BBAI501 HUMAN VALUES AND PROFESSIONAL ETHICS

SUBJECT CODE	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
		THEORY			PRACTICAL		L	T	P	CREDITS
		END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BBAI501	Human Values and Professional Ethics	60	20	20	-	-	4	-	-	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
*Teacher Assessment shall be based on following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives

The objective of the course is to disseminate the theory and practice of moral code of conduct and familiarize the students with the concepts of "right" and "good" in individual, social and professional context

Course Outcomes

1. Help the learners to determine what action or life is best to do or live.
2. Right conduct and good life.
3. To equip students with understanding of the ethical philosophies, principles, models that directly and indirectly affect business.

COURSE CONTENT

Unit I: Human Value
1. Definition, Essence, Features and Sources
2. Sources and Classification
3. Hierarchy of Values
4. Values Across Culture

Unit II: Morality
1. Definition, Moral Behaviour and Systems
2. Characteristics of Moral Standards
3. Values Vs Ethics Vs Morality
4. Impression Formation and Management

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Unit III: Leadership in Indian Ethical Perspective.
1. Leadership, Characteristics
2. Leadership in Business (Styles), Types of Leadership (Scriptural, Political, Business and Charismatic)
3. Leadership Behaviour, Leadership Transformation in terms of Shastras (Upanihads, Smritis and Manu-smriti).

Unit IV: Human Behavior – Indian Thoughts
1. Business Ethics its meaning and definition
2. Types, Objectives, Sources, Relevance in Business organisations.
3. Theories of Ethics, Codes of Ethics

Unit V: Globalization and Ethics
1. Sources of Indian Ethos & its impact on human behavior
2. Corporate Citizenship and Social Responsibility – Concept (in Business),
3. Work Ethics and factors affecting work Ethics.

Suggested Readings

1. Beteille, Andre (1991). *Society and Politics in India*. Athlone Press:New Jersey.
2. Chakraborty, S. K. (1999). *Values and Ethics for Organizations*. oxford university press
3. Fernando, A.C. (2009). *Business Ethics - An Indian Perspective* .India: Pearson Education: India
4. Fleddermann, Charles D. (2012). *Engineering Ethics*. New Jersey: Pearson Education / Prentice Hall.
5. Boatright, John R (2012). *Ethics and the Conduct of Business.*Pearson. Education: New Delhi.
6. Crane, Andrew and Matten, Dirk (2015). *Business Ethics*. Oxford University Press Inc:New York.
7. Murthy, C.S.V. (2016). Business *Ethics – Text and Cases*. Himalaya Publishing House Pvt. Ltd:Mumbai
8. Naagrajan, R.R (2016). *Professional Ethics and Human Values*. New Age International Publications:New Delhi.

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Semester IV (B.Sc. Chemistry Hons)

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME					Th	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BSHCH 403	DC	SPECTROSCOPIC METHODS AND STRUCTURE DETERMINATION	60	20	20	0	0	4	1	0	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; Q/A – Quiz/Assignment/Attendance, MST Mid Sem. Test.
*Teacher Assessment shall be based on following components: Quiz/Assignment/Project/ Participation in class, given that no component shall exceed more than 10 marks.

Course Objective:
(i)   To develop the understanding of fundamentals of Spectroscopy.
(ii)   To develop the understanding of structure determination.
(iii)   To give basic knowledge of Spectroscopic Methods.

Course Outcomes:
After completion of the course the students will be able to understand :

(i) Fundamentals of Spectroscopy.
(ii) Fundamentals of Spectroscopic Methods and Structure Determination.

Spectroscopic Methods and Structure Determination

Unit I
Rotational and Vibrational spectra: Basic principles, selection rule, fundamental vibrations, Raman Effect. Identification of some representative organic and inorganic compounds.

Electronic spectra: Frank-Condon principle, Fluorescence, Phosphorescence, electronic spectra of diatomic molecules, chromophores , auxochromes, absorption and intensity shifts, solvent effects, Woodward Fieser rules.

Unit II
Nuclear Magnetic Resonance Spectroscopy: Basic principles, origin of chemical shifts, factors affecting the chemical shifts and their interpretation, spin-spin coupling, relaxation processes, coupling constants. Nuclear Overhouser Effect (NOE) 2D-NMR, 1H, 13C, and 19F NMR spectra of selected compounds. Shift reagents.

Unit III
EPR spectroscopy: Basic principles, origin of g-shifts , hyperfine and super hyperfine coupling, spin orbit coupling, line shape, zero field splitting, Kramer degeneracy, ESR analysis of organic radicals, transition metal complexes of vanadium, copper, cobalt and iron.

Mass spectrometry: Basic principles and instrumentation, mass spectral fragmentation of organic compounds, applications to organometallic compounds.

Unit IV
Mössbauer Spectroscopy: Nuclear resonance absorption, recoil energy, Doppler effect, Mössbauer effect, Isomer shift, quadruple interactions, effect of magnetic field, determination of oxidation states of iron (including bioinorganic systems, ferredoxins) tin and cobalt compounds.

Unit V
X-ray Diffraction: X-ray diffraction by single crystal – Space groups –Systematic absences in X-ray data and identification of lattice types , glide planes and screw axes.X-ray intensities, structure factor and its relation to intensity and electron density , phase problem. Structure solution by Heavy atom method and direct method. Determination of absolute configuration of molecules
Electron Diffraction by Gases - Scattering intensity vs Scattering angle, elucidation of structure of simple gas phase molecules.
Neutron Diffraction by Crystals – magnetic scattering, measurement techniques. Elucidation of structure of magnetically ordered unit cell.

Books:
1. C.N. Banwell, Fundamentals of molecular Spectroscopy, TMH, New Delhi.
2. B.P. Straughan and S.Walker Spectroscopy Vol.3, Chapman Hall London.
3. P.M. Silverstein, F. X. Wester, Spectroscopic Identification of Organic Compounds, Wiley.
4. Y.R. Sharma , Elementary Organic Spectroscopy – Principles and Chemical applications, S.Chand.
5. P.S.Kalsi, Spectroscopy of Organic Compounds.
6. Drago, R. S. Physical Methods for Chemistry, (Saunders Company).

7. Nakamoto, K. Infrared and Raman Spectra: Inorganic and Coordination Compounds, (John Wiley).

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CR EDI TS
			END SEM University Exam	Two Term Exam	Teach ers Assess ment*	END SEM Unive rsity Exam	Teachers Assessment *				
BSHCH-408	DC	CHEMICAL TECHNOLOGY (HEAVY AND FINE CHEMICALS)	60	20	20	0	0	4	0	0	4

Semester IV (B.Sc. Chemistry Hons)

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;
Q/A – Quiz/Assignment/Attendance, MST Mid Sem Test.
*Teacher Assessment shall be based on following components: Quiz/Assignment/Project/ Participation in class, given that no component shall exceed more than 10 marks.

Course Objective:

  (i) To develop the understanding of fundamentals of Chemistry of Heavy Inorganic Chemicals , Heavy Organic Chemicals and Fine Chemicals
  (ii) To give basic knowledge of Heavy and Fine Chemicals.

Course Outcomes:
After completion of the course the students will be able to understand:

  (i) Fundamentals of Chemistry of Heavy Inorganic Chemicals, Heavy Organic and Fine Chemicals.
  (ii) Fundamentals of Heavy and Fine Chemicals.

HEAVY AND FINE CHEMICALS

Unit I
Heavy Inorganic Chemicals
Basic concept of Heavy Inorganic Chemicals and Manufacture of following with reference to:
  (i) Raw material,
  (ii) Production process,
  (iii)Quality control,
  (iv)Hazards and safety,

(v) Effluent management.

Ammonium phosphates, super phosphate, triple super phosphate, carbon blacks, manufacture of graphite and carbon, calcium carbide, silicon carbide, sodium thiosulphate, borax and boric acid.

Unit II
Industrial catalysts

Raney nickel, other forms of nickel, palladium and supported palladium, copper chromate, vanadium and platinum based catalyst. Aluminium alkoxides, titanium tetrachloride and titanium dioxide.

Speciality industrial solvents : Synthesis, properties and uses of Dimethyl-formamide (DMF) , Dimethyl sulfoxide (DMSO), Tetrahydrofuran (THF), Dioxane, Diethyl ether and sulfolane.

Unit III
Fine Chemicals

Basic concept of Fine Chemicals. And Manufacture of following with reference to –
   (i) Raw material,
   (ii) Production process,
   (iii)Quality control,
   (iv)Hazards and safety,
   (v) Effluent management.

Sodium borohydrate, lithium aluminium hydride, sodium ethoxide, paracetamol, indigo, vat dyes. Essential oils, surfactants and emulsifying agents, coloring agents- manufacture of some natural and synthetic colors. Flavouring agents – fragrance and food additives. Biochemical reagents – ninhydrin, tetrazolium blue, 1,2-naphthaquinone-4-sulphonate.

Unit IV
Heavy Organic Chemicals

Basic concept of Heavy Organic Chemicals and Manufacture of following with reference to –
(i)   Raw material,
(ii)   Flow chart,
(iii)   Effluent management.
(iv)   Uses.

Fischer-tropsch synthesis. Applications and uses of zeolites as catalyst. Propargyl alcohol, 1,4-butanediol, vinyl chloride, pyridines, picolines, phthalic anhydrides, glycerol, sorbitol, chloroform, ethanolamine. Industrial solvents – DMF, DMSO, sulpholane, alkyl pyrrolidone, THF, dioxane.

Unit V
Acids: Manufacture, Properties and uses of Nitric acid, Sulphuric acid, Phosphoric acid, Hydrochloric acid
Industrial Gases: Hydrogen, Nitrogen, Oxygen, Carbon dioxide and Sulphur dioxide.
Alkali: Sources, uses and preparation of sodium chloride, Manufacture and uses of Sodium hydroxide, Sodium carbonate, Sodium bicarbonate and sodium hypochlorite.

Books:
1. Chemical process industries by Shreve R. N. , McGraw Hill
2. Industrial chemistry by B.K. Sharma 7th edition
3. Introduction to material science and engineering by K.M. Rells, T. Courtney and J. Wulff, Wiley Dastern Pvt. Ltd. New Delhi
4. Unit process in organic synthesis by P.H Groggine, McGrow Hill Kogakusin Ltd.
5. Outline of chemical technology by G.E. Dryen, East West Press, New Delhi
6. Industrial chemicals by Faith et. al. Wiley Interscience, New York
7. Heavy organic chemicals by A. J. Saile, Pargaon Press U.K.

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DEGREE PROGRAM

B.Sc. IV Sem

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL					
			End Sem University Exam	Two Term Exam	Teachers Assessment *	End Sem University Exam	Teachers Assessment*	Th	T	P	CREDITS
BSPH402	DC	Electrostatics & Magneto statics	60	20	20	30	20	3	1	4	6

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;
Q/A – Quiz/Assignment/Attendance, MST MidSem Test.
*Teacher Assessment shall be based on following components: Quiz/Assignment/ Project/Participation in class (Given that no component shall be exceed 10 Marks)

Course Objectives:-

1. To develop the comprehensive understanding of laws of physics related to Electrostatics & Magnetostatics and ability to apply them for laying the foundation for research and development.

2. To work ethically as member as well as leader in a diverse team.

Course Outcomes:-

1. Student will be able to understand and solve the problems related to Electrostatics.

2. Student will be able to understand and solve the problem related to Magnetostatics.

3. Student will be able to determine physical parameter experimentally with optimal usage of resources and complete the assignments in time.

BSPH 402-Electrostatics &Magnetostatics

Unit-1

Electric Circuits AC Circuits: - Complex Reactance and Impedance. Series LCR Circuit: Resonance, Power Dissipation and Quality Factor, and Band Width. Parallel LCR Circuit.Network theorems: - Ideal Constant voltage and Constant-current Sources, Network Theorems: Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem, and Maximum Power Transfer theorem.

Unit-2

Electrostatics Coulombs law in vacuum expressed in vector forms, calculations of electric field E for simple distributions of charge at rest, dipole and quadruple fields. Relation between electric field & electric potential ($E = - \nabla V$), torque on a dipole in a uniform electric field and its energy, flux of the electric field, Gauss's law and its application.. Dielectrics, parallel plate capacitor with a dielectric, dielectric constant, polarization and polarization vector P, relation between displacement vector D, E and P. Molecular interpretation of Claussius-Mossotti equation

Unit-3

Magnetostatics Force on a moving charge, Lorentz force equation and definition of B, force on a straight conductor carrying current in a uniform magnetic field, torque on a current loop, magnetic dipole moment, angular momentum and gyro magnetic ratio, Biot and Savart's law, Electromagnetic induction, Faraday's Laws, Electromotive force, Integral and differential forms of Faraday's laws, Self and mutual inductance, Transformers, Energy in a static magnetic field, Maxwell's displacement current, Derivations of Maxwell's equations, Electromagnetic field energy density. Poynting vector,

Unit-4

Current Electricity: Steady current, current density J, non-steady currents and continuity equation, Kirchoff's laws and analysis of multi loop circuits, growth and decay of current in LR and CR circuits, decay constants, LCR circuits. AC circuits, complex numbers and their applications in solving AC circuits problems, complex impedance and reactance, series and parallel resonance. Q-factor, power consumed by an A.C. circuit, power factor, Y and Δ networks and transmission of electric power.

Unit-5

Dielectric Properties of Matter Dielectrics:- Electric Field in Matter. Dielectric Constant.Parallel Plate Capacitor with a Dielectric.Polarization, Polarization Charges and Polarization Vector.Electric Susceptibility.Gauss's law in Dielectrics.Displacement vector D. Relations between the three Electric Vectors. Capacitors filled with Dielectrics.

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References:

1. Introduction to Electrodynamics: David J. Griffiths, 4th Edition, Printice Hall.
2. Classical Electrodynamics: Jhon David Jackson, Jhon Wiley & Sons.
3. Electrodynamics: Emi Cossor&Bassin Lorraine, Asahi Shimbunsha Publishing Ltd.
4. From Neuron to Brain: Kuffler and Nicholas, Sinauer Associates, Inc Pub. Sunderland, Masschuetts (Reference for topics of Bioelectricity) Department of Higher Education, Government of Mad

List of Experiments:

1. Hall probe method for measurement of resistivity.
2. To Study Series Resonance CKT
3. Charging and discharging of Capacitor through resistance
4. Study of B-H Curve (Magneto statics)
5. To study Parallel Resonance
6. Measurement of Frequency of A.C. mains by electrically maintained vibrating rod.(Electromagnetic induction)
7. Growth and decay of current in LR
8. Determination of e/m using Thomson's method.
9. Verification of Thevenin theorem
10. Verification of Norton theorem
11. Verification of Superposition theorem
12. Verification of Maximum Power Transfer theorem.

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Name of Program : B.Sc. Physics (Honors)/ Chemistry (Honors)

Subject Code	Category	Subject Name	Teaching & Evaluation Scheme								
			Theory			Practical					
			End Sem University Exam	Two Term Exam	Teacher Assessment	End Sem University Exam	Teacher Assessment	L	T	P	CREDITS
BSCS404	Compulsory	Database Management System	60	20	20	0	0	3	0	0	3

Legends: L – Lecture; **T** – Tutorial/Teacher Guided Student Activity; **P** – Practical; **Q/A** – Quiz/Assignment/Attendance; MST – Mid Semester Test.
*Teacher Assessment shall be based on following components: Quiz/Assignment/Project/Participation in class activities, given that no component shall exceed more than 10 marks

Course Education Objectives (CEOs):

- To provide a sound introduction to the discipline of database management as a subject in its own right, rather than a compendium of techniques and product specific tools.
- To give a good formal foundation on the relational model of data.
- To present SQL and procedural interfaces to SQL comprehensively.
- To give an introduction to systematic database design approaches covering conceptual design, logical design and an overview of physical design.
- To introduce the concepts of transactions and transaction processing.

Course Outcomes (COs):

- Design any Desktop application using an entity relationship diagrams (ERD) to express requirements and demonstrates skills to model data requirements and create data models.
- Understanding of database systems theory in order to apply that knowledge to any particular database implementation using Structured Query Language (SQL).
- To learn and understand various Database Architectures and Applications.
- Develop an ability to remove data redundancy by translating created relational model into normalized designs.

UNIT-I
Introduction: An overview of database management system, database system Vs file system,Characteristics of database approach, DBMS architecture, data models, schema and instances,data independence.

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Shri Vaishnav Institute of Computer Applications

Name of Program : B.Sc. Physics (Honors)/ Chemistry (Honors)

Subject Code	Category	Subject Name	Teaching & Evaluation Scheme								
			Theory			Practical					
			End Sem University Exam	Two Term Exam	Teacher Assessment	End Sem University Exam	Teacher Assessment	L	T	P	CREDITS
BSCS404	Compulsory	Database Management System	60	20	20	0	0	3	0	0	3

UNIT II
Data Modelling using Entity Relationship Model: Entity, Entity types, entity set, notation for ER diagram, attributes and keys, Concepts of composite, derived and multivalued attributes, Super Key, candidate key, primary key, relationships, relation types, weak entities, enhanced E-R and object modelling, Sub Classes:, Super classes, inheritance, specialization and generalization.

UNIT – III
Introduction to SQL: Overview, Characteristics of SQL. Advantage of SQL, SQL data types and literals.
Types of SQL commands: DDL, DML, DCL. Basic SQL Queries.
Logical operators: BETWEEN, IN, AND, OR and NOT
Null Values: Disallowing Null Values, Comparisons Using Null Values
Integrity constraints: Primary Key, Not NULL, Unique, Check, Referential key Introduction to Nested Queries, Correlated Nested Queries, Set-Comparison Operators, Aggregate Operators: The GROUP BY and HAVING Clauses.

UNIT – IV
Relational Data Model: Relational model terminology domains, Attributes, Tuples, Relations, characteristics of relations, relational constraints domain constraints, key constraints andconstraints on null, relational DB schema. Codd's Rules.
Relational algebra: Basic operations selection and projection, Set Theoretic operations Union, Intersection, set difference and division,
Joins: Inner joins, Outer Joins, Left outer, Right outer, full outer joins. Overview of views and indexes.

UNIT V
ER to relational Mapping: Data base design using ER to relational language.
Data Normalization: Functional dependencies, Armstrong's inference rule, Normal form up to 3rd normal form.

TEXT BOOKS:
1. R. Elmarsi and SB Navathe, "Fundamentals of Database Systems", Pearson,6th ed.
2. Singh S.K., "Database System Concepts, design and application", Pearson Education
3. Ramakrishnan and Gherke, "Database Management Systems", TMH.

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Name of Program : B.Sc. Physics (Honors)/ Chemistry (Honors)

Subject Code	Category	Subject Name	Teaching & Evaluation Scheme								
			Theory			Practical					
			End Sem University Exam	Two Term Exam	Teacher Assessment	End Sem University Exam	Teacher Assessment	L	T	P	CREDITS
BSCS404	Compulsory	Database Management System	60	20	20	0	0	3	0	0	3

REFERENCE BOOKS:
1. Abraham Silberschatz, Henry Korth, S. Sudarshan, "Database Systems Concepts", 4th Edition, McGraw Hill, 1997.
2. Jim Melton, Alan Simon, "Understanding the new SQL: A complete Guide", MorganKaufmann Publishers, 1993.
3. A.K. Majumdar, P. Battacharya, "Data Base Management Systems', TMH, 1996.
4. Bipin Desai, "An Introduction to database Systems", Galgotia Publications, 2012.

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Name of Program : B.Sc. Physics (Honors)/ Chemistry (Honors)

Subject Code	Category	Subject Name	Teaching & Evaluation Scheme								
			Theory			Practical					
			End Sem University Exam	Two Term Exam	Teacher Assessment	End Sem University Exam	Teacher Assessment	L	T	P	CREDITS
BSCL408	Compulsory	Lab in DBMS	0	0	0	30	20	0	0	2	1

Legends: L – Lecture; **T** – Tutorial/Teacher Guided Student Activity; **P** – Practical; **Q/A** – Quiz/Assignment/Attendance; MST – Mid Semester Test.
*Teacher Assessment shall be based on following components: Quiz/Assignment/Project/Participation in class activities, given that no component shall exceed more than 10 marks

Course Education Objectives (CEOs):

- To provide a sound introduction to the discipline of database management as a subject in its own right, rather than a compendium of techniques and product specific tools.
- To give a good formal foundation on the relational model of data.
- To present SQL and procedural interfaces to SQL comprehensively.
- To give an introduction to systematic database design approaches covering conceptual design, logical design and an overview of physical design.
- To introduce the concepts of transactions and transaction processing.

Course Outcomes (COs):

- Design any Desktop application using an entity relationship diagrams (ERD) to express requirements and demonstrates skills to model data requirements and create data models.
- Understanding of database systems theory in order to apply that knowledge to any particular database implementation using Structured Query Language (SQL).
- To learn and understand various Database Architectures and Applications.
- Develop an ability to remove data redundancy by translating created relational model into normalized designs.

LIST OF PRACTICALS:

1. To study DDL-create and DML-insert commands.
2. Create the given table (table will be given in lab hours) and insert the data accordingly.
3. Insert, Select Commands, Update and Delete Commands.
4. To study various options of LIKE predicate in the created table.
5. To perform various data manipulation commands, aggregate functions and sorting concept on all created tables.
6. To study single row functions.
7. To make use of different clauses viz. where, group by, having, order by, union, intersection, set difference.

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Name of Program : B.Sc. Physics (Honors)/ Chemistry (Honors)

Subject Code	Category	Subject Name	Teaching & Evaluation Scheme								
			Theory			Practical					
			End Sem University Exam	Two Term Exam	Teacher Assessment	End Sem University Exam	Teacher Assessment	L	T	P	CREDITS
BSCL408	Compulsory	Lab in DBMS	0	0	0	30	20	0	0	2	1

8. To use oracle functions viz. aggregate, numeric, converison, string functions.
9. Displaying data from Multiple Tables (join).
10. To apply the concept of Aggregating Data using Group functions.
11. To solve queries using the concept of sub query.

TEXT BOOKS:
1. R. Elmarsi and SB Navathe, "Fundamentals of Database Systems", Pearson,6th ed.
2. Singh S.K., "Database System Concepts, design and application", Pearson Education
3. Ramakrishnan and Gherke, "Database Management Systems", TMH.

REFERENCE BOOKS:
1. Abraham Silberschatz, Henry Korth, S. Sudarshan, "Database Systems Concepts", 4th Edition, McGraw Hill, 1997.
2. Jim Melton, Alan Simon, "Understanding the new SQL: A complete Guide", Morgan Kaufmann Publishers, 1993.
3. A.K. Majumdar, P. Battacharya, "Data Base Management Systems', TMH, 1996.
4. Bipin Desai, "An Introduction to database Systems", Galgotia Publications, 2012.

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B.Sc. (Chemistry) Hons.

BSBT404: Immunology (Chemistry Hons.)

COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								CREDITS
			THEORY			PRACTICAL		Th	T	P	
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BSBT404	DC	Immunology	60	20	20	30	20	3	-	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;
*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:
1. To give an introductory course in Immunology
2. To give an introduction to analytical methods in Immunology.

Course Outcomes:
1. Students will have a comprehensive idea about basics of Immunology
2. Students will learn about analytical methods in Immunology.

Immunology

Unit-I

Origin of Immunology, Concept of Innate and Adaptive immunity, Cell mediated and Humoral Immunity. Primary and secondary immune response, Clonal selection of lymphocytes. Structure, Functions and Properties of: Immune Cells – Stem cell, T cell, B cell, NK cell, Macrophage, Neutrophil, Eosinophil, Basophil, Mast cell, Dendritic cell; and Immune Organs – Bone Marrow, Thymus, Lymph Node, Spleen.

Unit-II

Characteristics of antigens (Foreignness, Molecular size and Heterogeneity), antigenicity, immunogenicity, hapten, epitopes, Adjuvant, T-dependent and T- independent antigen.

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Unit III

Structure, Types, Functions and Properties of antibodies; Antigenic determinants on antibodies (Isotypic, allotypic, idiotypic); Monoclonal, Polyclonal and Chimeric antibodies. Antibody mediated effector functions. Antigen processing and presentation (Cytosolic and Endocytic pathways).

Unit IV

Antigen - Antibody interactions: Principles of Precipitation and Agglutination. Precipitation reactions-Radial immunodiffusion, double immunodiffusion, immunoelectrophoresis;

Agglutination reactions-Hemagglutination, passive agglutination, bacterial agglutination. ELISA, ELISPOT, Western blotting, Immunofluoresence, Radio Immuno Assay.

Unit V

Hypersensitivity: definition, types, examples. Auto-Immune disease and Immuno-deficiencies with examples. Vaccines: Active and passive immunization (definition, characteristics, examples and functions). Attenuated and inactivated viral or bacterial vaccines (definition, characteristic, functions, examples).

BSBTL404 Practical:

1. Estimation of hemoglobin
2. Total count of WBC and RBC
3. Differential WBC count
4. Flocculation Reaction – VDRL
5. Agglutination Reaction – Widal test, Blood Grouping
6. Immuno-diffusion Techniques – ODD and RID
7. ELISA

Books:

1. Immunology – Kuby J.
2. Fundamental Immunology – Paul WE.
3. Fundamentals of Immunology – Coleman et al.
4. Immunology – Weir and Steward.
5. Immunology, A Textbook – Rao CV.
6. Lecture notes in Immunology – Todd IR.
7. Essentials of Immunology – Roitt IM.
8. Immunology – Understanding of Immune System – Elgert KD.

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Name of the Program: B. Sc. (Honours)

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME									
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM	MST	Q/A	END SEM	Q/A				
BSHMA 404	Hons	MATHEMATICS – IV (Numerical Methods & Linear Programming)	60	20	20	-	-	4	1	-	5

Course Objective

To introduce the students with the Fundamentals of the Numerical Methods & Linear Programming.

Course Outcomes

After the successful completion of this course students will be able to

1. understand and apply the basics of the Calculus of Finite Difference.
2. Interpolate and Extrapolate values.
3. apply the techniques to find the Numerical Integration.
4. know the principles of the Linear Programming Problems.
5. understand and apply the Optimization Techniques.

Course Content:

BSHMA 401: MATHEMATICS – IV (Numerical Methods & Linear Programming)

UNIT – I
Numerical Methods: Approximate numbers, Significant figures, Rounding off numbers. Error – Absolute, Relative and Percentage. **Operators** - Δ , ∇ and E (Definitions and some relations among them). **Interpolation:** The problem of Interpolation, Equispaced arguments –Difference Tables, Deduction of Newton's Forward Interpolation Formula. Remainder term (expression only). Newton's Backward Interpolation formula (statement only) with remainder term.

UNIT – II
Unequally – spaced arguments –Lagrange's Interpolation Formula (statement only). Numerical problems on Interpolation with both equi- and unequally-spaced arguments. **Number Integration :** Trapezoidal and Simpson's ⅓rd formula (statement only). Problems on Numerical Integration.

UNIT – III

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Solution of Numerical Equation: To find a real root of an algebraic or transcendental equation. Location of root (Tabular method), Bisection method. Newton-Raphson method with geometrical significance. Numerical problems. (Note : emphasis should be given on problems)
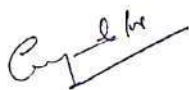
UNIT – IV

Linear Programming: Motivation of Linear Programming problem. Statement of L.P.P. formulation of L.P.P. Slack and Surplus variables. L.P.P. is matrix form. Convex set, Hyperplane, Extreme points, Convex Polyhedron, Basic solutions and Basic Feasible Solutions (B.F.S.) Degenerate and Non-degenerate B.F.S. The set of all feasible solutions of an L.P.P. is a convex set. The objective function of an L.P.P. assumes its optimal value at an extreme point of the convex set of feasible solutions. A B.F.S. to an L.P.P. corresponds to an extreme point of the convex set of feasible solutions.

UNIT – V

Fundamental Theorem of L.P.P. (Statement only). Reduction of a feasible solution to a B.F.S. Standard form of an L.P.P. Solution by graphical method (for two variables), by simplex method and method of penalty. Concept of duality. Duality theory. The dual of the dual is the primal. Relation between the objective values of dual and the primal problems. Dual problems with at most one unrestricted variable, one constraint of equality. Transportation and Assignment problem and their optimal solutions.

BOOKS:
1.   Numerical methods – E. Balagurusamy (Tata McGraw Hill).
2.   Introduction to numerical analysis – F. B. Hilderbrand (TMH Edition).
3.   Numerical Analysis – J. Scarborough.
4.   Introduction to numerical analysis – Carl Erik Froberg (Addison Wesley Publishing).
5.   Numerical methods for science and engineering – R. G. Stanton (Prentice Hall).
6.   Linear Programming : Method and Application – S. I. Gass.
7   Linear Programming – G. Hadley.
8.   An Introduction to Linear Programming & Theory of Games – S. Vajda.

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