentric inversion
 - c) Pericentric inversion
 - d) Translocation



- 6) Completely sex linked genes are of two kinds known as _____
- a) X-linked, X-linked genes b) X-linked, O-linked genes
 c) X-linked, Y-linked genes d) Y-linked, Y-linked genes
- 7) Genes which confer antibiotic resistance on bacteria are located on _____
- a) Chromosomal DNA b) Plasmid
 c) RNA d) Polysomes

B) Answer the following terms :

7

- 1) Spontaneous mutations
- 2) Pseudoalleles
- 3) Expressivity
- 4) Polyploidy
- 5) Linkage
- 6) Sexduction
- 7) Linkage groups.

SECTION – II

Attempt **any four** :

2. What is linkage maps ? Explain gene mapping with molecular markers. **14**
3. Explain in detail gene mapping in bacteria by interrupted mating. **14**
4. Explain in detail numerical alterations of chromosomes. **14**
5. Explain why Mendel used pea plant as an experimental material and add a note on law of segregation with suitable example. **14**
6. Answer **any two** of the following : **14**
 - 1) Describe sex determination.
 - 2) What are mutants ? Describe biochemical mutant.
 - 3) Explain with suitable example complementary gene action.
7. Answer **any two** of the following : **14**
 - 1) Explain gene transfer by transduction
 - 2) Describe in detail tetrad analysis.
 - 3) Explain with suitable example inheritance of chloroplast gene.



4. Obtain the equation of the line of regression of yield of rice (Y) on water (X). **14**

Water in inches	12	18	24	30	36	42	48
Yield in tones	5.27	5.68	6.25	7.21	8.02	8.71	8.42

5. Discuss in detail the homology modeling of protein. **14**

6. Answer **any two** of the following : **14**

a) Calculate the arithmetic mean of following data :

Class interval	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
Frequency	3	5	10	15	5	12

- b) Write a note on scatter plot.
c) Discuss about nucleic acid sequence databases.

7. Answer **any two** of the following : **14**

- a) Write a note on methods of multiple sequence alignment.
b) Explain in detail docking.
c) Describe in detail structure classification databases.
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