SEMESTER IV

SEC-II BIOINFORMATICS

1. Course Description

Programme: B.Sc.
Course Code: U24/BIC/SEC/401
Type of course: SEC
No. of credits: 2

Max. Hours: 30
Hours per week: 2
Max. Marks: 50

2. Course Objectives

- This course aims to provide students with a well-rounded understanding of bioinformatics, combining biological knowledge with computational and analytical skills.
- Equip students with the tools and knowledge needed to tackle complex biological questions using computational approaches.

3. Course Outcomes

CO1: Examine the basics of Bioinformatics with the knowledge of Databases. (L4)

CO 2: choose the data mining of Biological Databases and design sequence analysis techniques. (L5, L6)

4. Course content-

Module I: INTRODUCTION TO BIOINFORMATICS & DATA BASES **(15 hrs)**

Introduction, Definition, Objectives, Scope & application.Biological databases: Primary protein databases – SWISS PROT, TrEMBL, PIR, PDB.Primary Nucleic databases – EMBL, GENBANK, DDBJ.Data mining of biological databases. Explore all the major databases and sequence retrieval from NCBI.

Module II: SEQUENCE ANALYSIS: **(15 hrs)**

Sequence alignment -FASTA, BLAST. Multiple sequence alignment – Clustal W, T-Coffee. Conserved Domains, Phylogenetic analysis and cladograms.2D and 3D models of a given protein structure prediction. SCOP, CATH, OMIM, KEGG, PROSITE, Pfam. Physical Properties and Protein domains, Trans domain and primary structure of proteins. Introduction to Molecular Docking.

5. Reference Books:

1. Sharma, Munjal& Shankar, A Text Book of Bioinformatics (2008), Rastogi Publishers, First Edition, ISBN 978-81-7133-917
2. Zhumur Ghosh &Bibekan and Mallik, Bioinformatics- Principles & Applications (2008) First Edition ISBN-10: 0195692306

6. Syllabus Focus

d) Relevance to Local, Regional, National and Global Development Needs

Local /Regional/National /Global Development Needs	Relevance
Global	With the huge availability of biological data, computational biochemistry facilitates data sharing and research on a global scale.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
Skill	Module 1 & 2	Practicals in Dry Lab

7. Course Assessment Plan

Weightage of Marks in Formative and Summative Assessments

Formative Assessment - FA (40%)	Summative Assessment - SA (60%)
CIA-20 marks **Mini project/Assignment/** **Problem solving/Case studies**	**End Semester exam-30Marks**

EXTERNAL- MODEL QUESTION PAPER
PRACTICAL

Course Code: U24/BIC/SEC/401
Credits: 2

Max Time: 1 Hr
Max. Marks: 30

Answer the following.

1. Illustrate the Sequence analysis -BLAST/MSA (10M)
2. Categorize the Databases (15M)
3. Record (5M)

SPrepared by Course Teacher [Name & Signature]	Checked & verified by HOD [Name & Signature]	Approved by the Principal
	21/12/24 (C.S. Malathi Varma)	

HOD Biochemistry
St. Francis College for Women
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St. FRANCIS COLLEGE FOR WOMEN, BEGUMPET, HYDERABAD-500016
(An Autonomous College Affiliated To Osmania University)
FACULTY OF SCIENCE- DEPARTMENT OF CHEMISTRY
PRACTICAL SYLLABUS CBCS-2024
SEMESTER -IV
SYNTHESIS OF ORGANIC COMPOUNDS AND FUNCTIONAL GROUP ANALYSIS

Program: B.Sc.
Course Code: U24/CHE/DSC/401/P
Course: DSC-4
No. of Credits: 1

Max. Hours: 20 Hrs
Max. Marks: 50
Hours per week: 2

Course Objective

- To prepare simple organic compounds and systematically analyse functional groups based on their nature and chemical reactivity.

Course Outcomes

CO1: Utilise the knowledge of organic reaction mechanisms in their preparations.
CO2: Categorise functional groups present in organic compounds using systematic quantitative analysis.

Systematic Qualitative Organic Analysis of Organic Compounds possessing mono functional groups (-COOH, phenolic, aldehydic, ketonic, carbohydrate, amide, nitro, amines) and preparation of one derivative.

Synthesis of organic compounds:

a. Acetylation – Preparation of Acetanilide.
b. Halogenation – Preparation of p-Bromo acetanilide.
c. Oxidation – Preparation of Benzoic acid.
d. Esterification - Preparation of n-butyl acetate.
e. Methylation – Preparation β-Naphthyl methyl ether.
f. Nitration – Preparation of Nitrobenzene
g. Reduction – Preparation of m-Nitroaniline

Reference Books:

- Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G., *Textbook of Practical Organic Chemistry*, Prentice-Hall, 5th edition, 1996.
- Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry* Orient-Longman, 1960.
- Ahluwalia, V.K. & Aggarwal, R. *Comprehensive Practical Organic Chemistry,* Universities Press.

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6. Syllabus Focus

a. Relevance to Local, Regional, National and Global Development Needs

Local /Regional/ National /Global Development Needs	Relevance
Local	Knowledge of the basic principles of Chemistry to help in day-to-day life.
Regional	Learn about the concepts and significance of carbohydrates and bioinorganic chemistry.
National	Understand the basics of organometallic compounds, non-aqueous solvents and dipole moments.
Global	Application of basic principles of rotational, IR, UV-Vis Spectroscopy techniques, concepts of chemical kinetics, heterocyclic compounds and pericyclic reactions.

b. Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Practical syllabus which includes Organic preparations and Qualitative analysis in Organic Chemistry Problem solving in Physical Chemistry	Students perform the experiments based on the procedure and also analyse the unknown compounds. Students solve the problems
ED	Organic preparations and analysis. Structural investigation of organic compounds based on spectroscopy	Students prepare organic compounds, analyse the functional groups and carry out the structural analysis based on spectral data
EMP	Inorganic, Organic, Physical Chemistry and Spectroscopy	Tutorials and assignments

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7. Pedagogy

S. No.	Student Centric Methods Adopted	Type / Description of Activity
1	Experiential	Experiments, attending seminars/workshops and field visits
2	Participative	Group discussion, quiz, presentations etc.
3	Problem solving	Solving problems in Physical Chemistry and structural elucidation based on spectral data.

8. Course Assessment Plan

a. Weightage of Marks in Continuous Internal Assessments & End Semester Examination

CO	Continuous Internal Assessments CIA - 40%	End Semester Examination-60%
CO1	CIA1-Written Exam	Written Exam
CO2	CIA 2- Skill based test like poster/powerpoint presentation, collage, 3D model making, problem solving and quiz.	
CO3	CIA1-Written Exam	
CO4	CIA 2- Skill based test like poster/powerpoint presentation, collage, 3D model making, problem solving and quiz.	

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b. Model Question Paper - End Semester Exam

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(An Autonomous College Affiliated to Osmania University)

Faculty of Science – Department of Chemistry

MODEL PAPER

B.Sc. II YEAR SEMESTER -IV

CHEMISTRY - PAPER IV

Course Code: U24/CHE/DSC/401

TIME: 2 hrs
Max. Marks: 60

SECTION –A (Essay Questions)

.Answer the following

4X10=40 Marks

1. a) Explain the classification of organometallic compounds based on metal-carbon bonds. (CO1) **L1** 5M
   b) Discuss the reactions in liquid ammonia with suitable examples. (CO1) **L2** 5M

OR

2. a) Describe the preparation, properties and applications of Grignard reagent. (CO1) **L3** 6M
   b) How does fixation of carbon dioxide occur in photosynthesis? (CO1) **L2** 4M
3. a) Derive an expression for the rate constant of first order reaction. (CO2) **L3** 5M
   b) A first order reaction is 50% complete in 100 minutes. How long will it take for 90% completion? (CO2) **L5** 5M

OR

4. Explain different methods of experimental determination of order oa a reaction. (CO2) **L2** 10M
5. a) Discuss the open chain structure of Glucose. (CO3) **L2** 5M
   b) Write the equations involved in Killiani-Fischer synthesis. (CO3) **L2** 5M

OR

6. a) Explain the synthesis of Furan, Pyrrole and Thiophene from 1,4-dicarbonyl compounds. (CO3) **L2** 5M
   b) What are pericyclic reactions? Give their classification with an example each. (CO3) **L4** 5M
7. a) What is a dipole moment? Predict the structure of CO_2 and SO_2 based on dipole moment. (CO4) **L4** 5M
   b) Explain the various molecular vibrations seen in IR spectroscopy. (CO4) **L2** 5M

OR

8. a) Describe in detail about the electronic transitions observed in UV-VIS spectroscopy. (CO4) **L2** 5M
   b) Explain the basic principles of Raman spectroscopy. (CO4) **L2** 5M

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SECTION –B

II. Answer any four. **4x5=20 Marks**

9. Write a note on the biological significance of calcium and chloride ions. (CO1) **L1**
10. Give two methods of preparation of ferrocene. (CO1) **L1**
11. Discuss briefly about collision theory. (CO2) **L2**
12. Explain the factors affecting the rate of a reaction. (CO2) **L2**
13. Explain mutarotation taking glucose as an example. (CO3) **L2**
14. Explain the concept of chromophore and auxochrome. (CO4) **L2**

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b. Model Question Paper - End Semester Exam

St. FRANCIS COLLEGE FOR WOMEN, BEGUMPET, HYDERABAD-500016
(An Autonomous College Affiliated to Osmania University)
Faculty of Science – Department of Chemistry
B.SC. II YEAR SEMESTER -IV

TIME: 2 hrs
Max. Marks: 60

Course Code: U24/CHE/DSC/401
Credits: 4

SECTION –A (Essay Questions)
SECTION –A

SECTION A - INTERNAL CHOICE			**4 X 10 M = 40M**	
Question Number	**Question**		**CO**	**BTL**
1	**Module 1**	a) Explain the classification of organometallic compounds based on metal-carbon bonds. 5M b) Discuss the reactions in liquid ammonia with suitable examples. 5M **OR**	**CO 1**	**(Level I,II)**
2	**Module 1**	a) Describe the preparation, properties and applications of Grignard reagent. 6M b) How does fixation of carbon dioxide occur in photosynthesis? 4M	**CO 1**	**(Level III,II)**
3	**Module 2**	a) Derive an expression for the rate constant of first order reaction. 5M b) A first order reaction is 50% complete in 100 minutes. How long will it take for 90% completion? 5M **OR**	**CO 2**	**(Level III, V)**
4	**Module 2**	Explain different methods of experimental determination of order oa a reaction. 10M	**CO 2**	**(Level II)**
5	**Module 3**	a) Discuss the open chain structure of Glucose. 5M b) Write the equations involved in Killiani-Fischer synthesis. 5M **OR**	**CO 3**	**(Level II)**

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6	**Module 3**	a) Explain the synthesis of Furan, Pyrrole and Thiophene from 1,4-dicarbonyl compounds. (CO3) **L2** 5M b) What are pericyclic reactions? Give their classification with an example each. (CO3) 5M	**CO 3**	**(Level II, IV)**
7	**Module 4**	a) What is a dipole moment? Predict the structure of CO_2 and SO_2 based on dipole moment. 5M b) Explain the various molecular vibrations seen in IR spectroscopy. 5M **OR**	**CO 4**	**(Level II, IV)**
8	**Module 4**	a) Describe in detail about the electronic transitions observed in UV-VIS spectroscopy. 5M b) Explain the basic principles of Raman spectroscopy. 5M	**CO 4**	**(Level II)**
SECTION B - ANSWER ANY 4 OUT OF 6				**4 X 5M = 20 M**
9	**Module 2**	Write a note on the biological significance of calcium and chloride ions.	**CO 1**	**(Level I)**
10	**Module 1**	Give two methods of preparation of ferrocene.	**CO 1**	**(Level I)**
11	**Module 2**	Discuss briefly about collision theory.	**CO 2**	**(Level II)**
12	**Module 2**	Explain the factors affecting the rate of a reaction.	**CO 2**	**(Level II)**
13	**Module 3**	Explain mutarotation taking glucose as an example.	**CO 3**	**(Level II)**
14	**Module 4**	Explain the concept of chromophore and auxochrome.	**CO 4**	**(Level II)**

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SEMESTER-1V

ENDOCRINOLOGY & MOLECULAR BIOLOGY

1. Course Description

Programme : B.Sc.
Course Code : U24/BIC/DSC/401
Type of course: DSC
No. of credits : 4

Max. Hours: 60
Hours per week: 4
Max. Marks: 100

2. Course Objectives

- To discuss cellular mechanisms related to the molecular basis of life.
- To infer the molecular, biochemical, and physiological effects of hormone on cells and tissues.

3. Course Outcomes:

After the successful completion of the course, the student will be able to:

CO1: Outline the different classes and chemical structures of hormones, glands, organs, tissues, and cells that synthesize and secrete hormones, precursors and associated compounds, synthesis and regulation. (L1)

CO2: Describe the different steps in the central dogma of molecular biology, gene expression and emphasize the enzymes involved in the process. (L2)

CO3: Apply clear knowledge in techniques of Molecular biology which includes PCR, Hybridization, and blotting & sequencing techniques. (L3)

CO4: Analyze the nature of signals, sorting and applications like Recombinant DNA technology. (L4)

4. Course Content

Module I: ENDOCRINOLOGY **(15hrs)**

Organisation of endocrine system. Definition and Classification of Hormones based on composition & mode of action. Outline of chemistry, physiological role and disorders of hormones of hypothalamus, pituitary, thyroid, adrenal, parathyroid, gonads, pancreas, and placenta. Introduction to gastrointestinal hormones. Mechanism of hormone action – Signal transduction pathways for adrenaline, glucocorticoids, and insulin.

Module II: REPLICATION & TRANSCRIPTION **(15hrs)**

General features of mechanism of DNA replication, models of DNA replication, Experimental evidence of semi conservative model - Meselson Stahl experiment. Replicosome. Mechanism of transcription – RNA synthesis, RNA polymerase of prokaryotes. DNA polymerases I, II and III of E. coli, helicase, topoisomerases, primase, ligase. Bidirectional replication model. Okazaki fragments, leading and lagging strands of DNA synthesis. Inhibitors of DNA replication.

Promoters, Initiation - sigma factors and their recognition sites. Elongation – role of core enzymes. Termination – rho dependent and rho independent. RNA polymerase I, II III of eukaryotes Inhibitors of transcription. Post transcriptional modification – 5'α - amanitin.

Comparison of transcription in prokaryotes & eukaryotes.

Module III: PROTEIN SYNTHESIS & REGULATION OF GENE EXPRESSION (15hrs)

Transcription - RNA synthesis, RNA polymerases of prokaryotes. Promoters, Initiation- sigma factors and their recognition sites. Elongation- role of core enzyme. Termination- rho dependent and rho independent. RNA polymerase I, II and III of eukaryotes. Translation machinery, mechanism of translation, polysomes, inhibitors of protein synthesis.

Post translational modifications and their significance. Basic principles of protein sorting, Signal hypothesis & protein secretion. Regulation of gene expression – promoter, operator, repressor binding in DNA. Lac Operon - Control by negative and positive regulatory proteins.

Module IV: RECOMBINANT DNA TECHNOLOGY **(15hrs)**

Creation of a recombinant molecule – general outline. Restriction endonucleases – types, uses, Ligases, phosphatases, reverse transcriptase, polynucleotide kinases, terminal transferase, nucleases-S1 and RNAase H. Restriction mapping. Salient features of cloning vectors – plasmids, Ti plasmids, cosmids, lambda phage vectors & virus vectors, Insertion vectors, expression vectors, Shuttle vectors. Introduction of Recombinant DNA to host cells by various modes like transformation, transfection, microinjection, liposome, encapsulation etc. selection of

transformed cells. Sequencing of nucleic acids – Sanger's and Maxam – Gilbert methods. Principles & Techniques of hybridization - Colony hybridization, NA Hybridization. Blotting techniques – Southern, Northern and Western blotting techniques. Polymerase chain reaction and its applications.

5. Reference Books

1. Lodish: Molecular Cell Biology, 5th Edition (2003) Freeman, W. H. & Company. ISBN- 13: 2900716743667
2. Devlin : Textbook of Biochemistry with Clinical Correlations (2011), T.M. John Wiley &Sons, Inc. (New York)
3. Campbell, Biochemistry (1995) 3rd Edition, Publisher: John Vondeling. ISBN: 0-03-02-44-269
4. P.K Gupta, Biotechnology and Genomics, Rastogi Publications. (2004) ISBN: 81-7133-67-6-0.

6. Syllabus Focus

a) Relevance to Local, Regional, National and Global Development Needs

Local /Regional/National /Global Development Needs	Relevance
Global	Endocrinology is crucial for hormone balance, cell and organ communication, pivotal in understanding and treating medical conditions.
Global	The knowledge of molecular mechanisms helps in identifying the underlying causes of health and disease.

b) Components on Skill Development/Entrepreneurship, Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD-Module 1	Chemistry of various hormones in the body and their physiological role	Lecture- Identifying, analyzing and troubleshooting the hormonal defects
ED Module 2,3	Molecular biology techniques	Practicals
Entrepreneurship Module 4	Sequencing of nucleic acids Techniques of hybridization Blotting techniques Polymerase chain reaction	Lecture-Equip the students with the knowledge of the most important tools in biochemistry

7. Pedagogy

S. No	Type/Description of Activity	Student Centric Methods Adopted
1.	Seminar	Participative Learning
2.	Model making/Art projects	Experiential Learning
3.	Quiz	Experiential Learning

8. Course Assessment Plan

a) Weightage of Marks in Continuous Internal Assessments and End Semester Examination

COs	Continuous Internal Assessments – CIA (40%)	End Semester Examination (60%)
CO1	CIA-1	End Semester examination
CO2	CIA-1	
C03	CIA-2 -Objective test	
C04	CIA-2 - Assignment/ model making/ PPT	

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b) Model Question Paper

ENDOCRINOLOGY & MOLECULAR BIOLOGY

Code : U24/BIC/DSC/401
Credits: 4

Max Marks : 60
Time : 2hrs

I. Answer the following questions **(4x10=40M)**

1. (a)Outline and discuss the hormones involved in calcium metabolism.
   (OR)
   (b)Explain the mechanism involved in hormone action.

2. (a)Discuss in detail the different enzymes involved in DNA replication.
   (OR)
   (b)Explain the mechanism of transcription in prokaryotes.

3. (a)Explain the initiation process of protein synthesis in prokaryotes.
   (OR)
   (b)Summarise signal peptide hypothesis with diagram.

4. (a)Assess the principle, procedure and applications of southern blotting.
   (OR)
   (b)Examine in detail the sequencing of nucleic acids by Maxum and Gilbert's method.

II. Write Short notes on any 4 questions **(4x5=20M)**

5. Classification of Hormones
6. Gastro intestinal Hormone
7. Post transcriptional modifications
8. Clover leaf model of t-RNA
9. Lac operon
10. Chaperons

GUIDELINES FOR MODEL PAPER SETTING AS PER BLOOMS TAXONOMY LEVEL (BTL)

Semester IV: Molecular Biology & Endocrinology

SECTION A - INTERNAL CHOICE (4 X 10 M = 40 M)				
Question Number	**Question**	**Question**	**CO**	**BTL (Blooms Taxonomy Level)**
1	Module 1	Outline and discuss the hormones involved in calcium metabolism	CO 1	1,2
2	Module 1	Explain the mechanism involved in hormone action.	CO 1	2
3	Module 2	Discuss in detail the different enzymes involved in DNA replication.	CO 2	2
4	Module 2	Explain the mechanism of transcription in prokaryotes.	CO 2	2
5	Module 3	Explain the initiation process of protein synthesis in prokaryotes.	CO 3	2
6	Module 3	Summarise signal peptide hypothesis with diagram.	CO 3	2
7	Module 4	Describe the principle, procedure and applications of southern blotting	CO 4	2
8	Module 4	Explain in detail the sequencing of nucleic acids by Maxum and Gilbert's method.	CO 4	2
SECTION B - ANSWER ANY 4 OUT OF 6 (4Q X 5M = 20M) (To compulsorily have **ONE** question from **each** module)				
9	Module 1	Classification of Hormones	CO 1	1
10	Module 2	Gastro intestinal Hormone	CO 1	1
11	Module 3	Post transcriptional modifications	CO 2	2
12	Module 2	Clover leaf model of t-RNA	CO 3	2
13	Any Module	Lac operon	CO 4	3
14	Any Module	Chaperons	CO3	3

PRACTICAL
ENDOCRINOLOGY & MOLECULAR BIOLOGY

1. Course Description:

Programme: B.Sc.
Course Code: U24/BIC/DSC/401/P
Type of course: DSC 4
No. of credits: 1

Max. Hours: 30
Hours per week: 2
Max.Marks: 50

2. Course objective:

- To demonstrate the knowledge of molecular biology and related techniques in the current research fields.

3. Course Outcome:

This course will help the students to-

CO1: Apply the knowledge of different electrophoresis to separate DNA, RNA and protein molecules. (L3)

CO2: Probe the skills of various molecular biology techniques(L4).

CO3: To assess the importance of various Hormones(L5)

PRACTICAL SESSION

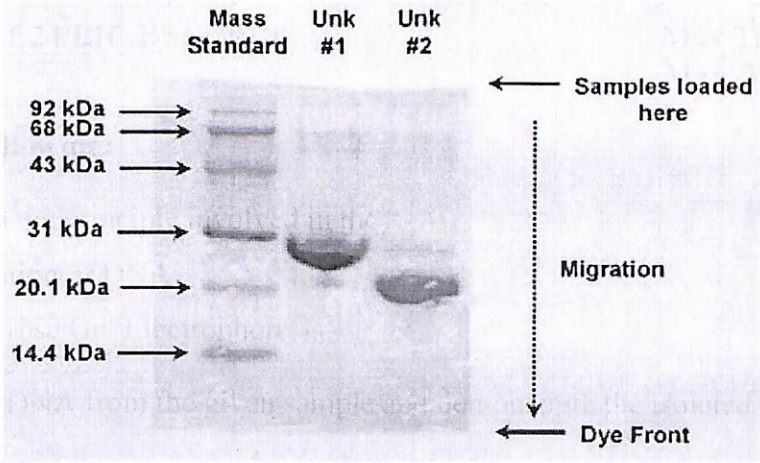
1. Detection of HCG/TSH Hormone.
2. Estimation of DNA by DPA Method
3. Estimation of RNA by Orcinol Method
4. Isolation of DNA from Rice Leaves
5. Determination of Purity of Isolated DNA by UV Spectrophotometer
6. Isolation of DNA from Goat Liver
7. Electrophoresis of Standard DNA.
8. Restriction Digestion of DNA and their Size Determination.
9. Isolation of Plasmid
10. Separation of Proteins by SDS – PAGE
11. PCR (Demo)

MODEL QUESTION PAPER
PRACTICAL

Course Code: U24/BIC/DSC/401/P **Max Time: 2 Hrs**
Credits: 1 **Max. Marks: 50**

Answer the following:

1. Explain the principle involved in the
   a. Isolation of DNA (5 M)
   b. Agarose Gel Electrophoresis (5 M)
2. Isolate DNA from the given sample and demonstrate the isolated DNA on Agarose gel (20 M)
3. Determine the molecular weight of unknown using the SDS-PAGE given below (10 M)



4. Record (5 M)
5. Viva (5 M)

Prepared by Course Teacher [Name & Signature]	Checked &verified by HOD [Name & Signature]	Approved by the Principal
(S. Malathi Varma)	(S. Malathi Varma) HOD Biochemistry St. Francis College for Women Begumpet, Hyderabad-16.	

Professor Karuna Rupula Department of Biochemistry University College of Science Osmania University Hyderabad-500 007 (TS)

SEMESTER - IV
HEMATOLOGY

1. Course Description:

Programme: B.Sc.
Course Code: U24/MIC/SEC/401
Type of course: SEC
No. of credits: 2

Max. Hours:30
Hours per week: 2
Max. Marks: 50

2. Course Objectives:

- To study the concepts in phlebotomy and blood transfusion.
- To create awareness about safe handling of blood and its components.

3. Course Outcomes:

CO1: Understand and remember the technique of Phlebotomy and evaluate the results of blood analysis in hematological disorders.

CO2: Understand the prerequisites for blood transfusion and know its applications.

4. Course Content:

MODULE I - BASIC LABORATORY PRINCIPLES: **(15 Hrs)**

Techniques in hematology: Technique of Phlebotomy and handling of blood, Anticoagulants, Rouleaux formation, Hemolytic diseases of new born. Hb estimation by Sahli's method, Clotting time and bleeding time of blood, Giemsa/Fields Staining for differential count of WBCs, Cholesterol estimation by Wybenga.

MODULE II - BLOOD BANKING AND TRANSFUSION: **(15 Hrs)**

Blood Group system: ABO Subgroups, Rh System, Blood Grouping methods- Slide and tube. Blood Banking and Transfusion: Collection of donor blood, Whole blood, blood components and blood derivatives, Collection of venous blood (technique demonstration) Transfusion of blood to recipient.

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5. **Resources:**
Text books:

1. Essentials of clinical PatologySirish M Kawathalkar, JP Medical Ltd, 2012, ISBN: 9350901846, 9789350901847.
2. Murray et al., (1999), Manual of Clinical Microbiology, 7th edition, American Society for Clinical Microbiology.
3. Sood, R. (2009), MLT Methods and interpretation, 5th edition, JPB Publishers.
4. Talib, V.H (2006), Essential Lab Medicine, 2nd edition, Mehta Publishers.

Reference Books:

1. Pagana, K. and Pagana T.(2013), Mosby's manual of diagnostic and Lab tests, Mosby Publishers.
2. Cella, J.H. (2000). Medical Lab Technology, Jaypee Publishers.
3. Estridge, B.and Reynolds, A. (2011). Basic Clinical Laboratory Techniques, 6th Edition Delmar Cengage Learning.
4. Win, W.C. *et al.,* (2005). Koneman's Color Atlas & Text book of Diagnostic Microbiology, 6th Edition, Wolters Kluwer.

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6. Syllabus Focus:

a) Relevance to Local, Regional, National and Global Development Needs

Local /Regional/National /Global Development Needs	Relevance
Global Development Needs	The increasing incidence of blood disorders, both chronic and acute, has driven the demand to explore the concept of hematological diseases.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Module I	Practical sessions will enable the students to develop the skills necessary to analyze the different disorders of blood and excel in knowledge related to diagnosing the diseases.

7. Course Assessment Plan:

Weightage of Marks in Continuous Internal Assessments and End Semester Examination

Continuous Internal Assessments CIA -20%	End Semester Examination-30%
Written Exam / Case studies	Written Exam

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HEMATOLOGY

MODEL QUESTION PAPER
INTERNAL EXAM

Max. Marks: 20
Time: 1 Hr

1. Assignment/ SBT

MODEL QUESTION PAPER- SEM END EXAM

Course Code: U24/MIC/SEC/401 **Max.Marks: 30**

No. of credits: 2 **Time: 1Hrs**

I. Major **(8 marks)**

You are provided with the blood sample of a patient showing symptoms of Eosinophillia. Confirm the results by performing a suitable differential staining method.

II. Minor **(5 marks)**

Perform ABO blood grouping test of the given blood sample and report the blood type.

III. Comment on given specimens C, D and E **(3x4=12 marks)**

IV. Viva / Record **(5 marks)**

Prepared by Faculty	Checked & Verified by HoD	Approved by the Principal
Dr. Arsheen Tabassum	Dr. P. Roselin	Dr. Uma Joseph

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Osmania University, Hyd-07

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SEMESTER – IV
MEDICAL MICROBIOLOGY

1. Course Description:

Programme: B.Sc.
Course Code: U24/MIC/DSC/401
Course Type: DSC
No. of credits: 4

Max. Hours: 60
Hours per week: 4
Max. Marks: 100

2. Course Objectives:

- Students learn about the origin of medical microbiology, different organisms associated with human body and various aspects of medically important microbes.
- The students also know about various diagnostic procedures, drugs to cure the diseases and prevention.

3. Course Outcomes:

CO1: Understand basic principles of medical microbiology, mechanisms of infectious disease and the role of the human body's normal micro flora. (L II)

CO2: Apply conceptual basis for analyzing pathogenic microorganisms and the mechanisms by which they cause disease in the human body. (L III)

CO3: Apply diagnostic skills gained including the use and interpretation of laboratory tests in the diagnosis of infectious diseases. (L III)

CO4: Understand the methods of control of microorganisms through chemotherapy and vaccines. (LII)

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4. Course Content:

MODULE I - INTRODUCTION TO MEDICAL MICROBIOLOGY : (15 Hrs)

History and Scope of Medical Microbiology.
Normal flora of the human body.
Outlines of host pathogen interactions.
Infection – types, sources and mode of transmission Virulence and Attenuation.

MODULE II - BACTERIAL, VIRAL AND PROTOZOAN INFECTIONS: (18 Hrs)

Mycobacterium tuberculosis.
Salmonella typhi.
Serum hepatitis.
Influenza.
Entamoeba histolytica.
Plasmodium vivax.

MODULE III - FUNGAL INFECTIONS & PRINCIPLES OF DIAGNOSTIC MICROBIOLOGY: (12 Hrs)

Cutaneous mycoses: *Tineapedis* (Athlete's foot).
Opportunistic mycoses: Candidiasis, Aspergillosis.
General principles of diagnostic microbiology - collection transport and processing of clinical samples.
General methods of lab diagnosis.

MODULE IV- PROPHYLAXIS AND ANTIMICROBIAL AGENTS : (15 Hrs)

Preventive control of diseases- vaccines and types.

Major antimicrobial agents and therapeutic drugs- mode of action (penicillin, sulfa drugs) and clinical use.

Various Tests for antimicrobial susceptibility Antiviral agent- Interferons.

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5. Resources :

Text books:

1. Willey JM, Sherwood LM, and Woolverton CJ, Prescott, Harley and Klein, (2011) Microbiology. 8th edition. McGraw Hill Higher Education.
2. Ananthanarayan R. and Paniker C.K.J. (2013) Textbook of Microbiology. 9th edition, University Press Publication.
3. Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. (2007) Jawetz, Melnick and Adelberg's Medical Microbiology. 24th edition. McGraw Hill Publication.
4. Jawetz, Melnick & Adelberg (2007) Medical Microbiology, 24th Edition. Mac Graw Hill companies.
5. Kindt, Goldsby, Osborne.(2007) Kuby Immunology. 6th Edition. W.H. Freeman company.
6. Powar and Daginawala Volume II (1997) General Microbiology. Himalaya Publishing House.

Reference Books:

1. Goering R., Dockrell H., Zuckerman M. and Wakelin D. (2007) Mims' Medical Microbiology. 4th edition.Elsevier.
2. Madigan MT, Martinko JM, Dunlap PV and Clark DP. (2014). Brock Biology of Microorganisms.14th edition.Pearson International Edition.
3. Warren Levinson. (2010). Review of medical microbiology and immunology, 11th edition. McGraw Hill.
4. Cappucino J and Sherman N. (2010). Microbiology: A Laboratory Manual. 9th edition. Pearson Education Limited.
5. Gopal Reddy et al. (2008). Laboratory experiments in Microbiology,3rdedition,Himalaya publishers.
6. Prescott, Harley and Klein Wim. (2002), Laboratory exercise in Microbiology, McGraw Hill Publishers.
7. R.C Dubey, D.K Maheshwari, Practical Microbiology,(2012),S Chand and Company, New Delhi.
8. Medical lab technology. Vol I, II, III (2003). Mukherjee Kanai L. Tata McGraw Hill.

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6. Syllabus Focus:

a) Relevance to Local, Regional, National, and Global Development Needs

Local /Regional/National /Global Development Needs	Relevance
Local	Gives awareness about the Endemic, diagnosis, prophylaxis, and treatment.
Regional	Gives awareness about the Epidemic, diagnosis, prophylaxis, and treatment.
National	Gives awareness about the Pandemic, diagnosis, prophylaxis, and treatment .

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
ED	Module I & II	To set up a diagnostic laboratory
EMP	Module III	Awareness regarding the collection, transport, and diagnosis of different samples collected from patients

7. Pedagogy:

S. No	Student Centric Methods Adopted	Type/Description of Activity
1	Video Presentations	Participative Learning
2	Science Experiments	Experimental Learning
3	Group Discussion	Participative Learning

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8. Course Assessment Plan:

a) Weightage of Marks in Continuous Internal Assessments and End Semester Examination

COs	Continuous Internal Assessments - CIA (40%)	End Semester Examination - (60%)
CO1	CIA-1	End Semester examination
CO2	CIA-1	
CO3	CIA-2 Model / Objective questions	
CO4	CIA-2 Assignment	

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b) Question Paper Pattern:

MEDICAL MICROBIOLOGY
MODEL QUESTION PAPER – THEORY

Course Code: U24/MIC/DSC/401 **Max Marks: 60**
Credits: 4 **Time: 2 Hrs**

SECTION – A

Answer the following **4 x 10 = 40 M**

1. Explain in detail about Human Normal Flora.

OR

2. Explain the outlines of host pathogen interactions.

3. Describe the diagnosis often involving imaging studies (such as chest X-rays), microbiological tests (like sputum culture or nucleic acid amplification), and tuberculin skin infection caused by *Mycobacterium spp* you have studied.

OR

4. Demonstrate in detail structure, infection and diagnosis involved with Influenza disease.

5. Interpret cutaneous mycoses with the knowledge you gained.

OR

6. What are the methods implemented in laboratory diagnosis of different samples?

7. Explain the various tests for antimicrobial susceptibility.

OR

8. What are vaccines? Discuss the various types of vaccines used for the prevention of common diseases.

SECTION – B

Answer any Four **4 x 5 = 20 M**

9. How would you describe the History of medical microbiology?

10. How would you classify the types of Infection?

11. How can you explain what is meant by WIDAL test?

12. How would you explain the disease caused by *Plasmodium vivax*?

13. What is Candidiasis?

14. Explain the details about the antibiotic Penicillin.

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SECTION A - INTERNAL CHOICE 4Q X 10 M = 40 M				
Question Number	**Module**	**Question**	**CO**	**BTL(Blooms Taxonomy Level)**
1	**Module 1**	Explain in detail about Human Normal Flora	**CO 1**	**Level II**
2	**Module 1**	Explain the outlines of host pathogen interactions	**CO 1**	**Level II**
3	**Module 2**	Describe the diagnosis often involving imaging studies (such as chest X-rays), microbiological tests (like sputum culture or nucleic acid amplification), and tuberculin skin infection caused by *Mycobacterium spp* you have studied	**CO 2**	**Level I**
4	**Module 2**	Demonstrate in detail structure, infection and diagnosis involved with Influenza disease.	**CO 2**	**Level II**
5	**Module 3**	Interpret cutaneous mycoses with the knowledge you gained	**CO 3**	**Level II**
6	**Module 3**	What are the methods implemented in laboratory diagnosis of different samples	**CO 3**	**Level I**
7	**Module 4**	Explain the various tests for antimicrobial susceptibility	**CO 4**	**Level II**
8	**Module 4**	What are vaccines? Discuss about the various types of vaccines used for the prevention of common diseases	**CO 4**	**Level I**
SECTION B - ANSWER ANY 4 OUT OF 6 **4Q X 5 M = 20 M** (To compulsorily have **ONE** question from **each** module)				
9	**Module 1**	How would you describe the History of medical microbiology	**CO 1**	**Level II**
10	**Module 2**	How can you explain what is meant by WIDAL test	**CO 2**	**Level II**
11	**Module 3**	What is Candidiasis	**CO 3**	**Level I**
12	**Module 4**	Explain the details about the antibiotic Penicillin	**CO 4**	**Level II**
13	**Module 1**	How would you classify the types of Infection	**CO 1**	**Level II**
14	**Module 2**	How would you explain the disease caused by Plasmodium vivax	**CO 2**	**Level II**

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SEMESTER – IV

MEDICAL MICROBIOLOGY - PRACTICAL

1. Course Description:

Course Code: U24/MIC/DSC/401/P

Course Type: DSC

No. of credits: 1

Max. Hours: 30

Hours per week: 2

Max. Marks: 50

2. Course Objectives:

- Students will learn serological tests like VDRL and WIDAL.
- They perform complete identification of bacteria using cultural, morphological and biochemical characteristics, learn preparation of important differential media, isolate bacterial flora and perform Minimal Inhibitory concentration of an antibiotic.

3. Course Outcomes:

CO1: Perform basic qualitative and quantitative serological tests.

CO2: Develop diagnostic skills, including the use and interpretation of laboratory tests in the diagnosis of infectious diseases.

CO3: Demonstrate practical skills in Medical microbiological techniques like differential media preparation, Anti microbial susceptibility, MIC and study of normal flora.

CO4: Understand morphology and characteristics of various infectious agents.

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List of Practicals

1. VDRL Slide Test for identification of Syphilis.
2. WIDAL Test: Qualitative test for identification of *Salmonella sps.*
3. Identification of *Mycobacteria* by Acid fast staining.
4. Identify bacteria (any three of *E.coli, Klebsiella, Pseudomonas, Staphylococcus, Bacillus*) using laboratory strains on the basis of :

a) Cultural characteristics

b) Morphological characteristics

c) Biochemical characteristics: IMViC, urease production and catalase, oxidase.

d) Antibiotic sensitivity test by Kirby-Bauer method

5. Study of composition and use of important differential media for identification of bacteria: EMB Agar, McConkey agar, Mannitol salt agar, Deoxycholate citrate agar, TCBS.
6. Study of bacterial flora of skin by swab method
7. Study symptoms of the diseases with the help of photographs:

a) Bacteria: *Corynebacterium diphtheriae, Nesseria gonorrhea, Clostridium tetani, Vibrio cholerae, Pneumococcus.*

b) Fungi: Candidiasis,dermatomycoses (ring worms), Aspergillosis.

c) Viruses: Polio, herpes, chicken pox..

8. Study of malaria parasite and *Entamoeba* using permanent mounts.

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MODEL QUESTION PAPER – PRACTICAL

Course Code: U24/MIC/DSC/401/P **Max.Marks:50**
Credits: 1 **Time: 2Hrs**

I. MAJOR **20M**

A bacteria has been isolated from a patient and the culture has been provided to you.

Identify the bacteria based on the following characteristics:

a) Culturing characteristics

b) Staining characteristics

c) Biochemical characteristics

d) Antibiotic sensitivity test

II. MINOR **10 M**

1. Perform VDRL test on the given patient's serum sample and report the results.

OR

2. WIDAL quantitative test has been performed on a patient's serum sample. Observe the tubes and report the results.

III. Identify the given spots (A-E) and write few significant points **5x2=10 M**

IV. Record **5M**

V. Viva **5M**

Prepared by Faculty	Checked &Verified by HoD	Approved by the Principal
K.Suman	Dr. P. Roselin	Dr.Uma Joseph

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St. FRANCIS COLLEGE FOR WOMEN, BEGUMPET, HYDERABAD-500016
(An Autonomous College Affiliated To Osmania University)
FACULTY OF SCIENCE- DEPARTMENT OF CHEMISTRY
PRACTICAL SYLLABUS CBCS-2024
SEMESTER -IV
SYNTHESIS OF ORGANIC COMPOUNDS AND FUNCTIONAL GROUP ANALYSIS

Program: B.Sc.
Course Code: U24/CHE/DSC/401/P
Course: DSC-4
No. of Credits: 1

Max. Hours: 20 Hrs
Max. Marks: 50
Hours per week: 2

Course Objective

- To prepare simple organic compounds and systematically analyse functional groups based on their nature and chemical reactivity.

Course Outcomes

CO1: Utilise the knowledge of organic reaction mechanisms in their preparations.
CO2: Categorise functional groups present in organic compounds using systematic quantitative analysis.

Systematic Qualitative Organic Analysis of Organic Compounds possessing mono functional groups (-COOH, phenolic, aldehydic, ketonic, carbohydrate, amide, nitro, amines) and preparation of one derivative.

Synthesis of organic compounds:

a. Acetylation – Preparation of Acetanilide.
b. Halogenation – Preparation of p-Bromo acetanilide.
c. Oxidation – Preparation of Benzoic acid.
d. Esterification - Preparation of n-butyl acetate.
e. Methylation – Preparation β-Naphthyl methyl ether.
f. Nitration – Preparation of Nitrobenzene
g. Reduction – Preparation of m-Nitroaniline

Reference Books:

- Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G., *Textbook of Practical Organic Chemistry*, Prentice-Hall, 5th edition, 1996.
- Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry* Orient-Longman, 1960.
- Ahluwalia, V.K. & Aggarwal, R. *Comprehensive Practical Organic Chemistry,* Universities Press.

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6. Syllabus Focus

a. Relevance to Local, Regional, National and Global Development Needs

Local /Regional/ National /Global Development Needs	Relevance
Local	Knowledge of the basic principles of Chemistry to help in day-to-day life.
Regional	Learn about the concepts and significance of carbohydrates and bioinorganic chemistry.
National	Understand the basics of organometallic compounds, non-aqueous solvents and dipole moments.
Global	Application of basic principles of rotational, IR, UV-Vis Spectroscopy techniques, concepts of chemical kinetics, heterocyclic compounds and pericyclic reactions.

b. Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Practical syllabus which includes Organic preparations and Qualitative analysis in Organic Chemistry Problem solving in Physical Chemistry	Students perform the experiments based on the procedure and also analyse the unknown compounds. Students solve the problems
ED	Organic preparations and analysis. Structural investigation of organic compounds based on spectroscopy	Students prepare organic compounds, analyse the functional groups and carry out the structural analysis based on spectral data
EMP	Inorganic, Organic, Physical Chemistry and Spectroscopy	Tutorials and assignments

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7. Pedagogy

S. No.	Student Centric Methods Adopted	Type / Description of Activity
1	Experiential	Experiments, attending seminars/workshops and field visits
2	Participative	Group discussion, quiz, presentations etc.
3	Problem solving	Solving problems in Physical Chemistry and structural elucidation based on spectral data.

8. Course Assessment Plan

a. Weightage of Marks in Continuous Internal Assessments & End Semester Examination

CO	Continuous Internal Assessments CIA - 40%	End Semester Examination-60%
CO1	CIA1-Written Exam	Written Exam
CO2	CIA 2- Skill based test like poster/powerpoint presentation, collage, 3D model making, problem solving and quiz.	
CO3	CIA1-Written Exam	
CO4	CIA 2- Skill based test like poster/powerpoint presentation, collage, 3D model making, problem solving and quiz.	

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b. Model Question Paper - End Semester Exam

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(An Autonomous College Affiliated to Osmania University)

Faculty of Science – Department of Chemistry

MODEL PAPER

B.Sc. II YEAR SEMESTER -IV

CHEMISTRY - PAPER IV

TIME: 2 hrs **Course Code: U24/CHE/DSC/401**

Max. Marks: 60

SECTION –A (Essay Questions)

.Answer the following

4X10=40 Marks

1. a) Explain the classification of organometallic compounds based on metal-carbon bonds. (CO1) **L1** 5M
   b) Discuss the reactions in liquid ammonia with suitable examples. (CO1) **L2** 5M

OR

2. a) Describe the preparation, properties and applications of Grignard reagent. (CO1) **L3** 6M
   b) How does fixation of carbon dioxide occur in photosynthesis? (CO1) **L2** 4M
3. a) Derive an expression for the rate constant of first order reaction. (CO2) **L3** 5M
   b) A first order reaction is 50% complete in 100 minutes. How long will it take for 90% completion? (CO2) **L5** 5M

OR

4. Explain different methods of experimental determination of order oa a reaction. (CO2) **L2** 10M
5. a) Discuss the open chain structure of Glucose. (CO3) **L2** 5M
   b) Write the equations involved in Killiani-Fischer synthesis. (CO3) **L2** 5M

OR

6. a) Explain the synthesis of Furan, Pyrrole and Thiophene from 1,4-dicarbonyl compounds. (CO3) **L2** 5M
   b) What are pericyclic reactions? Give their classification with an example each. (CO3) **L4** 5M
7. a) What is a dipole moment? Predict the structure of CO_2 and SO_2 based on dipole moment. (CO4) **L4** 5M
   b) Explain the various molecular vibrations seen in IR spectroscopy. (CO4) **L2** 5M

OR

8. a) Describe in detail about the electronic transitions observed in UV-VIS spectroscopy. (CO4) **L2** 5M
   b) Explain the basic principles of Raman spectroscopy. (CO4) **L2** 5M

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SECTION –B

II. Answer any four. **4x5=20 Marks**

9. Write a note on the biological significance of calcium and chloride ions. (CO1) **L1**
10. Give two methods of preparation of ferrocene. (CO1) **L1**
11. Discuss briefly about collision theory. (CO2) **L2**
12. Explain the factors affecting the rate of a reaction. (CO2) **L2**
13. Explain mutarotation taking glucose as an example. (CO3) **L2**
14. Explain the concept of chromophore and auxochrome. (CO4) **L2**

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