SEC-3 BIOANALYTICAL TECHNIQUES

1. Course Description

Programme: B.Sc. **Max. Hours: 30**
Course Code: U24/BIC/SEC/501 **Hours per week: 2**
Type of course: SEC **Max. Marks: 50**
No. of credits: 2

2. Course Objectives

a. To gain understanding of the various instruments in Life Sciences

b. To learn step wise approach to Biochemical investigation.

3. Course Outcome:

This SEC paper will help students to enhance their overall skills and to

CO1: Infer the basics of Scientific calculations and use the concepts of GLP(L3,4)

CO 2: Assess the principles of separation techniques(L5)

4. Course content-

Module I : BASIC LABORATORY CALCUATIONS AND GLP **(15 hrs)**

Safety practices in the laboratory (GLP). Preparation of buffers for a given pH (Acetate, Phosphate), Calculation of Molarity, Normality, Percent solution (W/V,V/V,W/W). Preparation of stock standard, working standard and storage of solutions. Concepts of solution concentration. Introduction to IPR.

Module II : CHROMATOGRAPHIC AND ELECTROPHORETIC TECHNIQUES (15 hrs)

General principles of chromatography. Principles, operational procedure and applications of paper chromatography (ascending & descending) of sugars and amino acids, thin layer chromatography of Lipids, Gel filtration chromatography, High performance liquid chromatography (Demo).

Electrophoretic techniques: General principles, factors affecting migration rate. Electrophoresis with paper, cellulose agarose, SDS-PAGE, Immuno electrophoresis.

5. Reference Books:

1. Keith Wilson and John Walker, Principles & Techniques of Practical Biochemistry, (1999) Cambridge Press.
2. RS Khandpur Handbook of Biomedical Instrumentation, (2004). Tata McGraw-Hill Publishing Company Ltd, New Delhi
3. Shawney, Randhir Singh Introduction to Practical Biochemistry (2001) , Narasa Pub, N.Delhi.

6. Syllabus Focus

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

Local /Regional/National /Global Development Needs	Relevance
Global	Bioanalytical techniques play crucial roles in various scientific processes in biochemistry, pharmaceuticals, and environmental monitoring.

7. Components on Skill Development/Entrepreneurship Development/Employability

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

8. Course Assessment Plan

a) **Weightage of Marks in Formative and Summative Assessments**

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

E XTERNAL- MODEL QUESTION PAPER PRACTICAL

Course Code: U24/BIC/SEC/501 **Max Time: 1 Hr**
Credits: 2 **Max. Marks: 30**

Answer the following.

1. Demonstrate the separation technique
   (Paper chromatography/ Electrophoresis) (10M)
2. Problems on calculation of Molarity/Normality (15M)
3. Record (5M)

Prepared by Course Teacher [Name & Signature]	Checked & Verified by HOD [Name & Signature]	Approval by the Principal
(S. Malathi Varma)	21/12/24 (S. Malathi Varma)	

HOD Biochemistry
St. Francis College for Women
Begumpet, Hyderabad-16.

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

SEMESTER-V

BIOCHEMISTRY OF DISEASES

1. Course Description:

Programme: B.Sc.
Course Code: U24/BIC/DSE/502
Type of course: DSE 15
No. of credits: 4

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

2. Course Objective:

- Students will be able to analyze the various types of lifestyle & metabolic disorders.
- Assess the principles underlying the application of clinical biochemistry investigations in human diseases.

3.Course Outcome: This course will help students in the –

CO 1: Interpret and apply biochemical concepts of various metabolic diseases and disorder. (L3)

CO 2: Use disease indications for diagnostic relevance. (L3)

CO 3: Examine disease occurrence with the understanding of biochemistry. (L4)

CO 4: Categorize various techniques used in diagnosis of clinical evaluation. (L4)

4.Course Content

Module I: METABOLIC AND LIFESTYLE DISORDERS **(15 hrs)**

Obesity and eating disorders – Anorexia &Bulimia, Diabetes mellitus – a metabolic disorder and relationship with hypertension, obesity, hypothyroidism, and stress. Inflammatory Bowel Disease (IBD)-biochemistry behind the disease and the influence of diet, stress, and environment to the condition. Fatty Liver, Cardiovascular diseases, and atherosclerosis – understanding the factors contributing the disorder, biochemical aspect and management of the condition. Inborn errors of Metabolism. Cancer- Etiology and stages of cancer, biochemistry of cancer, proto-oncogenes, tumor suppressor genes, mutations and tumor viruses, Biochemical analysis of cancer and Biomarkers.

MODULE II: CLINICAL BIOCHEMISTRY **(15 hrs)**

Plasma proteins in health and disease. Disorders of blood coagulation(hemophilia). Types of anemias, haemoglobinopathies – sickle cell anemia and thalassemia.Structure and functions of the liver. Liver diseases – jaundice, hepatitis, cirrhosis. Liver function tests – conjugated and total bilirubin in serum, albumin globulin ratio, hippuric acid and bromosulphthalein test, serum enzymes in liver diseases - SGPT, SGOT and alkaline phosphatase.Kidneys-structure of nephron, urine formation, normal and abnormal constituents of urine. Biological buffers. Role of kidneys in maintaining acid base and electrolyte balance in the body. Renal function tests– creatinine and urea clearance tests, phenol red test.

Biochemical tests for the diagnosis of heart disease – HDL/ LDL, cholesterol, SGOT, LDH, CK, C-reactive protein, cardiac troponins.

MODULE III: DISORDERS DUE TO PROTEIN MISFOLDING AND GENETIC ANOMALIES

(15 hrs)

Overview of protein misfolding and genetic anomalies. Prions and prion diseases. Alzheimer, kuru, creutzfelt-Jakob disease, Huntington's Syndrome.Down's Syndrome, , Edward's Syndrome, Klinefelter Syndrome, Turner Syndrome and XXX, Sickle cell anemia, Thalassemia

MODULE IV: MOLECULAR & IMMUNODIAGNOSTICS **(15 hrs)**

Basics of Immunology. Antigen – antibody reactions-immunoprecipitation, agglutination, immunodiffusion. Immunodiagnostics - RIA & ELISA, direct & indirect immunofluorescence, flow cytometry, biosensor assay & Immuno blotting techniques. PCR.Monoclonal antibodies. Vaccines and their classification – Traditional vaccines- Live and attenuated vaccines, toxoids. Modern vaccines – recombinant, peptide vaccines and DNA vaccines.

5. Reference Books

1. Devlin, Text book of Biochemistry with Clinical Correlations (2011) T.M. John Wiley & Sons, Inc. (New York),
2. Coico, R and Sunshine, Immunology: A Short Course (2009) 6thed. G. John Wiley & sons, Inc (New Jersey)
3. Berg, J.M., Tymoczko, J.L. and Stryer, L. Biochemistry (2012) 7thed, W.H Freeman and Company.
4. Snustad, D.P. and Simmons, Genetics (2012) 6th ed., M.J., John Wiley & Sons. (Singapore)

6. Syllabus Focus

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

Local /Regional/National /Global Development Needs	Relevance
Global	Understanding immune responses is essential to addressing global health issues and promoting general wellbeing.
Global and National	The field of clinical biochemistry is fundamental to public health initiatives, illness management, and healthcare delivery.

b) Components on Skill Development/Entrepreneurship development/Employability

SD	Unit 4	Practicals
EMP	Unit 2	Theoretical as well as practical knowledge on clinical biochemistry concepts helps students to work in diagnostic labs

7. Pedagogy

S.No	Student Centric Methods Adopted	Type/Description of activity
1.	Quiz	Experiential Learning
2.	Poster presentation	Participative Learning
3.	Case studies	Problem solving

8. Course Assessment Plan

a) Weightage of Marks in Formative and Summative Assessments

CO	Formative Assessment – FA (40%)	Summative Assessment - SA (60%)
CO1	CIA-1	End Semester exam
CO2	CIA-1	
CO3	CIA-2 Presentation	
CO4	CIA-2 Quiz	

b) Model Question Paper

BIOCHEMISTRY OF DISEASES

Course Code: U24/BIC/DSE/502
Credits: 4

Max Marks: 60
Time: 2 Hrs

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

1. (a)Illustrate Diabetes Mellitus as a metabolic disorder.
   (OR)
   (b)Demonstrate inborn errors of metabolism? Discuss with examples.

2. (a)Analyse the different types of plasma proteins and elaborate on it functions
   (OR)
   (b)Infer KFT and its reference to the kidney diseases explaining the structure of kidney.

3. (a)Explain sickle cell anemia and its biochemical Considerations.
   (OR)
   (b)Discuss prion diseases? Explain giving examples.

4. (a)Classify the Antigen -antibody reactions. Add a note on its applications
   (OR)
   (b)Categorise vaccines and their classification with examples.

II. Write short notes on any 4 questions **(4 X 5=20M)**

5. Obestiy
6. Jaundice
7. RIA
8. Schizophrenia
9. Turner's syndrome
10. ELISA

CBCS-2024

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

DSE 1 B: Biochemistry of Diseases

SECTION A - INTERNAL CHOICE (4 X 10 M = 40 M)				
Question Number	**Question**	**Question**	**CO**	**BTL (Blooms Taxonomy Level)**
1	Module 1	Illustrate Diabetes Mellitus as a metabolic disorder.	CO 1	3
2	Module 1	Demonstrate inborn errors of metabolism? Discuss with examples.	CO 1	3
3	Module 2	Analyse the different types of plasma proteins and elaborate on its functions.	CO 2	4
4	Module 2	Infer KFT and its reference to the kidney diseases explaining the structure of kidney.	CO 2	4
5	Module 3	Explain sickle cell anaemia and its biochemical Considerations	CO 3	2
6	Module 3	Discuss prion diseases? Explain giving examples.	CO 3	2
7	Module 4	Classify the antigen -antibody reactions. Add a note on its applications.	CO 4	4
8	Module 4	Categorise Vaccines and their classification with examples.	CO 4	4
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	Obesity	CO 1	4
10	Module 2	Jaundice	CO 2	4
11	Module 4	RIA	CO 4	5
12	Module 3	Schizophrenia	CO 3	4
13	Any Module	Turner syndrome	CO 3	4
14	Any Module	ELISA	CO4	5

BIOCHEMISTRY OF DISEASES

PRACTICAL

Programme : B.Sc. **Max. Hours: 30**
Course Code : U24/BIC/DSE/502/P **Hours per week: 2**
Type of course: DSE **Max. Marks: 50**
No. of credits : 1

Course objective:

- Introduce the students to biochemical aspects of diseases and prepare them for specialization in clinical aspects of biochemistry.

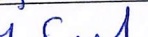
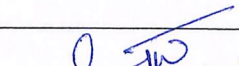
Course Outcome: This course will help the students to-

CO1: Analyze their skills in testing various clinical parameters in relation to human health. (L4)

CO2: Illustrate the abnormal concentrations of various components in body and how they can be used to identify various clinical aspects of the human body. (L3)

PRACTICAL SESSION

1. Determination of Rh and Blood Group Typing
2. Blood Pressure Measurement by Sphygmomanometer.
3. Estimation of Hemoglobin by Sahli's and Drabkin's Method
4. Estimation of Creatinine in urine
5. Estimation of Creatine in urine
6. Estimation of Serum Iron
7. Estimation of Serum Phosphorus
8. Estimation of Serum Urea
9. Estimation of Serum Cholesterol
10. Qualitative Analysis of Urine
11. Ouchterlony Immunodiffusion Technique
12. Immuno Electrophoresis
13. Dot ELISA, WIDAL, VDRL Test

Prepared by Course Teacher [Name & Signature]	Checked & Verified by HOD [Name & Signature]	Approval by the Principal
		

SEMESTER – V

SKILL ENHANCEMENT COURSE - III

CHEMINFORMATICS

1. Course Description

Programme: B.Sc.
Course Code: U24/CHE/SEC/301
Type of course: SEC
No. of credits: 2

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

2. Course Objectives

- To provide a basic learning in the emerging area of chemical sciences and usage of cheminformatics in the industry.

3. Course Outcome

This SEC paper will help students to enhance their overall skills

CO 1: Introduce students to different methods of cheminformatics, provide examples on the use of cheminformatics in modern drug research.

CO 2: Gain practical experience through exercises with representative methods used in cheminformatics.

4. **Course Content**

MODULE I: COMPUTER AIDED DRUG DESIGN **10 Hrs**

Introduction to CADD, Drug design and discovery, Lead Compounds, Lead optimization, Pharmacophore, Pharmacokinetics, ADME property, Toxicity. Prodrugs and Soft drugs, Introduction to Ligand-Based and Structure Based Drug design.

MODULE II: PRACTICE OF CHEMISTRY SOFTWARE **20 Hrs**

1. Construction of small molecules.
2. Energy minimization and generation of SMILES Notation.
3. Property calculation.
4. Searching RCSB for protein information, download protein and Literature search.
5. Protein preparation.
6. Active site identification and grid Generation.
7. Docking of ligands.
8. Protein ligand interaction studies.

5. References

1. Leach A.R., Gillet V.J., (2007): *An introduction to Chemoinformatics*. Springer: The Netherlands.
2. Gasteiger, J. & Engel, T. (2003) *Chemoinformatics: A text-book*. Wiley-VCH.
3. Gupta, S. P. (2011) *QSAR & Molecular Modelling*. Anamaya Pub.: New Delhi.

6. Syllabus Focus

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

Local /Regional/National /Global Development Needs	Relevance
Local	Optimizing and Energy minimization of existing drugs, development of new materials with enhanced properties
Regional	Designing new drugs from SAR drive innovation in computational and medicinal chemistry
National	Formulating symbiosis, understanding drug activities in the regulation of pharmacodynamic and pharmacokinetic properties, innovation in healthcare
Global	Improved energy efficiency and sustainability, development of new synthetic strategies, broad implications for industries and technologies

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b. Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Module 1	Medicinal chemists play a crucial role in the drug discovery process through the selection and synthesis of compounds that establish structure–activity relationships by using softwares.
EMP	Module 2	Involves the study of the effects of drug interactions on the target systems.

7. Pedagogy

S. No.	Student Centric Methods Adopted	Type / Description of Activity
1	Participative Learning	Online search engines for ADMET properties.
2	Experiential Learning	Practice of Chemistry software.

8. Course Assessment Plan

a. 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-30 Marks

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b. Question Paper Pattern

EXTERNAL- MODEL QUESTION PAPER

PRACTICAL

Course Code: U24/CHE/SEC/301
Credits: 2

Max Time: 1 Hr
Max. Marks: 25

Answer the following.

1. Write about Molecular docking by iGEM Docking software and interpret the results. (CO 2) **L2** — 10M
2. Write a short note on generation of SMILES Notation. **(CO1) L1** — 5M
3. Viva — 5M
4. Record

Prepared by	Checked & verified by	Approved by
Name and Signature of the teaching faculty	Name and Signature of the HoD	Name and Signature of Principal
Dr. K. Susmitha Dr. M. Bhargavi M.Bhargavi	Dr. D. Sumalatha D. Sumalatha	Dr. Uma Joseph

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SEMESTER V

GENERIC ELECTIVE

CHEMISTRY OF COSMETICS AND FOOD TECHNOLOGY

1. Course Description

Programme: B.Sc
Course Code: U24/CHE/GE/501
Course Type: GE
No. of credits: 4

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

2. Course Objectives

- To learn the history of cosmetics and the importance of self grooming
- To learn the chemistry involved in cosmetics,chemicals/ natural products present in them. their usage in personal care.
- To understand the significance of various technological methods of food for better health.

3. Course Outcomes

On completion of the course the student will be able to:

CO1: Identify the types of cosmetics and learn about their chemistry.
CO2: Articulate the ingredients present in personal care products and apply it in their preparation.
CO3: Understand water purification process, and role of additives in food
CO4: Analyze the adulterants in food samples; learn steps involved in food processing and preservation

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4. Course Content

MODULE I: CHEMISTRY OF COSMETICS **15 hrs**

History of cosmetics, classification of cosmetics, professional image of self grooming, beauty and wellness.

Cosmetics emulsions: cream, cleansers, powders, moisturisers, sun screen, acne and anti aging creams.

Chemical peels and peeling agents, lasers and light devices, Electro Chemistry, bath salts, gels, soaps, bubble baths and scrubs.

MODULE II: PERSONAL CARE **15 hrs**

Skin Care

General Anatomy and Physiology of skin, Structure of skin, Growth and nutrition, dermal fillers

Hair Care

Structure of hair, growth of hair, Cosmetics used for hair – Shampoos, conditioners, Bleaches, hair dyes, hair gels, hair perms and hair relaxers/straighteners.

Nail Care

Structure of nail, cosmetics used for nail – Nail lacquer, nail polish remover, Manicure and Pedicure, nail care techniques.

Eye Care

Cosmetics used for the eye – eyebrow pencil, eye liner, eye shadows, mascaras. Eye concealer and eye creams.

Practical – Cosmetics Preparations

1. Preparation of Cold cream
2. Preparation of Talcum Powder.
3. Preparation of Bath salt.
4. Preparation of Lip Balm
5. Preparation of Nail Polish Remover
6. Preparation of Hand Wash.

MODULE III: INTRODUCTION TO FOOD, FOOD ADDITIVES & WATER PURIFICATION **15 Hrs**

Introduction - Food: source, functions of food- food groups- food guide- basic five food groups, usage of the food guide- food in relation to health- objectives of cooking.

Food Additives: Food additives: artificial sweeteners- saccharin, cyclomate, aspartame- food flavours- esters, aldehydes and heterocyclic compounds. Antioxidants. Food colours- changes in cooking, Restricted use. Spurious colours.Emulsifying agents, preservatives- leavening agents.Baking powder- Yeast. Taste Enhancers- MSG- vinegar.

Water: Purification processes- Ion exchangers , reverse osmosis, activated charcoal treatment. Use of chlorination, ozone and UV light disinfection. Specification of drinking water.

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Head
Department of Chemistry
UCS, Osmania University
Hyderabad-500 007.

MODULE IV: FOOD ADULTERATION, PROCESSING & PRESERVATION 15 hrs

Adulterants: Common adulterants in different foods- milk and milk products, vegetable oils, and fats, spices and condiments, cereals, pulses, sweetening agents and beverages.

Contamination with toxic chemicals- pesticides and insecticides. Methods involved in the analysis of detection and prevention of food adulteration.

Food deterioration, chemical methods of preservation and processing, and by freezing.

Heat processing of milk – pasteurization.Preservation of milk.Deep freeze preservation. Spray drying technique- milk powder, infant food preparation.

Practicals:

1. Estimation of total hardness of water.

2. Testing for the presence of adulterants in food samples.

5. References

1. Perry Romanowski, *Beginning Cosmetic Chemistry*, Allured Pub Corp.2009.
2. Dr. Ramesh Kumari, *Chemistry of Cosmetics*, Prestige Publishers.
3. Srilakshmi B., *Food Science*, New age International Pvt. Ltd. Publishers, III ed. 2003.
4. Shakuntala Manay N. and Shadaksharaswamy M. *FOODS: Facts and Principles*. New Age. International Pvt. Ltd. Publishers, II ed. 2002.
5. Norman N. Potter, *Food Science*, CBS publishers and distributors, New Delhi. 1994.
6. Swaminathan M. *Text Book on Food Chemistry*, Printing and Publishing CO., Ltd., Bangalore. 1993.
7. Swaminathan M. *Advanced Text Book on Food and Nutrition*, volume I and II Printing and Publishing CO., Ltd., Bangalore. 1993.

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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 cosmetic and food chemistry helps to have a well groomed healthy life
Regional	Learning the concepts of cosmetology and processing involved in the food industry, helps to choose the best products.
National	Acquire knowledge to identify and choose better health products.
Global	The widespread increase in the adoption of skin care and personal care products rise along with the global ageing population.

b. Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Module 1 & 2	Students are taught to prepare various cosmetics using natural products and non toxic chemicals
EMP		
SD	Module 3 & 4	Students are trained to check the quality parameters of food and water samples.
EMP		

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7. Pedagogy

S. No.	Student Centric Methods Adopted	Type / Description of Activity
1.	Experiments	Students are taught to prepare cosmetics
2.	Presentations	Students present the toxic chemicals involved in various cosmetics products, and their alternatives
3.	Case studies	Students are made to evaluate various market samples of the same product.

8. Course Assessment Plan

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

CO	Continuous Internal Assessments CIA - 40%	End Semester Examination- 60%
CO1	CIA 1 Written exam 10 M	Written Exam
CO2	Practical Skill test 10 M	
CO3	CIA 1 Written exam 10 M	
CO4	Practical Skill test 10 M	

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b. Model Question Paper- End Semester Exam

CHEMISTRY OF COSMETICS AND FOOD TECHNOLOGY
B.SC. III YEAR SEMESTER -V

TIME: 2hrs **Course Code: U24/CHE/GE/501**
Max. Marks: 60

SECTION –A (Essay Questions)

I.Answer the following **4X10 =40 Marks**

1. Classify cosmetics on the basis of their raw materials. (**L2**) 10M

OR

2. a) Outline the history of cosmetics. (**L2**) 5 M
b) Discuss the importance of self grooming and professional image. (**L2**) 5 M
3. a) Describe the structure of the nail with the help of a neat diagram. (**L1**) 5 M
b) List out the ingredients used in Shampoos. (**L1**) 5 M

OR

4. a) Describe chemical peels and types of peeling agents? (**L2**) 5 M
b) Explain the structure and growth cycle of hair. (**L2**). 5 M
5. a)Classify foods based on their function. (**L4**) 5 M
b) Explain the advantages of cooking. (**L2**) 5 M

OR

6. a) Define reverse osmosis. How does it help in water purification? (**L3**) 5 M
b) Emphasize the significance of chlorination of water. (**L2**) 5 M
7. a) Define food adulteration . Write any two tests to determine adulteration of food of your choice. (**L3**) 5 M
b) Illustrate the methods involved in the preservation of milk. (**L3**) 5 M

OR

8. a) Write a brief note on contamination of food by toxic chemicals. (**L1**) 5 M
b) Discuss about the various factors which lead to food deterioration. (**L2**) 5M

SECTION – B (Short answer questions)

II. Answer any four questions. **4 X 5 = 20 Marks**

9. What is the scope of beauty and wellness? (**L1**)
10. How do fillers work? (**L1**)
11. Outline five functions of talcum powder? (**L2**)
12. How is UV radiation used in water purification plants? (**L4**)
13. Elaborate the role of leavening agents in the food industry. (**L5**)
14. Explain Chemical methods of food preservation. (**L5**)

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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 -V
EXPERIMENTS IN MEDICINAL & SUSTAINABLE CHEMISTRY
CHEMISTRY PRACTICALS – ELECTIVES 2

Program: B.Sc. Max. Hours: 30 Hrs
Course Code: U24/CHE/DSE/502/P Max. Marks: 50
Course: DSE 2 Hours per week: 2 Hrs
No. of Credits: 1

Course Objectives

- To apply the knowledge of synthetic methods in Chemistry to prepare drugs, nanoparticles.
- To design chemical products and processes for Green Chemistry.

Course Outcomes

CO1: Synthesize drugs, nanoparticles and developing green and sustainable methods.
CO2: Cut down the stream of chemicals pouring into the environment.

Synthesis and analysis

1. Preparation of Aspirin (conventional and green method)
2. Preparation of Paracetamol.
3. Preparation of Thiobarbeturic acid.
4. Preparation of Fluorescein.

Green Methods for the preparation of the following:

1. Preparation of Acetanilide.
2. Preparation of p-Bromo acetanilide.
3. Preparation of Dihydropyrimidinone.

Synthesis of Nanoparticles:

1. Preparation of nano silver.
2. Preparation of nano ZnO.
3. Preparation of Ferrofluid.
4. Preparation of nano CuO.

References

1. Krupadanam.D, VijayaPrasad.D, Varaprasad Rao.K, Reddy.K.L.N, Sudhakar.C, (2001), *Drugs,* Universities Press (India) Limited.
2. Patrick.G, (2001), Medicinal Chemistry, BIOS Scientific Publications
3. Ahluwalia V.K ,*Green Chemistry :Greener Alternatives for Synthetic Organic Transformation* :Narosa Publishing House
4. Ahluwalia V.K ,*Green Chemistry : Environmentally benign reaction* : Ane books Pvt.Ltd,2006
5. Kulkarni.K.S, (2011), *Nanotechnology- Principles & Practices*, Co-Published by Springer International Publishing Company, Switzerland, New Delhi, Capital Publishing Company.

6. Syllabus Focus

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

Local /Regional/National /Global Development Needs	Relevance
Local	To develop products that benefit the environment either directly or indirectly.
Regional	Nanotechnology helps in improving many technology and industry sectors and even revolutionize.
National	The concepts of Green Chemistry reduces the use of energy and fuel by using renewable inputs wherever possible
Global	Recent advances in Medicinal Chemistry, Green Chemistry and Nanotechnology provide reliable synthetic pathways for sustainable development goals.

b. Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	All	Educational tour to industries/factories to make students learn outside the classroom
ED	All	Case studies relevant to the problems, challenges and help students to develop solutions
EMP	All	Systematic and sustained effort to adapt specific skills for improving career goals

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7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Experiential Learning	Field Trips
2.	Participative Learning	Role play
3.	Problem solving	Research Projects

8. Course Assessment Plan

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

CO	Continuous Internal Assessments CIA - 40%	End Semester Examination- 60%
CO1	CIA1-Written Exam	Written Exam
CO2	CIA1-Written Exam	
CO3	CIA2- Case Study	
CO4	CIA2- Presentations (poster/ ppt)	

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b. Model Question Paper - End Semester Exam

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FACULTY OF SCIENCE – DEPARTMENT OF CHEMISTRY

B.Sc. III YEAR SEMESTER -V

MEDICINAL & SUSTAINABLE CHEMISTRY

TIME: 2hrs **Course Code: U24/CHE/DSE/502**

Max. Marks: 60 **Credits: 4**

SECTION –A (Essay Questions)

SECTION A - INTERNAL CHOICE			**4 X 10 M = 40M**	
Question Number	**Question**		**CO**	**BTL**
1	**Module 2**	a) Evaluate the structure of Penicillin G & discuss its commercial production 5M b) Explain briefly about diluents and stabilizing agents with examples. 5M **OR**	**CO 2**	**(Level I, V)**
2	**Module 2**	Outline the synthetic route and brief therapeutic action of i) Ciprofloxacin ii) Aspirin iii) Salbutamol iv) Omeprazole 10M	**CO 2**	**(Level II)**
3	**Module 1**	a) Summarize briefly about agonist and antagonist. 5M b) What are anaesthetic and antipyretic drugs? 5M **OR**	**CO 1**	**(Level I, II)**
4	**Module 1**	Describe in detail about ADME. 10M	**CO 1**	**(Level I)**
5	**Module 3**	a) List out the basic principles of green chemistry. 5M b) Simplify the atom economy? Calculate atom economy using suitable examples. 5M **OR**	**CO 3**	**(Level I, IV)**
6	**Module 3**	a) Assess the need for green chemistry. 5M b) Interpret the selection of solvents in green synthesis. 5M	**CO 3**	**(Level V)**

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7	Module 4	a) Give two methods for synthesis of Nanoparticles. 5M b) Compose a note on carbon nanotubes.5M **OR**	CO 4	(Level I, VI)
8	Module 4	a) Elaborate a note on Zeolites? 5M b) Compile the principle and working of STM. 5M	CO 4	(Level VI)
SECTION B – (Short answer questions) **ANSWER ANY 4 OUT OF 6**				**4 X 5M = 20 M**
9	Module 1	How would you explain drugs acting on the renal system?	CO 1	(Level II)
10	Module 2	Build a short note on clinical trials.	CO 2	(Level III)
11	Module 1	What are chemotherapeutic agents? Discuss about antimalarial drugs.	CO 1	(Level I)
12	Module 2	Construct briefly about computer aided drug designing.	CO 2	(Level III)
13	Module 3	Analyze the role of phase transfer catalyst in green synthesis.	CO 3	(Level IV)
14	Module 4	Give any four applications of Nanomaterials.	CO 4	(Level I)

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b. Model Question Paper - End Semester Exam

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FACULTY OF SCIENCE – DEPARTMENT OF CHEMISTRY

b. MODEL PAPER - B.Sc. III YEAR SEMESTER -V

MEDICINAL & SUSTAINABLE CHEMISTRY

TIME: 2hrs **Course Code: U24/CHE/DSE/502**

Max. Marks: 60

SECTION –A (Essay Questions)

I. Answer the following **4X10=40 Marks**

1. a) Evaluate the structure of Penicillin G & discuss its commercial production(CO2) **L5** 5M
   b) Explain briefly about diluents and stabilizing agents with examples. (CO 2) **L1** 5M

OR

2. Outline the synthetic route and brief therapeutic action of 10M
   i) Ciprofloxacin ii) Aspirin iii) Salbutamol iv) Omeprazole (CO 2) **L2**
3. a) Summarize briefly about agonist and antagonist. (CO 1) **L2** 5M
   b) What are anaesthetic and antipyretic drugs? (CO 1) **L1** 5M

OR

4. Describe in detail about ADME. (CO 1) **L1** 10M
5. a) List out the basic principles of green chemistry. (CO3) **L1** 5M
   b) Simplify atom economy? Calculate atom economy using suitable examples.(CO3) **L4** 5M

OR

6. a) Assess the need for green chemistry. (CO3) **L5** 5M
   b) Interpret the selection of solvents in green synthesis. (CO3) **L5** 5M
7. a) Give two methods for synthesis of Nanoparticles. (CO4) **L1** 5M
   b) Compose a note on carbon nanotubes. (CO4) **L6** 5M

OR

8. a) Elaborate a note on Zeolites? (CO4) **L6** 5M
   b) Compile the principle and working of STM. (CO4) **L6** 5M

SECTION –B (Short Answer Questions)

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

9. How would you explain drugs acting on the renal system? (CO 1) **L2**
10. Build a short note on clinical trials. (CO 2) **L3**
11. What are chemotherapeutic agents? Discuss about antimalarial drugs. (CO 1) **L1**
12. Construct briefly about computer aided drug designing.(CO2) **L3**
13. Analyze the role of phase transfer catalyst in green synthesis. (CO3) **L4**
14. Give any four applications of Nanomaterials. (CO4) **L1**

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c. Question Paper Blueprint

Modules	Hours Allotted in the Syllabus	COs Addressed	Section A (No. of Questions)	Total Marks	Section B (No. of Questions)	Total Marks
1	15	1	2	10	2	5
2	15	2	2	10	2	5
3	15	3	2	10	1	5
4	15	4	2	10	1	5

5. CO-PO Mapping

CO	PO	Cognitive Level	Classroom sessions(hrs)
1	2,5	Understanding	15
2	1,7	Applying & Analysing	15
3	2,7	Remembering	15
4	4	Creating & Evaluating	15

Prepared by	Checked & verified by	Approved by
Shikha Chander M. Deepthi Name and Signature of the teaching faculty Dr. Shikha Chander M. Deepthi	D. Sumalatha Name and Signature of the HoD Dr. D. Sumalatha	Name and Signature of the Principal Dr. Uma Joseph

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SEMESTER – V

CLINICAL BIOCHEMISTRY & IMMUNOLOGY

1. Course Description

Programme : B.Sc.
Course Code : U24/BIC/DSE/501
Course Type : DSE IA
No. of credits: 4

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

2. Course Objectives:

1. Prepare the students for clinical and immunological aspects of human body.
2. Learn Immunological techniques which are used as a diagnostic tool.

3. Course Outcomes

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

CO1: Examine the physiology with respect to important systems of the human body. (L4)

CO2: Analyze the biochemical aspects of the clinical conditions in the human body. (L4)

CO3: Compare the organization of the immune system and understand different immunological responses. (L4)

CO4: Assess the principles, procedures, and applications of various immune techniques. (L5)

4. Course Content –

MODULE I: PHYSIOLOGY **(15 Hrs)**

Composition of blood and coagulation of blood. Hemoglobin and transport of gases in blood (oxygen and CO2) Heart – Structure of the heart, cardiac cycle and cardiac factors controlling blood pressure. Muscle - Types of muscles, Structure of myofibril, organization of contractile proteins mechanism of muscle contraction. Anabolic steroids. Nervous system - structure of neuron, resting potential, action potential, propagation of nerve impulse, synapse, synaptic transmission. Excitatory and inhibitory neurotransmitters. Physiology of vision – visual pigments and visual cycle. Bone – types, composition. Effect of ageing on bones.

MODULE II: CLINICAL BIOCHEMISTRY **(15 Hrs)**

Plasma proteins in health and disease. Disorders of blood coagulation(haemophilia). Types of anemias, haemoglobinopathies – sickle cell anemia and thalassemia.Structure and functions of the liver. Liver diseases – jaundice, hepatitis, cirrhosis. Liver function tests – conjugated and total bilirubin in serum, albumin globulin ratio, hippuric acid and bromosulphthalein test, serum enzymes in liver diseases - SGPT, SGOT and alkaline phosphatase.Kidneys-structure of nephron, urine formation, normal and abnormal constituents of urine. Biological buffers. Role of kidneys in maintaining acid base and electrolyte balance in the body. Renal function tests – creatinine and urea clearance tests, phenol red test. Biochemical tests for the diagnosis of heart disease – HDL/ LDL, cholesterol, SGOT, LDH, CK, C- reactive protein, cardiac troponins.

MODULE III: IMMUNOLOGY **(15 Hrs)**

Organisation of immune system. Organs and cells of the immune system. Innate and acquired immunity Cell mediated and humoral immunity. Antigen, epitopes/ antigenic determinants. Concept of haptens, adjuvants. Major histocompatibility antigens. Blood group antigens. Structure & Classification of immunoglobulins, Isotype, allotype & idiotype Theories of antibody formation - Clonal selection theory of antibody formation. Genetic basis of antibody diversity. Outlines of hypersensitivity reactions. Fundamentals of graft rejection and MHC proteins. Outline of autoimmunity

MODULE IV: IMMUNOLOGICAL TECHNIQUES **(15 Hrs)**

Antigen – antibody reactions – immunoprecipitation, agglutination, immunodiffusion. Immunodiagnostics - RIA& ELISA, direct & indirect immunofluorscence, flow cytometry, biosensor assay & Immuno blotting techniques. Monoclonal antibodies. Vaccines and their classification – Traditional vaccines- Live and attenuated vaccines,
toxoids. Modern vaccines – recombinant, peptide vaccines and DNA vaccines.

5. Reference Books:

1. Judy Owen, Jenni Punt and Stranford: Kuby Immunology 2012 Seventh Edition. ISBN-10: 1-4292-1919-X; ISBN-13: 978-1-4292-1919-8.
2. Gerard .J. Tortora and Bryan Derrickson : Principles of Anatomy and Physiology, 13th edition, 2011. John Wiley & sons Inc. ISBN-13: 978-1118345009.
3. Thomas. M. Devlin : Textbook of Biochemistry with Clinical Correlations, 7th edition, 2010; Wiley – Liss New York. ISBN-13: 978-0470281734.
4. Delves, Martin, Burton &Roitt: Roitt's Essential Immunology. 12th Edition 2012, Wiley Blackwell. ISBN-13: 000-1405196831.
5. Dr. A.C. Deb, Concepts of Biochemistry 1999, Books and Allied Publication Ltd. ISBN: 81-87134-29-1.

6. Syllabus Focus

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

Local /Regional/National /Global Development Needs	Relevance
Global	It is integral to modern medicine, providing information of diagnosis, treatment and monitoring of different medical conditions.

b)Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
Skill Development	Module 4	Practicals

7. Pedagogy

S.No	Student Centric Methods Adopted	Type/Description of activity
1.	Case studies	Problem Solving
2.	Quiz	Experiential Learning
3.	Group Discussion	Participative Learning

8. Course Assessment Plan

a) Weightage of Marks in Formative and Summative Assessments

CO	Formative Assessment - FA (40%)	Summative Assessment - SA (60%)
CO1	CIA-1	End Semester exam
CO2	CIA-1	
C03	CIA-2 Presentation	
C04	CIA-2 Quiz	

b) Model question paper

CLINICAL BIOCHEMISTRY & IMMUNOLOGY

Course Code: U24/BIC/DSE/501 **Max Marks: 60**
Credits: 4 **Time: 2 Hrs**

SECTION – A

I. Answer the following **(4 x 10 = 40 M)**

1. (a) Explain the role of kidney in glomerular filtration and reabsorption.

   OR

   (b) Explain in detail the physiology of Vision. What is visual cycle.

2. (a) Categorize various Liver Function Tests

   OR

   (b)Arrange and analyse the disorders of Blood Coagulation. Add a note on Sickle Cell Anemia.

3. (a) Analyse in detail about cell mediated immunity

   OR

   (b) Illustrate the basic structure of Immunoglobulins and write their classification.

4. (a) Demonstrate how monoclonal antibodies are produced by hybridoma technology

   OR

   (b) Illustrate the various types of vaccines used for the prevention of common diseases.

SECTION – B

II. Write Short notes on any 4 Questions **(4X5=20M)**

5. Visual Cycle
6. Renal Function Tests
7. Albumin
8. SGPT
9. Major Histocompatibility Complex
10. ELISA

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

DSE 1A: Clinical BC & Immunology

SECTION A - INTERNAL CHOICE (4 X 10 M = 40 M)				
Question Number	**Question**	**Question**	**CO**	**BTL (Blooms Taxonomy Level)**
1	Module 1	Explain the role of kidney in glomerular filtration and reabsorption	CO 1	2
2	Module 1	Explain in detail the physiology of Vision. What is visual cycle.	CO 1	2
3	Module 2	Categorize various Liver Function Tests	CO 2	4
4	Module 2	Arrange and analyze the disorders of blood coagulation. Write a note on Sickle cell anemia	CO 2	4
5	Module 3	Analyze in detail about cell mediated immunity	CO 3	4
6	Module 3	Illustrate the basic structure of Immunoglobulins and write their classification.	CO 3	3
7	Module 4	Demonstrate how monoclonal antibodies are produced by hybridoma technology	CO 4	3
8	Module 4	Illustrate the various types of vaccines used for the prevention of common diseases.	CO 4	3
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	Visual Cycle	CO 1	4
10	Module 2	Renal Function Tests	CO 2	4
11	Module 2	Albumin	CO 2	4
12	Module 2	SGPT	CO 2	4
13	Any Module	Major Histocompatibility Complex	CO 3	4
14	Any Module	ELISA	CO4	5

CLINICAL BIOCHEMISTRY & IMMUNOLOGY
PRACTICAL

1. Course Description:

Programme : B.Sc.
Course Code : U20/BIC/DSE/501/P
Type of course : DSE
No. of credits : 1

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

2. Course objective:

- Prepare students for clinical and immunological techniques used to study various aspects of human body.

3. Course Outcomes:

- CO1: Demonstrate and analyse the abnormal concentrations of various components in the blood and metabolites in the urine
- CO2: Design the skills of immunological techniques to test infectious diseases.

PRACTICAL SESSIONS

1. Determination of Rh and Blood Group Typing
2. Blood Pressure Measurement by Sphygmomanometer.
3. Estimation of Hemoglobin by Sahli's and Drabkin's Method
4. Estimation of Creatinine in urine
5. Estimation of Creatine in urine
6. Estimation of Serum Iron
7. Estimation of Serum Phosphorus
8. Estimation of Serum Urea
9. Estimation of Serum Cholesterol
10. Qualitative Analysis of Urine
11. Ouchterlony Immunodiffusion Technique
12. Immuno Electrophoresis
13. Dot ELISA, WIDAL, VDRL Test

MODEL QUESTION PAPER
PRACTICAL

Course Code: U20/BIC/DSE/501/P
Credits: 1

Max Time: 2 Hrs
Max. Marks: 50

Answer the following.

1. Write the principles for the given experiments. (2 x 5 = 10 M)
   a) Estimation of serum Iron
   b) Estimation of Hemoglobin by Sahli's Method.
2. Quantitatively estimate the concentration of serum Iron in the given sample. Plot the calibration curve for the standard. Identify the concentration for the given unknown sample. Add a note on the clinical significance and write the normal range. (20 M)
3. Identify the abnormal constituents present in the given urine sample (10 M)
4. Viva (5 M)
5. Record (5 M)

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

HOD Biochemistry
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Professor Karuna Rupula
Department of Biochemistry
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SEMESTER - V

FUNDAMENTALS OF AI AND ML

1. Course Description

Programme: B.Sc./B.Com.
Course Code: U24/CSC/GE/501
Course Type: GENERIC ELECTIVE
No. of credits: 4

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

2. Course Objectives

- To understand AI fundamentals, including data types and processing tools.
- To learn Machine Learning principles and algorithms for various tasks.
- To gain practical skills in Deep Learning, NLP, and implementing AI solutions.

3. Course Outcomes

On completion of the course the student will be able to:

CO1: ***Demonstrate*** a comprehensive understanding of AI fundamentals. (Cognitive level – 3)

CO2: ***Classify*** the Machine Learning processes and algorithms, including supervised, unsupervised, reinforcement, and semi-supervised learning techniques. (Cognitive level – 4)

CO3*: **Develop*** a comprehensive understanding of Deep Learning principles, applications, and drawbacks, including distinctions from Machine Learning and insights into neural networks and hardware requirements. (Cognitive level - 6)

CO4: ***Apply*** natural language processing (NLP) techniques and effectively implement AI systems. (Cognitive level – 3)

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4. Course Content

MODULE I: AI FOUNDATIONS (15 Hrs)

Introduction- Turing Test, Neural Networks and Deep Learning, Structure of AI; Data-Basics, Types of data: Databases and other Tools, Data Process, More Data terms and Concepts.

MODULE II: MACHINE LEARNING (15 Hrs)

Introduction: Standard Deviation, Normal Distribution, Bayes' Theorem, Correlation, Feature Extraction, Uses of Machine Learning, Machine Learning Process, Supervised Learning, Un-Supervised Learning, Reinforcement Learning, Semi-Supervised Learning, Common Types of Machine Learning Algorithms- Navies Biased Classifier, K-Nearest Neighbour, Linear Regression, Decision Tree, Ensemble Modeling, K-Means Cluster.

MODULE III: DEEP LEARNING (15 Hrs)

Introduction to Deep Learning, Difference between Deep learning and Machine Learning, The Brain and Deep Learning, Artificial Neural Networks, Back Propagation, Various Neural Networks, Deep Learning Applications, Deep Learning Hardware, Draw Backs with Deep Learning.

MODULE IV: NLP (15 Hrs)

NLP- The Challenges of NLP, Understanding How AI Translates Language, Voice Recognition, NLP in the real world-Use Cases, Voice Commerce, Virtual Assistance, Chart Bort, Implementation of AI-Approaches to implementing AI, The Steps of AI Implementation, Forming a Team, The Right Tools and Platforms, AI Frame-works, Deploy and Monitor the AI System

5. References

1. Artificial Intelligence in the 21st Century - 2E by Stephen Lucci, Danny Kopec., Mercury Learning and Information, 2016
2. Artificial Intelligence: Building Intelligent Systems by Parag Kulkarni, Prachi Joshi, PHI Learning Yashwant Kanetkar, Let Us C 13E, BPS Publications.
3. Artificial Intelligence: A New Synthesis by Nils J Nilsson, Morgan Kaufmann Publishers Inc.
4. Introduction to Machine Learning with Python, 1st Edition by Andreas C. Müller & Sarah Guido, O'Reilly Media.2016.
5. Machine Learning for Absolute Beginners, by Oliver Theobald, 2020.

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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	AI and ML revolutionize industries by enabling data-driven decision-making, automation, and personalized experiences, ultimately shaping the future of technology and society.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Modules 2 and 4	ML and NLP empower individuals to analyze language patterns, extract insights from text data, and develop intelligent systems for natural language understanding and generation.
EMP	Modules 1,2,3 and 4	Enables individuals to meet the growing demand for data-driven decision-making, automation, and innovation across various industries.

7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Participative	Seminars/ Presentations
2.	Experimental	Data Analysis exercises
3.	Problem solving	Case studies

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8. Course Assessment Plan

a) Weightage of Marks in Continuous Internal Assessments and Written Exam

CO	Continuous Internal Assessments CIA -40%	End Semester Examination- 60%
CO1	CIA 1 – Written Test	Written Exam
CO2	CIA 2 – Written Test	
CO3	CIA 2 –Written Assignment /Presentation/Case Study	
CO4	CIA 3 – Written Assignment /Presentation/Case Study	

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b) Model Question Paper- End Semester Exam

FUNDAMENTALS OF AI AND ML

Course Code: U24/CSC/GE/501 **Max Marks: 60**

Credits:4 **Time: 2hrs**

Section- A

I. Answer any Four: **4 x 10 = 40 M**

1. Explain the relevance of AI and discuss about different types of data.

OR

2. Explain CRISP-DM Process.
3. Define Supervised Learning Algorithm. Explain in detail about k-nearest neighbours and Naive Bayes' classification.

OR

4. Describe in detail about Decision Trees.

5. Explain various Neural networks in detail.

OR

6. Explain the advantages and disadvantages of Deep Learning.

7. What is NLP? Explain how AI translates a language.

OR

8. Explain the steps of AI implementation in detail.

Section- B

II. Answer any Four: **4 x 5 = 20 M**

9. Explain structure of AI.
10. Give an overview of Neural Networks.
11. Differentiate between classification and Regression.
12. Explain Reinforcement learning with example.
13. Explain the difference between Deep learning and Machine Learning.
14. Explain briefly voice commerce and Virtual Assistance.

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FACULTY OF SCIENCE- DEPARTMENT OF CHEMISTRY
THEORY SYLLABUS CBCS-2024
SEMESTER -V
INSTRUMENTAL METHODS OF ANALYSIS

1. Course Description

Program: B.Sc.
Course Code: U24/CHE/DSE/501
Course: DSE- 1
No. of Credits: 4

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

2. Course Objectives

- To understand the importance of separation techniques such as solvent extraction and to explore the principles and procedures of chromatographic techniques including paper, thin layer,
- To learn the principles of column, ion exchange chromatography, HPLC and GLC.
- To delve into the principle and instrumentation of UV/Visible spectrophotometry, and its application to the quantitative analysis of various ions.
- An approach towards the principle and application of electroanalytical analysis.

3. Course Outcomes

CO1: Understand various separation techniques and choose the most appropriate analytical technique for a variety of samples.
CO2: Explain the theoretical principles of various separation techniques in chromatography and their typical applications.
CO3: Interpret the theoretical principles of selected instrumental methods with spectrophotometric methods.
CO4: Review and assessment of electro analytical methods.

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4. Course Content

MODULE I: CHROMATOGRAPHY I — 15 Hrs

Solvent Extraction- Principle, Methods of extraction: Batch extraction, continuous extraction and counter current extraction. Application – Determination of Iron (III).

Chromatography: Classification of chromatographic methods, principles of differential migration, adsorption phenomenon, nature of adsorbents, solvent systems.

Thin layer Chromatography (TLC): Advantages, preparation of plates, development of the chromatogram, Detection of the spots, factors affecting R_f values and applications.

Paper Chromatography: Principle, choice of paper and solvent systems, development of chromatogram – ascending, descending, radial and two dimensional chromatography and applications.

MODULE II: CHROMATOGRAPHY II — 15 Hrs

Column Chromatography: Principle, Types of stationary phases, Column packing – Wet packing technique, Dry packing technique. Selection criteria of mobile phase (solvents) for eluting, polar, non-polar compounds and its applications.

Ion exchange chromatography: Principle, cation and anion exchange resins, its application in separation of ions.

Gas Chromatography: Theory and instrumentation (Block Diagram), Types of stationary phases and carrier gases (mobile phase).

High performance liquid chromatography: Theory and instrumentation, stationary phases and mobile phases. Analysis of paracetamol.

MODULE III: COLORIMETRY AND SPECTROPHOTOMETRY — 15 Hrs

General features of absorption – spectroscopy, transmittance, absorbance, and molar absorptivity. Beer Lambert's law and its limitations, difference between Colorimetry and Spectrophotometry.

Instruments – Single beam UV- Visible Spectrophotometer, Double beam UV- Visible Spectrophotometer. Lamps used as energy sources. Verification of Beer's law. Estimation of iron in water samples by thiocyanate method. Estimation of (i) Chromium and (ii) Manganese in steel.

IR Spectrophotometer: Principle, Sources of Radiations, Sampling, Block diagram of FT-IR Spectrophotometer.

MODULE IV: ELECTROANALYTICAL METHODS — 15 Hrs

Types of Electroanalytical Methods.

I) Interfacial methods – a) Potentiometry: Principle, Electrochemical cell, Electrodes- (i) Indicator and (ii) Reference electrodes – Normal Hydrogen Electrode, Quinhydrone Electrode,

Saturated Calomel Electrode. Numerical Problems. Application of Potentiometry – Assay of Sulphanilamide

b) Voltammetry – three electrode assembly; Introduction to types of voltammetric techniques, micro electrodes, over potential and Polarization.

II) Bulk methods – Conductometry, Conductivity Cell, Specific Conductivity, Equivalent Conductivity. Numerical problems. Applications of conductometry. Estimation of Cl - using $AgNO_3$. Determination of Aspirin with KOH.

5. References

1. David Krupadanam, *Analytical Chemistry*, Universities Press (India) Limited.
2. S. M. Khopkar, *Basic concepts of Analytical Chemistry*, New Age International Publishers.
3. Gurdeep R. Chatwal, Sham K. Anand, *Instrumental methods of Chemical analysis*, Himalaya Publishing House.
4. D.A. Skoog, F.J. Holler, T.A. Nieman, *Principles of Instrumental Analysis*, Engage earning India Edn.
5. D. A. Skoog, D.M. West, F.J. Holler, *Fundamentals of Analytical Chemistry* 6 th Edn., Saunders College Publishing, Fort worth (1992).
6. Cooper, T.G. *The Tools of Biochemistry*, John Wiley and Sons, N.Y. USA.16, 1977.
7. Vogel, A. I. *Vogel's Qualitative Inorganic Analysis* 7th Edn, Prentice Hall.
8. Vogel, A. I. *Vogel's Quantitative Chemical Analysis* 6th Edn, Prentice Hall.
9. Gary D. Christian, *Analytical Chemistry* 7th edition. (2004).
10. B. K. Sharma, *Industrial Chemistry* (including Chemical Engineering). edn. (1997).

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FACULTY OF SCIENCE- DEPARTMENT OF CHEMISTRY
PRACTICAL SYLLABUS CBCS-2024
SEMESTER -V
~~CHEMISTRY PRACTICALS – ELECTIVES 1~~ Experiments in Physical Chemistry & Sustainable Chemistry

Program: B.Sc.
Course Code: U24/CHE/DSE/501/P
Course: DSE 1 & 2
No. of Credits: 1

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

Course Objectives

- To equip the students with required analytical skills for potentiometry, TLC and determination of partition coefficient.
- To investigate analytes with the use of scientific instruments.

Course Outcomes

CO 1: Acquire the skills to determine partition coefficient, perform TLC and potentiometric titrations.
CO 2: The techniques such as spectroscopy, electrochemical analysis provides adequate knowledge and applications.

Distribution Experiments:

1. Distribution of partition coefficient of acetic acid in water and butanol.
2. Distribution of benzoic acid in benzene and water.

Potentiometry:

3. Titration of strong acid vs strong base (HCl vs NaOH)

4,

Thin Layer Chromatography :

4. Determination of Rf values and identification of Organic compounds: preparation of and separation of 2,4-dinitrophenylhydrazone of acetone and acetophenone using toluene and light petroleum (40:60)
5. Separation of ortho & para-nitroaniline mixtures.

Electrochemistry

6 Titration of Strong acid Vs Strong base (HCl Vs NaOH)

~~6~~ 7. Determination of dissociation constant (Ka) of acetic acid by conductivity measurements

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Colorimetry

7. Verification of Beer's Law using $KMnO_4$ and determination of the concentration of the given solution.

Adsorption

8. Adsorption of acetic acid on animal charcoal, Verification of Freundlich adsorption isotherm.

Reference Books

1. Khosla, B. D.; Garg, V. C. &Gulati, A. Senior Practical Physical Chemistry, R.
2. Chand & Co.: New Delhi (2011).
3. Mendham, J, *Vogel's Quantitative Chemical Analysis:* Pearson, 2009.
4. Analytical Chemistry 7th edition by Gary D. Christian (2004)
5. Vogel, A. I. Vogel's Qualitative Inorganic Analysis 7th Ed., Prentice Hall. 11. Vogel, A. I.
6. Vogel's Quantitative Chemical Analysis 6th Ed., Prentice Hall.

(9) Green Synthesis of Acetanilide

(10) Green Synthesis of (P-Bromo acetanilide) Aspirin

(11) Green Synthesis of Dihydropyrimidinone

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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	To produce graduates with sound theoretical knowledge and technical skills.
Regional	To motivate students towards research.
National	To address the challenges with their innovative contributions for the benefit of mankind.
Global	To instill the essence of professionalism, ethical commitment to become researchers with core human values.

b. Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	1,2,3,4	Upskilling, cross skilling and reskilling
ED	1,2,3,4	Guest lecture Skill test involving creative thinking and problem solving
EMP	1,2,3,4	Using an engaging curriculum for career exploration

7. Pedagogy

S.No.	Student Centric Methods Adopted	Type / Description of Activity
1.	Experiential Learning	Science Experiments
2.	Participative Learning	Presentation
3.	Problem solving	Research Projects

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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	CIA1-Written Exam	
CO3	CIA2- Mini Project	
CO4	CIA2- Paper Presentation	

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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
MODEL PAPER - B.Sc. III YEAR SEMESTER -V
INSTRUMENTAL METHODS OF ANALYSIS
Course Code: U24/CHE/DSE/501

TIME: 2 Hrs
Max. Marks: 60

SECTION –A

I.Answer the following **4X10=40 Marks**

1. Evaluate the principle of paper chromatography and development of chromatogram by four methods. (CO1) **L5** 10M

OR

2. a) Explain the Craig's counter current process of solvent extraction. (CO2) **L1** 5M
   b) Summarize a short note on Soxhlet extraction technique. (CO1) **L2** 5M

3. a) Apply the theory involved in Gas chromatography and draw the block diagram. (CO2) **L3** 5M
   b) Give the analysis of paracetamol by HPLC (CO3) **L1** 5M

OR

4. Describe the principle of Ion exchange chromatography. Give an account of cation and anion exchange resins. (CO1) **L2** 10M
5. a) Estimation of iron in water sample samples by thiocyanate method. (CO3) **L6** 5M
   b) Explain the instrumentation of the double beam spectrophotometer. (CO3) **L1** 5M

OR

6. Analyse the Principle, Sources of Radiations, Sampling technique in IR spectrophotometry. (CO3) **L4** 10M
7. a) Describe the working of Calomel electrode with a neat diagram (CO4) **L2** 5M
   b) How chloride ions are estimated using silver nitrate by conductometry. (CO4) **L1** 5M

OR

8. Determine the EMF of a cell initially of an acid- base titration where 25 ml 0.1 M of HCl is titrated potentiometrically against standard 0.1 M NaOH using hydrogen electrode as indicator electrode and saturated calomel electrode as reference electrode. What would be the EMF after the addition of 20, 25 and 30 ml of NaOH solution? (CO4) **L5** 10M

SECTION –B

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

9. Illustrate any two applications of TLC (CO2) **L2**
10. Give an account of different types of column packing. (CO1) **L1**
11. Distinguish between Colorimetry and Spectrophotometry. (CO3) **L4**
12. Classify chromatographic methods and explain any two. (CO1) **L1**
13. Outline a short note on three electrode assembly. (CO4) **L2**
14. Explain the instrumentation and principle of HPLC. (CO2) **L1**

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. III YEAR SEMESTER -V
INSTRUMENTAL METHODS OF ANALYSIS

TIME: 2 Hrs **Course Code: U24/CHE/DSE/501**
Max. Marks: 60 **Credits: 4**

SECTION –A

SECTION A - INTERNAL CHOICE				**4 X 10 M = 40M**
Question Number	**Question**		**CO**	**BTL**
1	**Module 1**	Evaluate the principle of paper chromatography and development of chromatogram by four methods. 10M **OR**	**CO 1**	**(Level V)**
2	**Module 1**	a) Explain the Craig's counter current process of solvent extraction. 5M b) Summarize a short note on Soxhlet extraction technique. 5M	**CO 1**	**(Level I, II)**
3	**Module 2**	a) Apply the theory involved in Gas chromatography and draw the block diagram. 5M b) Give the analysis of paracetamol by HPLC 5M **OR**	**CO 2**	**(Level I, III)**
4	**Module 2**	Describe the principle of Ion exchange chromatography. Give an account of cation and anion exchange resins. 10M	**CO 2**	**(Level II)**
5	**Module 3**	a) Estimation of iron in water sample samples by thiocyanate method. 5M b) Explain the instrumentation of the double beam spectrophotometer. 5M **OR**	**CO 3**	**(Level I,VI)**
6	**Module 3**	Analyze the principle, sources of radiations, sampling technique in IR spectrophotometry. 10M	**CO 3**	**(Level IV)**

7	**Module 4**	a) Describe the working of Calomel electrode with a neat diagram 5M b) How chloride ions are estimated using silver nitrate by conductometry. 5M **OR**	**CO 4**	**(Level I, II)**
8	**Module 4**	a) What is the principle and instrumentation of potentiometry 5M b) Explain the three electrode assemblies of voltammetry. 5M	**CO 4**	**(Level I)**
SECTION B – (Short answer questions) **ANSWER ANY 4 OUT OF 6** **4 X 5M = 20 M**				
9	**Module 2**	Illustrate any two applications of TLC	**CO 2**	**(Level II)**
10	**Module 1**	Give an account of different types of column packing.	**CO 1**	**(Level I)**
11	**Module 3**	Distinguish between Colorimetry and Spectrophotometry.	**CO 3**	**(Level IV)**
12	**Module 1**	Classify chromatographic methods and explain any two.	**CO 1**	**(Level I)**
13	**Module 4**	Calculate the equivalent conductivity 0.1N concentrated sulphuric acid solution given specific conductivity is equal to 4×10^{-2} Sm-1.	**CO 4**	**(Level II)**
14	**Module 2**	Explain the instrumentation and principle of HPLC.	**CO 2**	**(Level I)**

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FACULTY OF SCIENCE- DEPARTMENT OF CHEMISTRY
THEORY SYLLABUS CBCS-2024
SEMESTER -V
MEDICINAL & SUSTAINABLE CHEMISTRY

1. Course Description

Program: B.Sc.
Course Code: U24/CHE/DSE/502
Course: DSE 2
No. of Credits: 4

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

2. Course Objectives

- To introduce students to the action of drugs on biological systems.
- To explain & discuss the drug formulation, synthetic routes and discovery process.
- To study the effects of chemical synthesis upon the environment and the importance of developing green techniques.
- Introduce students to the importance of nanoparticles, their properties and applications.

3. Course Outcomes

CO 1: Learn and understand the action of drugs on biological systems.
CO 2: Discuss the synthetic routes and therapeutic activity for some commonly used drugs.
CO 3: Acquire the ability to design green synthetic routes replacing conventional pathways.
CO 4: Apply the knowledge of Nanotechnology to synthesize, characterize Nanoparticles and explain their properties.

4. Course Content

MODULE I: MEDICINAL CHEMISTRY I **12 Hrs**

Terminology in Medicinal Chemistry **2 Hrs**
Disease, Drug, Pharmacology, Pharmacophore, Pharmacodynamics, Pharmacokinetics, metabolites, antimetabolites, agonist, antagonist and therapeutic index.

Nomenclature **1 Hr**
Chemical name, Generic name and Trade names. Trade names for the given generic names – (i) Aspirin (ii) Amoxycillin (iii) Ciprofloxacin (iv) Paracetamol (v) Mebendazole.

ADME **3 Hrs**
a) Absorption: Definition, absorption of drugs across the membrane – active and passive absorption, routes of administration of drugs. b) Distribution: definition and effect of plasma protein binding. c) Metabolism: definition, phase I and phase II reactions. d) Elimination: definition and renal elimination.

Classification of Drugs
Classification of Drugs based on therapeutic action–Chemotherapeutic agents, and Pharmacodynamic agents (brief explanation for the following)
(i) Chemotherapeutic agents **1 Hr**

Antimalarials – Chloroquine; Antibiotic – Amoxicillin; Antitubercular drugs – isoniazid; Antiprotozoals – metronidazole: Antibacterial – Sulphanilamide; Anthelmintics – Albendazole.

(ii) Pharmacodynamic agents **5 Hrs**

(a) Drugs acting on CNS: General (thiopental sodium)and local anaesthetics (Benzocaine),Analgesics (Ibuprofen),Antipyretics (Aspirin, Paracetamol), Sedatives & Hypnotics (Phenobarbital), Anticonvulsants (Diazepam), Anti-psychotics (Chlorpromazine) and Antidepressants (Fluoxetine).

(b) Drugs acting on PNS: Adrenergic (Salbutamol, Propranolol) & Cholinergic (Carbachol, Diphenhydramine) Drugs.

(c) Drugs acting on Cardiovascular System-Antihypertensive Drugs (Captopril, Nifedipine)

(d) Drugs acting on renal system- Diuretic drugs (Furosemide, Acetazolamide)

MODULE II: MEDICINAL CHEMISTRY II **11 Hrs**

SAR studies **1 Hr**

Introduction to Structure Activity Relationship Studies, Lead modification strategies.SAR of benzodiazepines.

Antibiotics **1 Hr**

Discovery- Isolation of Penicillin, Structure of Penicillin G, Penicillin-V, Penicillin-O &Amoxycillin.

Synthetic route and brief therapeutic action of the following drugs: **4 Hrs**

Chemotherapeutics: Chloroquine, Ciprofloxacin, Sulphanilamide, Metronidazole.

Drugs to treat metabolic disorders: Paracetamol, Salbutamol, Omeprazole, Mephensin, Aspirin, Thiobarbituric acid, L-Dopa, Phenobarbital, Oil of wintergreen, Nifedipine

Formulations **2 Hrs**

(a) Introduction: Need of conversion of drugs into medicine. Additives & their role (Brief account only). (b) Classification of Drug formulations: Oral, parenterals and topical dosage forms – advantages and disadvantages.

Brief Overview of Drug Development Process: **3 Hrs**

(a) Lead drug-Definition & example (b) Drug design-i) Based on Lead compound ii) Based on Target Structure(De novo drug design) iii) Computer aided Drug Design (Molecular modelling) (c) Drug Testing-Clinical trials.

MODULE III: GREEN CHEMISTRY **15 Hrs**

Principles of Green Chemistry and some real world cases

What is Green Chemistry? Twelve principles of Green Chemistry with their explanation and examples. Atom economy, Evaluation of the type of the reaction: Rearrangements, Addition, Substitution, elimination and Pericyclic reactions. Selection of solvent: Aqueous phase reactions, Reactions in ionic liquids, Solid supported synthesis, Solvent free reactions (solid phase reactions). Green catalysts: Phase transfer catalysts (PTC), Biocatalysts. Energy requirements for reactions – alternative sources of energy: use of microwaves and ultrasonic energy.

Microwave assisted reactions in water: Oxidation of toluene and alcohols, Claisen rearrangement, Pinacol pinacolone rearrangement.

Microwave assisted reactions in organic solvents, Diels-Alder reaction and Decarboxylation reaction, Fries rearrangement.

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Ultrasound assisted reactions: sonochemical Simmons-Smith Reaction (Ultrasonic alternative to Iodine), Cannizaro reaction, Strecker synthesis, Friedal crafts acylation.
Green Synthesis of the following compounds: adipic acid, catechol, disodium iminodiacetate (alternative to Strecker synthesis).

MODULE IV: NANOTECHNOLOGY 15 Hrs

Nanotechnology: Introduction, types of crystalline nano materials, synthesis of nano materials- physical, chemical and biological methods (one method each).
Characterization of nanoparticles using electron microscope, tunneling microscope and X-ray diffraction. (Elementary treatment only)
Properties of nanomaterials-structure of nanomaterials, mechanical, electrical conductivity, optical, melting point, luminescence, magnetic properties
Special nanomaterials- fullerenes, carbon nanotubes, porous silicon, zeolites, aerogels, self-assembled nanoparticles, their preparation and structure.
Applications-- Electronics, energy, automobiles, fuel cells, home appliances, Nanolithography, defense, medicine, nanotechnology and environment.

5. References

1. G.L. David Krupadanam, D.Vijaya Prasad, K.Varaprasad Rao, K.L.N. Reddy, C. Sudhakar, *Drugs*, Universities Press (India) Limited 2007.
2. Graham L. Patrick, *An Introduction to Medicinal Chemistry,* Oxford University Press, New York. 1995
3. *Chemistry text book for B.Sc., Vol. IV* published by Telugu Academy, Govt. of Telangana.
4. Ahluwalia V.K, *Green Chemistry: Environmentally benign reaction*: Ane books Pvt.Ltd,2006.
5. Ahluwalia V.K & Kidwai M, *New Trends in Green Chemistry:* Springer,1 edition (29thFeb 2004)
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12. O.D. Tyagi & M.Yadav Synthetic Drugs by, Anmol Publications, 1998.
13. Medicinal Chemistry by Alka L. Gupta, Pragati Prakashan.
14. Samuel Delvin, *Green Chemistry* :Sarup & Sons(2005)
15. Anastas, P.T & Warner, J.C, *Green Chemistry: Theory and Practice:* Oxford University Press (1998).
16. T. Pradeep *Nano: The Essentials* , McGraw-Hill Education.
17. CNR Rao et.al. *Chemistry of nanomaterials: Synthesis, Properties and applications*
18. Gurdeep R. Chatwal *Chemistry and industry*
19. https://www.electrical4u.com/properties-of-superconductors/
20. Poole Jr. C.P & Owens. J.F(copyright, reprint,2006).*Introduction to Nanotechnology*, New Delhi,Wiley India(P) L

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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	To develop products that benefit the environment either directly or indirectly.
Regional	Nanotechnology helps in improving many technology and industry sectors and even revolutionize.
National	The concepts of Green Chemistry reduces the use of energy and fuel by using renewable inputs wherever possible
Global	Recent advances in Medicinal Chemistry, Green Chemistry and Nanotechnology provide reliable synthetic pathways for sustainable development goals.

b. Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	All	Educational tour to industries/factories to make students learn outside the classroom
ED	All	Case studies relevant to the problems, challenges and help students to develop solutions
EMP	All	Systematic and sustained effort to adapt specific skills for improving career goals

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7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Experiential Learning	Field Trips
2.	Participative Learning	Role play
3.	Problem solving	Research Projects

8. Course Assessment Plan

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

CO	Continuous Internal Assessments CIA - 40%	End Semester Examination- 60%
CO1	CIA1-Written Exam	Written Exam
CO2	CIA1-Written Exam	
CO3	CIA2- Case Study	
CO4	CIA2- Presentations (poster/ ppt)	

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b. Model Question Paper - End Semester Exam

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FACULTY OF SCIENCE – DEPARTMENT OF CHEMISTRY

B.Sc. III YEAR SEMESTER -V

MEDICINAL & SUSTAINABLE CHEMISTRY

TIME: 2hrs **Course Code: U24/CHE/DSE/502**

Max. Marks: 60 **Credits: 4**

SECTION –A (Essay Questions)

SECTION A - INTERNAL CHOICE			**4 X 10 M = 40M**	
Question Number	**Question**		**CO**	**BTL**
1	**Module 2**	a) Evaluate the structure of Penicillin G & discuss its commercial production 5M b) Explain briefly about diluents and stabilizing agents with examples. 5M **OR**	**CO 2**	**(Level I, V)**
2	**Module 2**	Outline the synthetic route and brief therapeutic action of i) Ciprofloxacin ii) Aspirin iii) Salbutamol iv) Omeprazole 10M	**CO 2**	**(Level II)**
3	**Module 1**	a) Summarize briefly about agonist and antagonist. 5M b) What are anaesthetic and antipyretic drugs? 5M **OR**	**CO 1**	**(Level I, II)**
4	**Module 1**	Describe in detail about ADME. 10M	**CO 1**	**(Level I)**
5	**Module 3**	a) List out the basic principles of green chemistry. 5M b) Simplify the atom economy? Calculate atom economy using suitable examples. 5M **OR**	**CO 3**	**(Level I, IV)**
6	**Module 3**	a) Assess the need for green chemistry. 5M b) Interpret the selection of solvents in green synthesis. 5M	**CO 3**	**(Level V)**

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7	**Module 4**	a) Give two methods for synthesis of Nanoparticles. 5M b) Compose a note on carbon nanotubes.5M **OR**	**CO 4**	**(Level I, VI)**
8	**Module 4**	a) Elaborate a note on Zeolites? 5M b) Compile the principle and working of STM. 5M	**CO 4**	**(Level VI)**
SECTION B – (Short answer questions) **ANSWER ANY 4 OUT OF 6**			**4 X 5M = 20 M**	
9	**Module 1**	How would you explain drugs acting on the renal system?	**CO 1**	**(Level II)**
10	**Module 2**	Build a short note on clinical trials.	**CO 2**	**(Level III)**
11	**Module 1**	What are chemotherapeutic agents? Discuss about antimalarial drugs.	**CO 1**	**(Level I)**
12	**Module 2**	Construct briefly about computer aided drug designing.	**CO 2**	**(Level III)**
13	**Module 3**	Analyze the role of phase transfer catalyst in green synthesis.	**CO 3**	**(Level IV)**
14	**Module 4**	Give any four applications of Nanomaterials.	**CO 4**	**(Level I)**

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b. Model Question Paper - End Semester Exam

St. FRANCIS COLLEGE FOR WOMEN, BEGUMPET, HYDERABAD-500016

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FACULTY OF SCIENCE – DEPARTMENT OF CHEMISTRY

b. MODEL PAPER - B.Sc. III YEAR SEMESTER -V

MEDICINAL & SUSTAINABLE CHEMISTRY

TIME: 2hrs **Course Code: U24/CHE/DSE/502**

Max. Marks: 60

SECTION –A (Essay Questions)

I. Answer the following **4X10=40 Marks**

1. a) Evaluate the structure of Penicillin G & discuss its commercial production(CO2) **L5** 5M

   b) Explain briefly about diluents and stabilizing agents with examples. (CO 2) **L1** 5M

OR

2. Outline the synthetic route and brief therapeutic action of 10M
   i) Ciprofloxacin ii) Aspirin iii) Salbutamol iv) Omeprazole (CO 2) **L2**
3. a) Summarize briefly about agonist and antagonist. (CO 1) **L2** 5M

   b) What are anaesthetic and antipyretic drugs? (CO 1) **L1** 5M

OR

4. Describe in detail about ADME. (CO 1) **L1** 10M
5. a) List out the basic principles of green chemistry. (CO3) **L1** 5M

   b) Simplify atom economy? Calculate atom economy using suitable examples.(CO3) **L4** 5M

OR

6. a) Assess the need for green chemistry. (CO3) **L5** 5M

   b) Interpret the selection of solvents in green synthesis. (CO3) **L5** 5M
7. a) Give two methods for synthesis of Nanoparticles. (CO4) **L1** 5M

   b) Compose a note on carbon nanotubes. (CO4) **L6** 5M

OR

8. a) Elaborate a note on Zeolites? (CO4) **L6** 5M

   b) Compile the principle and working of STM. (CO4) **L6** 5M

SECTION –B (Short Answer Questions)

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

9. How would you explain drugs acting on the renal system? (CO 1) **L2**
10. Build a short note on clinical trials. (CO 2) **L3**
11. What are chemotherapeutic agents? Discuss about antimalarial drugs. (CO 1) **L1**
12. Construct briefly about computer aided drug designing.(CO2) **L3**
13. Analyze the role of phase transfer catalyst in green synthesis. (CO3) **L4**
14. Give any four applications of Nanomaterials. (CO4) **L1**

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c. Question Paper Blueprint

Modules	Hours Allotted in the Syllabus	COs Addressed	Section A (No. of Questions)	Total Marks	Section B (No. of Questions)	Total Marks
1	15	1	2	10	2	5
2	15	2	2	10	2	5
3	15	3	2	10	1	5
4	15	4	2	10	1	5

5. CO-PO Mapping

CO	PO	Cognitive Level	Classroom sessions(hrs)
1	2,5	Understanding	15
2	1,7	Applying & Analysing	15
3	2,7	Remembering	15
4	4	Creating & Evaluating	15

Prepared by	Checked & verified by	Approved by
Shikha Chander M. Deepthi Name and Signature of the teaching faculty Dr. Shikha Chander M. Deepthi	D. Sumalatha Name and Signature of the HoD Dr. D. Sumalatha	Name and Signature of the Principal Dr. Uma Joseph

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SEMESTER - V

MULTIMEDIA SYSTEMS

1. Course Description

Programme: B.Sc.

Course Code: U24/CAP/DSE/501

Course Type: DISCIPLINE SPECIFIC ELECTIVE

No. of credits: 4

Max. Hours: 60

Hours per week: 4

Max. Marks: 100

2. Course Objectives

- To introduce various aspects of multimedia components like Images, audio, sound and computer graphics.
- To Provide hands-on training in Image Editing tools with software.
- To learn various animation techniques and apply them in making animations that work.

3. Course Outcomes

On completion of the course the student will be able to:

CO1: ***Illustrate*** and ***explain*** multimedia concepts such as Stages of a Multimedia Project, Hypermedia and Hypertext and Animation for the Web (Cognitive level – 2)

CO2: ***Apply*** various principles of making Images. (Cognitive level – 3)

CO3*: **Choose*** and ***apply*** the correct type of image tools for enhancing photographs and producing files for the web (Cognitive level - 5)

CO4: ***Design*** Animation that works using various Animation techniques and Animation file formats. (Cognitive level – 6)

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4. Course Content

MODULE I: INTRODUCING MULTIMEDIA (15 Hrs)

Multimedia- Definitions, Use of Multimedia, Introduction to Making Multimedia: The Stages of a Multimedia Project, Need, Creativity, Organization, Communication. Text-About Fonts and Faces, Cases, Serif Versus Sans Serif, Using Text in Multimedia, Computers and Text, Font editing and design tools, Hypermedia and Hypertext. Designing for the World Wide Web-Developing for the Web, Text for the Web, Images for the Web, Sound for the Web, Animation for the Web.

MODULE II: IMAGES (15 Hrs)

Images: Making Still Images, Bitmaps, Vector Drawing, 3-D Drawing and Rendering, Color, Understanding Natural Light and Color, Computerized Color, Color Palettes, Image File Formats.

MODULE III: IMAGE EDITING (15 Hrs)

Image Editing software: selection tools, working with layers, masks and channels, correcting and enhancing photographs, typographic design and vector drawing, working with 3D images, producing files for the web.

MODULE IV: ANIMATION (15 Hrs)

Animation-Principles of Animation, Animation by Computer, Animation Techniques, Animation File Formats, Making Animations that Work, a Rolling Ball, a Bouncing Ball, Creating an Animated Scene; Installing and using animation software (Flash or Blender), adding animation, Tweening, morphing; Interactive navigation-working with sound and video.

5. References

1. Multimedia: Making it Work, by Tay Vaughan, (Seventh Edition) (2010). McGraw Hill Professional.

6.Syllabus Focus

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

Local /Regional/National /Global Development Needs	Relevance
Global Development	Multimedia course covers comprehensive and diverse aspects of the Media & Design industry such as text, audio, video, still images, graphics, animation, etc that apply to various domains.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Modules 1 and 2	Learning the stages of multimedia designing for the world wide web and making still images.
EMP	Modules 3 and 4	Producing working files for the web

7. Pedagogy

S. No	Student Centric Methods Adopted	Type / Description of Activity
1.	Participative Learning	Seminar Presentation
2.	Experiential Learning	Quiz
3.	Participative Learning	Group Discussion

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8. Course Assessment Plan

a) Weightage of Marks in Continuous Internal Assessments and Written Exam

CO	Continuous Internal Assessments CIA -40%	Written Exam-60%
CO1	CIA-1 Written Test	Written Exam
CO2	CIA-1 Written Test	
CO3	CIA-2 Written Assignment	
CO4	CIA-2 Quiz	

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b) Model Question Paper- End Semester Exam

MULTIMEDIA SYSTEMS

Course code: U24/CAP/DSC/401 **Max. Marks: 60**

Credits:4 **Time: 2Hrs**

SECTION-A

I. Answer any Four: **4 x 10 = 40 M**

1. Explain the differences between serif versus San serif

OR

2. a) Explain what characteristic a block of text might have.
   b) How can different graphics be designed for WWW?
3. a) Describe the various factors that apply to the use of images in multimedia.
   b) Describe the use of colors and palettes in multimedia.

OR

4. Describe how you will use animation to create a bouncing ball.
5. Describe the selection tools and the different ways of manipulating a selection.

OR

6. Explain the different methods by which you can correct and enhance photographs.
7. Explain the procedure to be followed in animating an object.

OR

8. Explain how tweening and morphing can be done?

SECTION-B

II. Answer any Four: **4 x 5 = 20 M**

9. Explain the capabilities and limitations of bitmap images.
10. Describe the different styles that can be applied to layers.
11. What are the different image file formats?
12. List any 5 types of font Faces and 5 Styles for a font.
13. Explain how you will create and edit an image and apply blending effects.
14. Explain how animation in 2D can be done.

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MULTIMEDIA SYSTEMS
PRACTICAL

1. Course Description:

Programme: B.Sc. **Max Hours :30**

Course Code: U20/CAP/DSE/501/P **Max.Marks:50**

Course Type: DISCIPLINE SPECIFIC ELECTIVE **Hours per week:2**

No. of credits: 1

2. Course Objective:

- To introduce the various aspects of multimedia components like Images, audio, sound and computer graphics
- To provide hands-on training in the use of 2D using Image Editing tools with software and 2D animation.

3. Course Outcomes:

CO1: To compare and contrast Images and Animation.

CO2: To create vector and typographic designs and apply masking effect to images and create an animation using the tools panel.

PRACTICAL SESSIONS

1.Getting to know the Software interface. Get a photograph of yourself and scan it. Enhance the background and use clone, patch and healing brush tools to retouch the digital image.
2. Create a composite image out of 3 images from other photographs using selection tools. Use at least three layers.
3. Experiment with adding a gradient, changing the opacity, applying filters, etc.
4. Integrate text into a multimedia project using software tools. Experiment with font styles, sizes, and colors to convey different moods or themes.
5. Create a composite image using layer masks and channels.
6. Create a simple poster or document using either serif or sans-serif fonts. Write a short message to compare how the two fonts look and feel.
7. Exercises on Color Palettes.
8. Design a personal Logo using vector drawing.
9. Designing a book cover or CD cover using the techniques learnt.
10. Installing animated software and getting to know the interface.
11. Create a simple animation sequence using motion tweening.

12. Dynamic content - bouncing ball, adding sound.
13. Create Animated Text.
14. Create a simple bouncing ball animation applying squash and stretch principles. Experiment with different levels of exaggeration.
15. Designing a Project: Create an online content-rich media using multimedia applications on a topic of your choice.

MULTIMEDIA SYSTEMS PRACTICAL

Course Code: U24/CAP/DSE/501/P
Credits:1

Time: 2Hrs
Max Marks:50M

I. Answer any two:

1. Create an animation to roll a ball

2. Create a banner for farewell.

3. Create a simple animation sequence using motion Tweening.

c) Question Paper Blueprint

Modules	Hours Allotted in the Syllabus	COs Addressed	Section A (No. of Questions)	Total Marks	Section B (No. of Questions)	Total Marks
1	15	CO-1	2	10	2	5
2	15	CO-2	2	10	1	5
3	15	CO-3	2	10	1	5
4	15	CO-4	2	10	2	5

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SEMESTER V

NUTRITIONAL BIOCHEMISTRY

1. Course Description

Programme: B.Sc.
Course Code: U24/BIC/GE/501
Type of course: GE
No. of credits: 4

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

2. Course Objective:

- Students will have a comprehensive understanding of energy metabolism, biomolecules, vitamins, and nutraceuticals.
- Enabling them to apply this knowledge to real-world scenarios and make informed decisions related to nutrition and health.

2. Course Outcome:

This course will help students to –

CO 1: Explain the fundamentals of energy metabolism along with factors and techniques related to it. (L2)

CO 2: Analyze the nutritional relevance of carbohydrates and discuss the important amino acids and lipids and their role in maintaining overall health. (L2, L4)

CO 3: Classify various vitamins elaborately including their sources, biochemical. roles, deficiency, toxicity (L4)

CO 4: Assess nutritional status of an individual and nutraceuticals (L5)

4. Course Content

Module I: ENERGY METABOLISM **(15hr)**

Unit of energy, biological oxidation of foodstuff, Measurement of energy content of food. Physiological energy value of foods, SDA. Measurement of energy expenditure- Direct and indirect calorimetry, factors affecting thermogenesis, energy utilization by cells, energy output- Basal and resting metabolism, physical activity, factors affecting energy input- Hunger, appetite, energy balance. Energy expenditure in man. Estimating energy requirements, BMR factors. Recommended dietary allowances for different age groups.

MODULE II: DIETARY MACRONUTRIENTS & HEALTH **(15hr)**

Sources and classification of macronutrients in the body. Digestion, absorption, utilization, and storage of these with their hormonal regulation. Dietary requirements for homeostasis and health.

Nutritional relevance of carbohydrates- Simple sugar, Complex sugar, Dietary fibers, and GI.

Essential fatty acids. Function of EFA, RDA- excess and deficiency of EFA. Lipotropic factors, role of saturated fat, cholesterol, lipoproteins, and triglycerides. Importance of the following: Omega fatty acids-3 and 6, Mono, polyunsaturated and saturated fatty acids, Dietary implications of fats and oils.

Essential and non-essential amino acids, amino acid availability, antagonism, toxicity, amino acid supplementation, Effects of deficiency, Amino acid pool, NPU, biological Value. Nitrogen balance, Biological Value, RDA for different age groups' – Kwashiorkor, Marasmus.

Module III: MICRONUTRIENTS AND MINERALS **(15hr)**

Micronutrients: Vitamins - sources, structure, biochemical role, deficiency disorders of water- and fat-soluble vitamins, Role of Vitamin A as antioxidant in visual cycle, immunity, vitamin E as antioxidants, role of vitamin C as cofactors in Amino acid modification, extra skeletal role of vitamin D and its effects in bone physiology, Vitamin B6 dietary source, RDA, Hypervitaminosis

Minerals- Fe, Ca, Cr, Mn, Mg, I, Cu, Mo, Zn, Se, F, P distribution in the body, sources, functions, deficiency, and toxicity.

Module IV: ASSESMENT OF NUTRITIONAL STATUS & NUTRACEUTICALS **(15 hr)**

Anthropometric measurements. Z score, BMI, skinfold, circumference ratio, Biochemical Assessment-Urine analysis, Assessment of Anemia, ROS assessment, GTT and glycosylated Hb, Differential diagnosis of B12 and folate.

Nutraceuticals: Nutrient interactions, alcohol Consumption and nutrient deficiency, appetite changes with drug interaction and malnutrition. Food as medicine.

5. Reference Books:

1. Textbook of Biochemistry with Clinical Correlations, Devlin, T.M John Willey Sons. Inc. (New York), ISBN;978-0-4710-228173-4.
2. Principles of nutritional Assessment (2005). Rosalind Gibson. Oxford University Press.
3. Nutrition for Health Fitness and Sports (2-013); Williams. MH Anderson, DE Rawson, McGraw-Hill International Edition. ISBN 978-0-07-131816-7
4. Kraus's food and nutrition care process (2012); Mahan LK Strings Elsevier's Publication ISBN;978-1-43-77-22-33-8.
5. The vitamins, Fundamental aspects in nutrition and health (2008); GF Coombs Jr. Elsevier's Publication ISBN 13-978-0-12-183493-7.

6. Syllabus Focus

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

Local /Regional/National /Global Development Needs	Relevance
Global	Important topics covered in curricula include global health, well-being, nutrition, metabolism, nutritional science, and developments in public health.

b) Components on Skill Development/Entrepreneurship development/Employability

SD	All general topics in module I, II, III, IV	Lecture
EMP	BMR, knowledge of homeostasis, health and nutritional status	Group Discussion
Entrepreneurship	Nutraceuticals	Lecture

7. Pedagogy

S. No	Student Centric Methods Adopted	Type/Description of Activity
1.	Model Making	Participative Learning
2.	Quiz	Experiential Learning
3.	Group Discussion	Participative 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	
C04	CIA-2 – Assignment/ model making/ PPT	

b) Model Question Paper

NUTRITIONAL BIOCHEMISTRY

Code : U24/BIC/GE/501 **Max Marks : 60**
Credits : 4 **Time : 2Hrs**

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

1. (a) Explain the physiological energy value of food. Describe the method of measurement of energy content of food.

   OR

   (b) Explain BMR and factors effecting energy input.

2. (a) Explain the sources, absorption, and digestion of carbohydrates?

   OR

   (b) Explain in detail Protein energy malnutrition. Add a note on Symptoms of Kwashiorkor and marasmus.

3. (a) Explain the physiological role of micronutrients.

   OR

   (b) Classify the vitamins and explain the role of Vitamin A in Vision Cycle.

4. (a) Explain different methods of Assessment for nutritional status.

   OR

   (b) Explain Nutraceuticals. Justify Food as medicine.

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

5. Factors affecting thermogenesis.
6. RDA for young man/woman
7. Essential fatty acids
8. NPU
9. Biological Role of Ca
10. Hyper- vitaminosis

CBCS-2024

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

GE: Nutritional Biochemistry

SECTION A - INTERNAL CHOICE (4 X 10 M = 40 M)				
Question Number	**Question**	**Question**	**CO**	**BTL (Blooms Taxonomy Level)**
1	Module 1	Explain the physiological energy value of food. Describe the method of measurement of energy content of food	CO 1	2
2	Module 1	Explain BMR and factors effecting energy input.	CO 1	2
3	Module 2	Explain the sources, absorption, and digestion of carbohydrates	CO 2	2
4	Module 2	Explain in detail Protein energy malnutrition. Add a note on Symptoms of Kwashiorkor and marasmus.	CO 2	3
5	Module 3	Explain the physiological role of micronutrients.	CO 3	2
6	Module 3	Classify the vitamins and explain the role of Vitamin A in Vision Cycle	CO 3	4
7	Module 4	Explain different methods of Assessment for nutritional status.	CO 4	2
8	Module 4	Explain Nutraceuticals. Justify Food as medicine.	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	Factors affecting thermogenesis.	CO 1	2
10	Module 2	RDA for young man/woman	CO 2	2,4
11	Module 2	Essential fatty acids	CO 2	2,4
12	Module 2	NPU	CO 2	2,4
13	Any Module	Biological Role of Ca	CO 3	4
14	Any Module	Hyper- vitaminosis	CO 4	5

SEMESTER-V
PHP with MYSQL

1. Course Description:

Programme: B.Sc. **Max. Hours: 30**

Course Code: U24/CSC/SEC/501 **Hours per week: 2**

Course Type: SKILL ENHANCEMENT COURSE **Max.Marks:50**

No. of credits: 2

2. Course Objectives:

To provide the knowledge necessary to design and develop dynamic, database-driven web pages using PHP.

3. Course Outcomes:

This SEC paper will help students to enhance their overall skills and to:

- **CO1:** A*nalyze* the basic structure of a PHP web application and its deployment on the s server. (Cognitive Level 4)
- **CO2**: ***Develop*** a database driven dynamic website using PHP and MySQL. (Cognitive Level 6)

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4. **Course Content:**

Module I: Handling HTML Forms **(15 Hrs)**

Submitting form values, using $_Get and $_Post Methods, Accessing form inputs with Get/Post functions, Combining HTML and PHP codes together on single page, Redirecting the user.

Module II: DATABASE CONNECTIVITY USING PHP **(15 Hrs)**

Database connectivity - Using the MYSQLI extension, setting up the connection, handling errors, querying the database, committing and rolling back a transaction.

5. References:

1. "Beginning PHP 5.3", by Matt Doyle, Wiley Publishing, Inc., 1/E, 2010.
2. "Web Technologies Black Book", by Kogent Learning Solutions Inc. DreamTech Press, 1/E,2009.
3. "Beginning PHP and MySQL from Novice to Professional" by W. Jason Gilmore., Apress, 4/E, 2010.
4. "PHP and MySQL Web Development" by Luke Welling, Laura Thomson, Pearson, 4/E, 2016.

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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	The **PHP Hypertext Preprocessor (PHP)** is a programming language that allows web developers to create dynamic content that interacts with databases. PHP is basically used for developing web-based software applications

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	Module 1	Creating HTML Forms
EMP	Module 2	Mini Project

7. Course Assessment Plan

a) Weightage of Marks in Formative and Summative Assessments

Formative Assessment - FA (50%)	Summative Assessment - SA (50%)
CIA-20 marks Mini project/Assignment/ Problem solving/Case studies	End Semester Exam – 30 Marks

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b) Question Paper Pattern

PRACTICAL MODEL QUESTION PAPER

Course Code: U24/CSC/SEC/501 **Max Time: 1 Hr**
Credits: 2 **Max. Marks: 30**

Answer any 2 of the following:

1. Write a PHP Script for creating Fibonacci Series with recursive function.
2. Write a PHP Script to demonstrate Single Inheritance.
3. Write a PHP Script using built-in String functions.

Prepared by	Checked & verified by	Approved by
Ms. Preethi Geetla Faculty.	**Ms. Sowjenya** **HOD**	**Dr. Uma Joseph** **Principal**

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SEMESTER-V

Programming in JAVA

1. Course Description

Programme: B.Sc. **Max. Hours: 60**

Course Code: U24/CAP/DSE/502 **Hours per week: 4**

Type of course: DISCIPLINE SPECIFIC ELECTIVE **Max. Marks: 100**

No. of credits: 4

2. Course Objectives:

- To write an Object-Oriented computer program to solve specified problems.
- To apply Object Oriented principles like inheritance, polymorphism to develop programs.

3. Course Outcomes:

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

CO1: ***Illustrate*** an integrated development environment to write, compile, run, and test simple object- oriented Java programs. (Cognitive level-3)

CO2: ***Analyse*** classes, objects, members of a class and relationships among them, needed for a specific problem. (Cognitive level-4)

CO3: ***Demonstrate*** the concepts of polymorphism and inheritance. (Cognitive level-3)

CO4: ***Demonstrate*** OOPS concepts using JAVA and help them to create programs and applications in java. (Cognitive level-3)

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4. Course Content

MODULE I: INTRODUCTION TO JAVA **(15 hrs)**

Introduction to Java-Identifiers, Variables, Written Assignment Statements, Written Assignment Expressions, Constants (final keyword), Data types and Operations, Console Input using Scanner class, Selections, Looping, Arrays.

MODULE II: OBJECT ORIENTED PROGRAMMING **(15 hrs)**

Objects and classes-Introduction, defining classes for Objects, Constructing Objects Using Constructors, Static Variables, Constants and Methods, Visibility Modifiers, Data Field Encapsulation, Passing Objects to Methods; This Reference, Class Abstraction and Encapsulation.

MODULE III: INHERITANCE AND POLYMORPHISM **(15 hrs)**

Inheritance and polymorphism-Introduction, Super classes and Subclasses, Types of Inheritance, Using the super Keyword, Overriding Methods, overriding vs. Overloading, Polymorphism, Static vs. Dynamic Binding, Preventing Extending and Overriding -Final Methods; Abstract Classes and Interfaces- Introduction, Abstract Classes, Interfaces, Interfaces Vs Abstract Classes.

MODULE IV: EXCEPTION HANDLING AND BUILT IN CLASSES **(15 hrs)**

Exception Handling-Introduction, Exception-Handling Overview, Exception-Handling Advantages, Exception Types, Declaring Exceptions, Throwing Exceptions, Catching Exceptions, Getting information from Exceptions, Object Class, String Class, Array Class, Command-Line Arguments.

5. References:

1. Programming with Java, by BalaguruSamy,3rd Edition,2007
2. Introduction to JAVA Programming by Liang, Y. Daniel. (7th Edition). Pearson Education,2008.
3. An Introduction to Object-Oriented Programming with Java by C. Thomas Wu,5E, McGraw Hill Higher Education 2009.

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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	JAVA is a high-level, class-based, object-oriented programming language that is designed to have as few implementation dependencies as possible.

b) Components on Skill Development/Entrepreneurship Development/Employability

SD/ED/EMP	Syllabus Content	Description of Activity
SD	MODULE -1,2	Designing and writing JAVA programs using Scanner class and loops.
EMP	MODULE 3,4	Testing programming skills in JAVA, including using its libraries and troubleshooting code

7. Pedagogy

S. No	Student Centric Methods Adopted	Type/Description of Activity
1.	Participative Learning	Seminar Presentation
2.	Experiential Learning	Quiz
3.	Participative Learning	Group Discussion

8. Course Assessment Plan

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

COs	Continuous Internal Assessments – CIA (40%)	Written Exam (60%)
CO1	CIA-1 Written test	Written Exam
CO2	CIA-1 Written test	
CO3	CIA-2 Quiz	
CO4	CIA-2 Presentation	

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b) Question Paper Pattern

Programming in JAVA

Course Code: U24/CAP/DSE/502 **Max. Marks: 60**
Credits:4 **Time: 2Hrs**

I. Answer the following: **4 x 10 = 40 M**

1. Explain the data types that support in Java?

OR

2. Discuss various loop statements available in Java? Show their syntax.

3. Define a constructor. Explain the various types of constructors with an example.

OR

4. How static methods can be defined and accessed. Explain with an example.

5. Write a short note on inheritance. Write a program to demonstrate inheritance.

OR

6.Define the: abstract classes & interfaces. What are the similarities and differences between abstract classes and interfaces?

7. Define Exception. Explain the following terms with respect to exception handling. i) try ii) catch iii) throw iv) finally.

OR

8.a) What is command line argument in java

b) Write a program to convert lower case string to upper case.

SECTION - B

II. Answer any FOUR **4 x 5 = 20 M**

9. Write a program to search a number in an array.
10. Write a program to demonstrate constructors.
11. Explain class abstraction and class encapsulation with appropriate examples.
12. Explain the differences between method overloading and method overriding.
13. Explain types of Access Modifiers.
14. What is the purpose of declaring exceptions? How do you declare an exception? Give an example.

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PROGRAMMING IN JAVA
PRACTICAL

1. Course Description

Course Code: U24/CAP/DSE/502/P **Max. Time: 2 hrs**

Course Type: DISCIPLINE SPECIFIC ELECTIVE **Max. Marks:50**

No. of Credits:1

2. Course Objective:

1. To write an Object-Oriented computer program to solve specified problems.
2. To apply Object Oriented principles like inheritance, polymorphism to develop programs.

3. Course Outcomes:

CO1: Use an integrated development environment to write, compile, run, and test simple object- oriented Java programs.

CO2: Demonstrate the concepts of Objects, polymorphism and inheritance, error handling techniques using exception handling.

PRACTICAL SESSIONS

1. Basic Programs using arithmetic operators, logical & relational operators.
2. Programs on Conditional statements
3. Programs on Looping
4. Programs on Arrays
5. Implementing Classes and methods
6. Constructors and constructor overloading (default, parameterized)
7. Method overloading,
8. Passing Objects as parameters to methods
9. Programs using Static member data and static methods, this keyword.
10. Programs on Visibility Modifiers
11. Single inheritance and Multilevel inheritance (using super keyword)
12. Program to perform String operations.
13. Program to perform methods of Array class.
14. Program on Abstract Classes and Interfaces
15. Programs on Exception Handling- Declaring, Throwing, Catching Exceptions, getting information from Exceptions, finally Block.

MODEL QUESTION PAPER

PRACTICAL

Course Code: U24/CAP/DSE/502/P **Max. Marks: 50**

Credits:1 **Max. Time: 2 hrs**

Answer any two: **2 x 25 = 50 M**

1. Write a java program to implement method overriding.
2. Write a java program to illustrate usage of try/catch with finally clause.
3. Write a java program to implement Multilevel inheritance

c) Question Paper Blueprint

Modules	Hours Allotted in the Syllabus	COs Addressed	Section A (No. of Questions)	Total Marks	Section B (No. of Questions)	Total Marks
I	15	1	2	10	2	5
II	15	2	2	10	1	5
III	15	3	2	10	1	5
IV	15	4	2	10	2	5

9. CO-PO Mapping:

CO	PO	Cognitive Level	Classroom sessions(hrs)
1	1	3	15
2	2	4	15
3	2	3	15
4	1	3	15

Prepared by	Checked & Verified	Approved by the Principal
Ms. Ummiya Mohammedi Teaching Faculty	Ms. D. Sowjenya HOD	Dr. Uma Joseph Principal

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