Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

ML-301 ENVIRONMENT AND ENERGY STUDIES

SUBJECT CODE	CATEGORY	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*				
ML-301	Compulsory	Environment and Energy Studies	60	20	20	0	0	4	0	0	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher's Assessment** shall be based upon following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives :

1. Understand sources of information required for addressing environmental challenges.
2. Identify a suite of contemporary tools and techniques in environmental informatics.
3. Apply literacy, numeracy and critical thinking skills to environmental problem-solving.

Course Outcomes

1. Apply the principles of ecology and environmental issues that apply to air, land and water issues on a global scale.
2. Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
3. Demonstrate ecology knowledge of a complex relationship between predators, prey, and the plant community.

Unit I: Environmental Pollution and Control Technologies - Environmental Pollution & Control: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and industrial pollution, Ambient air quality standards. Water pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid Waste management composition and characteristics of e - Waste and its management. Pollution control technologies: Wastewater Treatment methods: Primary, Secondary and Tertiary.

Unit II: Natural Resources - Classification of Resources: Living and Non - Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problem, Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources:

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Growing energy needs, renewable energy source, case studies.

Unit III: Ecosystems: Definition, Scope and Importance ecosystem. Classification, Structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Energy flow in the ecosystem, Biogeochemical cycles, Bioaccumulation, Ecosystem Value, Devices and Carrying Capacity, Field visits.

Unit IV: Biodiversity and its Conservation - Introduction - Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - . Biodiversity at global, National and local levels. - . India as a megadiversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man wild life conflicts; Conservation of biodiversity: In-situ and Ex-situ conservation. National Biodiversity Act.

Unit V: Environmental Policy, Legislation & EIA - Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP)

Recommended Readings:

1. Agarwal, K.C. (2001). ***Environmental Biology***. Bikaner: Nidi Pub. Ltd.
2. Brunner, R.C. (1993). ***Hazardous Waste Incineration***. New Delhi: McGraw Hill Inc.
3. Clank, R.S. (2001). ***Marine Pollution***. New York: Oxford University Press.
4. De, A.K. (2001).***Environmental Chemistry.*** New Delhi: Wiley Western Ltd.
5. Bharucha , Erach (2005). ***Environmental Studies for Undergraduate Courses.*** New Delhi: University Grants Commission.
6. Rajagopalan, R. (2006). ***Environmental Studies***. New York: Oxford University Press.
7. AnjiReddy, M. (2006).***Textbook of Environmental Sciences and Technology***. BS Publication.
8. Wright, Richard T. (2008). ***Environmental Science: towards a sustainable future*** .New Delhi: PHL Learning Private Ltd.
9. Gilbert M. Masters and Wendell P. Ela .(2008).***Environmental Engineering and science***. University Kindom:PHI Learning Pvt Ltd.
10. Botkin ,Daniel B. & Edwards A. Keller(2008).***Environmental Science.*** New Delhi: Wiley INDIA edition.
11. Kaushik ,Anubha (2009).***Environmental Studies***. New Delhi: New age international publishers.

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Shri Vaishnav Vidyapeeth Vishwavidyalaya

B.Sc. (Chemistry Hons)

Choice Based Credit System (CBCS)(Batch 2019-2022)

Semester III (B.Sc. Chemistry Hons)

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BSHCH 302	DC	CONCEPT OF INORGANIC CHEMISTRY - II	60	20	20	0	0	4	0	0	4

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.

Concept of Inorganic Chemistry - II

Course Objective :

(i) To develop the understanding of fundamentals of Metallurgy.
(ii) To develop the understanding of s block & p block elements.
(iii) To give basic knowledge of compounds of Nobel gases.

Course Outcomes

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

(i) Fundamentals of Metallurgy.
(ii) Fundamentals of s block, p block elements & compounds of Nobel gases.

Unit-I General Principles of Metallurgy

Chief modes of occurrence of metals based on standard electrode potentials. Ellingham diagrams for reduction of metal oxides using carbon and carbon monoxide as reducing agent. Electrolytic Reduction, Hydro metallurgy with reference to cyanide process for silver and gold. Methods of purification of metals: Electrolytic process, van-Arkel- process and Mond's process, Zone refining.

Unit-II Chemistry of s Block Elements:

General characteristics: melting point, flame colour, reducing nature, diagonal relationships and anomalous behavior of first member of each group. Reactions of alkali and alkaline earth metals with oxygen, hydrogen, nitrogen and water. Common features such as ease of formation, thermal stability and solubility of the following alkali and alkaline earth metal compounds: hydrides, oxides, peroxides, superoxides, carbonates, nitrates, sulphates. Complex formation tendency of s-block elements; structure of crown ethers and cryptates

of Group I.

Unit-III Chemistry of p Block Elements-I:
Electronic configuration, atomic and ionic size, metallic/non-metallic character, melting point, ionization enthalpy, electron gain enthalpy, electronegativity, Allotropy of C, P, S; inert pair effect, diagonal relationship between B and Si and anomalous behavior of first member of each group.

Unit-IV Chemistry of p Block Elements-II:
Structure, bonding and properties: acidic/basic nature, stability, ionic/covalent nature, oxidation/reduction, hydrolysis, action of heat of the following:•Hydrides: hydrides of Group 13 (only diborane), Group 14, Group 15 (EH3 where E = N, P, As, Sb, Bi), Group 16 and Group 17.•Oxides: oxides of phosphorus, sulphur and chlorine• Oxoacids: oxoacids of phosphorus and chlorine; peroxoacids of sulphur. •Halides: halides of silicon and phosphorus Preparation, properties, structure and uses of the following compounds: •Borazine •Silicates, silicones, •Phospho nitrilic halides {(PNCl2)n where n = 3 and 4}• Inter halogen and pseudohalogen compounds. Clathrate compounds of noble gases, xenon fluorides (MO treatment of XeF2).

Unit-V Bioinorganic Chemistry:
Elements of life: essential major, trace and ultratrace elements. Basic chemical reactions in the biological systems and the role of metal ions (specially Na^{+}, K^{+}, Mg^{2+}, Ca^{2+}, $Fe^{3+/2+}$, $Cu^{2+/+}$, and Zn^{2+}).Metal ion transport across biological membrane Na^{+}-ion pump, ionophores. Biological functions of hemoglobin and myoglobin, cytochromes and ferredoxins, carbonate bicarbonate buffering system and carbonicanhydrase. Biological nitrogen fixation, Photosynthesis: Photosystem-I and Photosystem-II. Toxic metal ions and their effects, chelation therapy (examples only), Pt and Au complexes as drugs (examples only), metal dependent diseases.

Books:

1. Lee, J.D. Concise Inorganic Chemistry, Pearson Education.
2. Douglas, B.E; Mc Daniel, D.H. & Alexander, J.J. Concepts & Models of Inorganic Chemistry, John Wiley Sons, N.Y.
3. Greenwood, N.N. & Earnshaw. Chemistry of the Elements, Butterworth-Heinemann.
4. Cotton, F.A. & Wilkinson, G. Advanced Inorganic Chemistry, Wiley, VCH, Miessler, G. L. & Donald, A. Tarr. Inorganic Chemistry, Pearson.
5. Shriver, D.F., Atkins P.W and Langford, C.H., Inorganic Chemistry, Oxford University Press.

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B.Sc. (Chemistry Hons)

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SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BSHCH 303	DC	CONCEPT OF ORGANIC CHEMISTRY - II	60	20	20	0	0	4	0	0	4

Semester III (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 Halogenated hydrocarbons, Alcohols, Phenols, Ethers & Epoxides.

(ii) To give basic knowledge of Carbonyl compounds, Carboxylic acids & their derivatives.

Course Outcomes:

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

(i) Fundamentals of Chemistry of Halogenated hydrocarbons, Alcohols, Phenols, Ethers & Epoxides.

(ii) Fundamentals of Carbonyl compounds, Carboxylic acids & their derivatives.

CONCEPT OF ORGANIC CHEMISTRY – II

Unit I Chemistry of Halogenated Hydrocarbons:

Alkyl halides: Methods of preparation and properties, nucleophilic substitution reactions – SN_1, SN_2 and SN_1 mechanisms with stereochemical aspects and effect of solvent etc.; nucleophilic substitution vs. elimination.

Aryl halides: Preparation (including preparation from diazonium salts) and properties, nucleophilic aromatic substitution; SNAr, Benzyne mechanism.

Relative reactivity of alkyl, allyl, benzyl, vinyl and aryl halides towards nucleophilic substitution reactions. Organometallic compounds of Mg (Grignard reagent) –Use in synthesis of organic compounds.

Unit II Alcohols, Phenols, Ethers and Epoxides:

Alcohols: preparation, properties and relative reactivity of 1°, 2°, 3° alcohols, Bouvaelt-Blanc Reduction; Oxidation of diols by periodic acid and lead tetra acetate, Pinacol- Pinacolone

rearrangement; Phenols: Preparation and properties; Acidity and factors effecting it, Ring substitution reactions, Reimer– Tiemann and Kolbe's–SchmidtReactions, Fries and Claisen rearrangements with mechanism; Ethers and Epoxides:

Preparation and reactions with acids. Reactions of epoxides with alcohols, ammonia derivatives and LiAlH4.

Unit III Carbonyl Compounds:
Structure, reactivity, preparation and properties; Nucleophilic additions, Nucleophilic addition-elimination reactions with ammonia derivatives with mechanism; Mechanisms of Aldol and Benzoin condensation, Knoevenagel condensation, Claisan-Schmidt, Perkin, Cannizzaro and Wittig reaction, Beckmann and Benzil-Benzilic acid rearrangements, haloform reaction and Baeyer Villiger oxidation, á -substitution reactions, oxidations and reductions (Clemmensen, Wolff- Kishner,LiAlH4, NaBH4, MPV, PDC) Addition reactions of á, â-unsaturated carbonyl compounds: Michael addition. Active methylene compounds:Keto-enoltautomerism. Preparation and synthetic applications of diethyl malonate and ethyl acetoacetate.

Unit IV Carboxylic Acids and their Derivatives:
General methods of preparation, physical properties and reactions of monocarboxylic acids, effect of substituents on acidic strength. Typical reactions of dicarboxylic acids , hydroxy acids and unsaturated acids. Preparation and reactions of acid chlorides, anhydrides, esters and amides; Comparative study of nucleophilic sustitution at acyl group- Mechanism of acidic and alkaline hydrolysis of esters, Claisen condensation, Dieckmann and Reformatsky reactions, Hofmann-bromamide degradation and Curtius rearrangement.

Unit V Carbohydrate:
Monosaccharides: Aldoses upto 6 carbons, structure of D-glucose & D-ructose (configuration & conformation), anomeric effect, mutarotation. Reactions: osazone formation, bromine – water oxidation, stepping–up (Kiliani method) and stepping–down (Ruff's & Wohl's method) of aldoses. Disaccharides: glycosidic linkages, structure of sucrose.

Books:
1. Morrison, R. T. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Finar, I. L.Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Graham Solomons, T.W. Organic Chemistry,John Wiley & Sons, Inc.

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B.Sc. (Chemistry Hons)

Choice Based Credit System (CBCS)(Batch 2019-2022)

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BSHCH 308	DC	INDUSTRIAL ASPECTS OF PHYSICAL CHEMISTRY	60	20	20	0	0	4	1	0	5

Semester III (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 Physical Chemistry.

(ii) To develop the understanding of Industrial Aspects of Physical Chemistry.

Course Outcomes:

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

(i) Fundamentals of Physical Chemistry.

(ii) Fundamentals of Industrial Aspects of Physical Chemistry.

INDUSTRIAL ASPECTS OF PHYSICAL CHEMISTRY

Unit I

Adsorption:

Physisorption and Chemisorptions, Applications of adsorption, Adsorption of gases by solids, Freundlich adsorption isotherm, Langmuir's theory of adsorption, BET theory of multilayer adsorption, Determination of surface area, Adsorption isotherms.

Unit II

Colligative Properties:

Lowering of vapour pressure, Raoult's law, Determination of molecular mass of solute from lowering of vapour pressure, Elevation of boiling point, Relation between elevation of boiling

point and lowering of vapour pressure, Determination of molecular mass of solute from elevation of boiling point, Depression of freezing point, Relation between depression of

freezing point and lowering of vapour pressure, Determination of molecular mass of solute from depression of freezing point.

Unit III

Catalysis:

General characteristics of catalytic reactions Acid-base catalysis, Enzyme catalysis, Mechanism and kinetics of enzyme catalyzed reactions, Michaelis-Menten equation, Effect of temperature on enzyme catalysis, Heterogeneous catalysis, Surface reactions, Kinetics of surface reactions.

Unit IV

Optical methods of analysis:

Origin of spectra, interaction of radiation with matter, fundamental laws of spectroscopy and selection rules, validity of Beer-Lambert's law.

UV-Visible Spectrometry: Basic principles of instrumentation (choice of source, monochromator and detector) for single and double beam instrument; Basic principle of quantitative analysis: estimation of metal ions from aqueous solution, geometrical isomers, keto-enol tautomers. Determination of composition of metal complexes using Job's method of continuous variation and mole ratio method.

Infrared Spectrometry: Basic principles of instrumentation (choice of source, monochromator & detector) for single and double beam instrument; sampling techniques. Structural illustration through interpretation of data, Effect and importance of isotope substitution.

Unit V

Corrosion and its control:

Introduction, Economic aspects of corrosion, Dry or Chemical Corrosion, Wet or electrochemical corrosion, Mechanism of Electrochemical Corrosion, Prevention from corrosion.

Books:

1. Admson, A.W., Physical Chemistry of Surfaces, 4th edition, Pubs: John Wiely & Sons, New York.
2. Austin H. T., Shreve's Chemical Process Industries, Pubs: McGraw Hill Book Company, New York.
3. Kent James A. (ed.), Reigel's Handbook of Industrial Chemistry, Pubs: Van Nostrand inhold Company, London .
4. Pandey C.N., Text Book of Chemical Technology, Vol. I & II, Pubs: Vikas Publishing House, Pvt. Ltd., New Delhi .
5. Buchner V., Sohliebs P., Winter G. & Buchel K.H., Industrial Inorganic Chemistry, Pubs: V. Ch. Publishers, New York .

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B.Sc. (Chemistry Hons)

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DEGREE PROGRAM

B.Sc III Sem

SUBJECT CODE	Category	SUBJECT NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment*	End Sem University Exam	Teachers Assessment*				
BSPH302	DC	Electronics: Principles and Devices	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 toElectronics: Principles and Devicesand 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 toElectronics: Principles and Devices,
2. Student will be able to determine physical parameter experimentally with optimal usage of resources and complete the assignments in time.

BSPH 302- Electronics: Principles and Devices

Unit 1:-

Classical FE Model, Debye Model, Summer Field FE Model, Band Model, Kronig-Penney Model, Effective Mass, Formulation of Energy Bands, Gap in Solids, Motion of e^- in Metals, Density of States, Fermi Level, Fermi Velocity and Fermi Dirac Distribution of e^- Inside a Matter.

Unit-2

Semiconductors; Intrinsic-semiconductors, electrons and holes, Fermi Level, Temperature dependence of electron and hole concentrations Doping: impurity states, n and p type semiconductors, conductivity, mobility, Hall Effect, Hall Coefficient. Semiconductor devices: Metal-semiconductor junction, p-n junction, majority and minority carriers,

Unit-3

Zener and tunnel diodes, light emitting diode, solar cell Diode as a circuit element, load line concept, rectification, ripple & factor, Zener diode, voltage stabilization, IC voltage regulation. FETs: Field effect transistorsJEET, BJT, MOSFET, Transistors, Characteristics of a transistor in CB, CE and CC mode, h-parameters,

Unit-4

Amplifiers,Small signal amplifiers; General Principle of operation, classification, distortion, RC coupled amplifier, gain frequency response, input and output impedance, multistage amplifiers.Transformer coupled amplifiers, Equivalent circuits at low, medium and high frequencies, emitter follower, low frequency common source and common drain amplifier, Noise in electronic circuits.

Unit-5

Oscillators, Feedback in amplifiers, principle, its effects on amplifiers, characteristicsPrinciple of feedback amplifier,,Barkhausen criteria, Hartley, Colpitt and Wein bridge oscillators.Condition for oscillations and frequency derivation - Crystal oscillator - UJT Relaxation oscillator.Monostable, Bi-stable and Astable multivibrators

References:

1. Introduction to Solid State Physics C. Kittel
2. Solid State Physics : R.L, Singhal
3. Micro Electronics J- Millman and A. Grabel
4. Electronic Devices and Circuits : MillmanHalkias
5. Electronic Devices Circuits and Applications : J.D. Ryder
6. Electronic Devices and Circuits: Robert Baylested and Louis Nashelsky

List of Experiments (Any Eight)

1. Find V-I characteristics of PN Junction Diode.
2. To Find V-I characteristics of Zener Diode
3. To Find V-I characteristics of Tunnel Diode
4. To Find V-I characteristics of Photo Diode
5. To find Input/output characteristics of common base PNP/NPN transistor.
6. To find Input/output characteristics of common emitter PNP/NPN transistor.
7. Determination of Energy band gap (E_g) using PN Junction Diode.
8. Study of regulated power supply.
9. Determination of Energy band gap 'E_g' of Ge using Four Probe method.
10. To Study Frequency of Hartley oscillator
11. To Study Frequency of Wein bridge oscillator
12. Study of RC coupled amplifiers

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

B.Sc. (Chemistry) Hons.

BSBT304: Metabolism

COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BSBT304	DC	Metabolism	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 understand the biochemistry of primary and secondary metabolism
2. To understand the principles of metabolic pathways

Course Outcomes:

1. Student will have the knowledge of synthesis and degradation of Biomolecules
2. Students will be able to understand the regulatory pathway of metabolism

Unit –I

Carbohydrate metabolism – aerobic and anaerobic glycolysis and regulation. Citirc acid cycle, Gluconeogenesis. Pentose phosphate pathway and regulation.

Unit – II

Lipid metabolism – synthesis and degradation of Triacylglycerols, β-oxidation of fatty acids, ketone bodies, regulations of fatty acid synthesis

Unit III

Nitrogen metabolism: Biological nitrogen fixation. Nitrate reduction and its regulation, Ammonia assimilation.

Amino acids metabolism, Oxidation of amino acids and production of urea.

Unit-IV

Protein metabolism, Hormonal control of protein digestion, Protein targeting and degradation.

Unit – V

Structures of purines and pyrimidines, Biosynthesis and degradation of purines and pyrimidines.

BSBTL304 Practical:

1. Estimation of reducing sugar by Dinitrosalicylic (DNS) Method
2. Separation of sugars using paper chromatography.
3. To construct a standard maltose curve
4. Extraction and estimation of lipids
5. Estimation of amino acids by ninhydrin method.
6. Estimation of protein by the Biuret method
7. Gel electrophoresis of proteins
8. Extraction of DNA from plant cells
9. Spectrophotometric analysis of DNA

Books:

1. Campbell, MK (2012) Biochemistry, 7th ed., Published by Cengage Learning
2. Campbell, PN and Smith AD (2011) Biochemistry Illustrated, 4th ed., Published by Churchill Livingstone
3. Tymoczko JL, Berg JM and Stryer L (2012) Biochemistry: A short course, 2nd ed., W.H.Freeman
4. Berg JM, Tymoczko JL and Stryer L (2011) Biochemistry, W.H.Freeman and Company

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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 304	BS	Integral Calculus and Differential Equations	60	20	20	-	-	4	0	0	4

Course Objective

To introduce the students with the Fundamentals of the Integral Calculus and OrdinaryDifferential Equations.

Course Outcomes

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

1. *understand and apply the basics of the Integral Calculus .*
2. *evaluate Integrals of various types.*
3. *apply the techniques to find length, surface area and volume by integration.*
4. *know the reason behind formation and solution of Differential Equations.*
5. *understand and apply the basics of theDifferential Equations.*

Course Content:

UNIT – I

Integral Calculus: Integration of the form : $\int \frac{dx}{a\cos x + b\sin x + c}$, $\int \frac{a\cos x + b\sin x + c}{p\cos x + q\sin x + r} dx$ and Integration of Rational functions. Evaluation of definite integrals. Integration as the limit of a sum (with equally spaced as well as unequal intervals).Reduction formulae of $\int \sin^m x dx$ $\cos^n x\, dx$, $\int (\sin^m x/\cos^n x) dx$, $\int \tan^n x\, dx$ and associated problems (*m* and *n* are non-negative integers).

UNIT – II

Definition of Improper Integrals: Statements of (i) μ -test, (ii) Comparison test (Limit form excluded) – Simple problems only. Use of Beta and Gamma functions (convergence and important relations being assumed).Working knowledge of Double integral.

UNIT – III

Applications: Rectification, Quadrature, Volume and Surface areas of solidsformed by revolution of plane curve and areas – Problems only.

UNIT – IV

Differential Equations: Order, degree and solution of an ordinary differential equation (ODE) inpresenceof arbitrary constants. Formation of ODE.First order equations**:**(i) Variables separable.(ii) Homogeneous equations and equations reducible to homogeneous forms.(iii) Exact equations and those reducible to such equation.

UNIT – V

Euler's and Bernoulli's equations (Linear).Clairaut's Equations: General and Singular solutions.Simple applications : Orthogonal Trajectories.**Second order linear equations:** Second order linear differential equationswith constant. Coefficients. Euler's Homogeneous equations.

BOOKS:

1. Integral Calculus – Shanti Narayan & P. K. Mittal (S. Chand & Co. Ltd.)
2.Integral Calculus – H. S. Dhami (New Age International)
3Integral Calculus – B. C. Das & B. N. Mukherjee (U. N. Dhur)
4. Differential & Integral Calculus (Vols. I & II) – Courant & John.
5. Differential & Integral Calculus (Vol. I) – N. Piskunov
6. Differential Equations – Lester R. Ford (McGraw Hill).
7. Differential Equations – S. L. Ross (John Wiley).
8. Differential Equations – H. T. H. Piaggio.
9. A Text Book of Ordinary Differential Equations – Kiseleyev, Makarenko&Krasnov (Mir).
10. Differential Equations – H. B. Phillips (John Wiley & Sons).
11. Differential Equations with Application & Programs – S. BalachandaRao, H.R. Anuradha (University Press).
12. Text Book of Ordinary Differential Equations (2nd Ed.) – S. G. Deo, VLakshmikantham& V. Raghavendra (Tata McGraw Hill).
13. An Elementary Course in Partial Differential Equation – T. Amarnath(Narosa).
14. An Introductory Course on Ordinary Differential Equation – D. A. Murray.