

94081

B. Sc. (Bio-Tech) 5th Semester (N.S.)
Examination – February, 2022

BIO-INFORMATICS

Paper : BT-501

Time : Three hours]

[Maximum Marks : 40

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Question No. 1 is compulsory. Answer any four other questions, one from each Unit.

1. Answer in brief the following : $2 \times 5 = 10$

(a) What do you understand by homology in bioinformatics ?

(b) Expand :

(i) PDB

(ii) EMBL

(c) What is the nature of data generated by Restriction digestion ?

(d) Differentiate between rooted and unrooted phylogenetic tree.

(e) Enlist any *two* Gene identification tool.

UNIT – I

2. What are the basic features of biological databases ?
Enlist and explain sequence and structure database with suitable examples, 7.5

3. Differentiate between primary and secondary biological database. 7.5

UNIT – II

4. Write short notes on any *two* : 4 + 3.5 = 7.5

(a) SWISSPROT

(b) PDB

(c) TREMBL

5. Describe in brief the technique of Microarray and the nature of data generated by them. 7.5

UNIT – III

6. Write short notes on any *two* : 4 + 3.5 = 7.5

(a) BLAST

(b) Multiple Sequence Alignment

7. What do you understand by substitution matrices ?
Differentiate between PAM and BLOSSUM. 7.5

UNIT – IV

8. Explain the basic architecture of Entrez at NCBI. 7.5
9. Explain the methods of patterns and repeat finding during genome annotation. 7.5
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**B. Sc. (Bio-Tech) 5th Semester (N.S.)
Examination – February, 2022**

RE-COMBINANT DNA TECHNOLOGY

Paper : BT-502

Time : Three hours]

[Maximum Marks : 40

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Unit. Question No. 1 is compulsory.

1. Write short note on the following : 1 × 8 = 8
- (a) Ti plasmid
 - (b) Polyethylene glycol
 - (c) Liposome fusion
 - (d) Random mutagenesis
 - (e) Phage display
 - (f) Chimeric proteins

(g) Immune modulators

(h) Microlaser

UNIT – I

2. Write detailed account on :

(a) Episomes 3

(b) Ultrasonication 3

(c) Microprojectile 2

3. What do you mean by gene recombination ? Discuss in detail the methods of genetic recombination. 8

UNIT – II

4. What do you mean by protein engineering ? Discuss in detail various methods of protein Engineering. 8

5. Write a detailed description on :

(a) PCR based site directed mutagenesis 4

(b) Primer extension method of site-directed mutagenesis 4

UNIT – III

6. Define genetic engineering. Discuss in detail the therapeutic products produced by the genetic engineering technology. 8

7. Discuss in detail :

- (a) Yeast to study eukaryotic gene function 4
- (b) Embryonic stem cells for the production of transgenic mouse 4

UNIT – IV

8. Write a note on :

- (a) Use of plant viruses as episomal expression vectors 4
- (b) Gene targeting in plants 4

9. Discuss in detail different strategies for gene transfer to plant cells. 8

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**B. Sc. (Bio-tech.) 5th Semester (N.S.)
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IMMUNOLOGY

Paper : BT-503

Time : Three hours]

[Maximum Marks : 40

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Unit. Question No. 1 is compulsory. All questions carry equal marks.

1. Write the short notes on the following :

8

(a) Suppressor T-cell

(b) Genome

(c) Antibody Engineering

(d) Plasma cell

(e) SCID *several conjugation Immuno deficiency*

(f) Infectious agents

(g) Any *two* vaccines for COVID-19 Covaxin
Corishield

(h) Immunofluorescence

UNIT - I

- B cell
- T cell
- Natural
kill

2. What is the immune system? Describe the various cells and organs related to the human immune system. 8

3. Write the short notes on any *two* :

1. B.M. Thy. 8
2. Lymph spleen. 8

(a) Humoral immune response

(b) T-lymphocytes

(c) Basic structure and functions of antibodies

UNIT - II

4. Explain the somatic-variation models' Hypotheses contended to explain antibody diversity in detail. 8

5. Write the short notes on any *two* : 8

(a) Immunological memory

(b) Clonal selection theory

(c) Allotypes & Idiotypes

UNIT - III

6. Write the short notes on any *two* : 8

(a) Pathogen defence strategies

(b) Immunity to repeated infections

(c) Exogenous Antigens : The Endocytic Pathway

7. What is the MHC ? Differences between the class I and class II MHC molecule.

8

UNIT - IV

8. What is the vaccine ? Describe various types of the vaccine in detail.

8

9. Write the short notes on any *two* :

8

- (a) Passive and Active immunization
- (b) Adjuvant
- (c) Properties and functions of Cytokines

B7
MHC
CD28
TCR
CD28
CD40L

1. K_H
2. L. Att.
3. Toxoid
4. Nuclear.
5. Polysacch. Bound
6. Bact.
7. Viral.
8. Conjugate.

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**B. Sc. (Bio-Tech) 5th Semester (N.S.)
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GENOMIC & PROTEOMICS

Paper : BT-504

Time : Three hours]

[Maximum Marks : 40

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting one question from each Unit. Question No. 1 is compulsory.

1. Write short note on the following : 1 × 8 = 8

- (a) Peptide mass fingerprint
- (b) Repetitive sequences
- (c) Isoelectric point
- (d) Pyrosequencing
- (e) DNA polymerase
- (f) Short-range interactions

(g) EcoCyc

✓

(h) Genome Browser

UNIT - I

✓ 2. What is DNA sequencing ? Discuss in detail the principle and procedure of Sanger's method of DNA sequencing and its advantages and disadvantages over other methods of DNA sequencing. 8

✓ 3. What is the principle of shotgun sequencing ? Describe in detail steps involved in shotgun sequencing method of genome sequencing and its advantages and disadvantages. 8

UNIT - II

✓ 4. Discuss in detail : $4 \times 2 = 8$

(a) VISTA

(b) NCBI

5. Write a detailed description on : $4 \times 2 = 8$

(a) TAIR

(b) SGD

UNIT - III

✓ 6. Write detailed account on :

(a) Sedimentation analysis and gel filtration 4

(b) Native PAGE 4

7. How do proteins interact ? Explain in detail different physical interactions that determine the property of proteins. 8

UNIT – IV

8. Define proteomics. Discuss in detail the principle and procedure of 2D-PAGE for the analysis of proteins. 8
9. What is the principle of Mass spectrometry ? Give a detailed description on mass spectrometry methods for protein identification. 8
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**B. Sc. Bio-Technology 5th Semester
(N. S.) Examination – February, 2022**

PHYSICAL CHEMISTRY

Paper : BT-505

Time : Three Hours]

[Maximum Marks : 40

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting at least one question from each Section. Question Number 1 is compulsory.

1. (a) Define Laplacian operator. 1
- (b) What do you understand by a normalized wave function ? 1
- (c) Define Doppler-broadening. 1

- (d) Define selection rules. 1
- (e) What is the direction of dipole moment? 1
- (f) Define photoelectric effect. 1
- (g) What are eigen functions? 1
- (h) Define polarizability. 1

SECTION - A

2. (a) Explain the following : $2 \times 2 = 4$

(i) Photoelectric effect

(ii) Heat capacity of solids

(b) Applying de-Broglie relationship, derive Schrodinger wave equation. 4

3. (a) When are the two eigen functions said to be :

$2 \times 2 = 4$

(i) Mutually orthogonal

(ii) Orthonormal

(b) State and derive plancks radiation law. How can it be verified experimentally? 4

SECTION - B

4. (a) What is dipole moment? What are its units? How is it determined by refraction method? 4
- (b) Derive Clausius-Mosotti equation. 4
5. (a) Briefly explain Gouy's method for the measurement of magnetic susceptibility. 4
- (b) A molecule of HCl has dipole moment 1.38 D. Calculate the percentage ionic character of HCl bond. Bond length is 1.20 Å. 4

SECTION - C

6. (a) Discuss rotational spectrum of the diatomic molecule. 4
- (b) What is signal to noise ratio? Discuss the means and methods to minimize it. 4
7. (a) Write short notes on: $2 \times 2 = 4$
- (i) Zero point energy
- (ii) Relative intensities of rotational spectral lines
- (b) Write expressions for the wave number of rotational levels of a non-rigid rotator. Explain why molecule behaves as a non-rigid rotator. 4

P. T. O.

SECTION – D

8. (a) Why a diatomic molecule should be considered as an anharmonic oscillator ? Write Moorse equation for the energy of the vibrational levels of an anharmonic oscillator. 4
- (b) Explain quantum theory of Raman effect. 4
9. (a) What do you understand by degrees of freedom of motion of a molecule ? Briefly explain the different types of degrees of freedom possessed by linear or non-linear molecules. 4
- (b) Calculate the force constant for bond in HBr when its fundamental vibrational frequency is $9.667 \times 10^{12} s^{-1}$. 4
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B. Sc. Bio-Technology 5th Semester
(N. S.) Examination – February, 2022

INORGANIC CHEMISTRY

Paper : BT-507/BIN-506

Time : Three Hours]

[Maximum Marks : 40

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting at least *one* question from each Section. Question Number 1 is *compulsory*.

1. (a) What are labile complexes ? 1
- (b) Which has larger value Δ_0 or Δ_t ? 1
- (c) Out of $\underline{Cl^-}$ and NH_3 which has more trans effect ? 1
- (d) What is Curie's point ? 1

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Max. Pl. on graph.
for thermodynamic
complex

P. T. O.

- (f) Define spectrochemical series. *Order of strength* 1
- (g) What are term symbols? *character* 1
- (h) State spin multiplicity rule. *2S+1* 1

SECTION - A

- (a) Give comparative account of valence bond theory and crystal field theory. 4
- (b) What are limitation of valence bond theory? Explain. 4
- (a) Explain why Ni^{2+} forms tetrahedral complex with CO whereas square planar with CN^- . 4
- (b) Calculate the number of unpaired electrons in $[Fe(CN)_6]^{3-}$ and $[Fe(H_2O)_6]^{3+}$. 4

SECTION - B

- a) What is $\log \beta$? How is it related to the stability of metal complexes? Explain with example. 4

(b) How does nature of ligand affect the stability of the complexes? 4

5. (a) Discuss the mechanism of substitution reactions in square planar complexes. 4

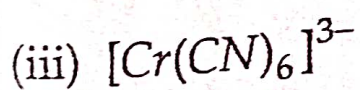
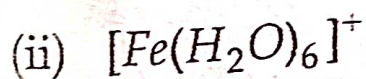
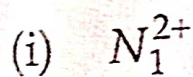
(b) What is trans effect? Explain the theories for it. 4

SECTION - C

6. (a) Discuss briefly the Gouy's method for measuring magnetic susceptibility. 4

(b) Explain spin and orbital contribution to magnetic moments. Give example. 4

7. (a) Calculate the magnetic moments (spin only) for the following ions: 4



(b) Explain what you understand by quenching of orbital angular momentum. 4

P. T. O.

SECTION - D

8. (a) What are two important limitations of Orgel energy level diagrams? 4

(b) Derive various term states for d^2 configuration. 4

✓ 9. (a) Explain selection rules for d-d transition in transition metal complexes. $L = S$ (1-3)
37 4

(b) Calculate the number of microstates for p^3 and d^2 configurations. 4

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**B. Sc. Bio-Technology 5th Semester
(N. S.) Examination – February, 2022**

ORGANIC CHEMISTRY

Paper : BT-506/BIN-507

Time : Three Hours]

[Maximum Marks : 40

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting at least one question from each Section. Question Number 1 is compulsory.

1. (a) Assign whether $^{14}_7\text{N}$ and $^{19}_9\text{F}$ are spin active nuclei or not.
- (b) How many PMR signal do you expect from acetaldehyde ?
- (c) Name any reagent whose test is used to distinguish Glucose and Fructose. *Tollen's R.*

- (d) Define inversion of sugar.
- (e) What do you mean by anomers ?
- (f) Name the most commonly used reference compound in PMR spectroscopy.
- (g) Write the reaction to prepare secondary alcohol from Grignard reagent.
- (h) Who discovered Grignard reagent ? When was it discovered ? $1 \times 8 = 8$

SECTION - A

2. (a) Write short note on the following : 4
- (i) Shielding and deshielding of proton
 - (ii) Coupling constant
- (b) Discuss the main factors affecting chemical shift. 4
3. (a) Explain the following : 4
- (i) Spin active nuclei
 - (ii) Peak area of signal
- (b) Give a detailed account of rules for splitting of proton signal. 4

SECTION - B

4. (a) A compound having molecular formula $C_2H_3Br_3$ exhibit two PMR signal :

4

$$\delta = 4.2(2H, d) \quad \delta = 5.8(1H, t)$$

What is the structure of compound ?

- (b) Propose structural formula for compounds with the following molecular formula which give rise to only one PMR signal :

4

- (i) C_5H_{12}
- (ii) C_2H_6O
- (iii) $C_2H_4Br_2$
- (iv) C_8H_{18}

5. (a) Describe the NMR of Acetophenone. 4

- (b) How can NMR spectroscopy to employed in differentiating Ethane, Ethene and Ethyne ? 4

SECTION - C

6. (a) Explain the mechanism of Osazone formation. 4

- (b) Convert :

3

4

- (i) Glucose into Fructose
- (ii) Fructose into Glucose

P. T. O.

7. (a) Illustrate with example the detailed steps of Killiani Fischer synthesis. 3 4

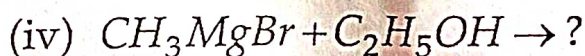
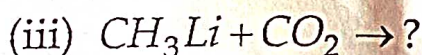
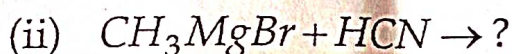
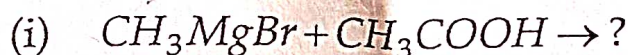
(b) Write Haworth projection formulae of the following: 4

(i) α -D-Glucopyranose. 

(ii) β -D-Fructofuranose 

SECTION - D

8. (a) Complete the following reactions: 4



(b) Write short note on reformat Sky reaction. 2 4

9. (a) What are polysaccharides? Name the major polysaccharide. Draw the structure of one of them. 4

(b) Draw the Haworth formula structure of the following: 4

(i) Sucrose

(ii) Maltose