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, Indore

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

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM	MST	Q/A	END SEM	Q/A				
BSMHMA 302	DC	**Algebra III (Fields and Vector Spaces)**	60	20	20	-	-	4	1	-	5

Course Objective

To introduce the students with the Linear Algebra.

Course Outcomes

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

1. *understand and apply the basics of the Field theory.*
2. *know the fundamentals of the Vector Space.*

Course Content:

Unit I :
Field extensions, splitting fields, algebraic closure, separability, normal extensions.
Unit II :
Finite fields: structure of finite fields; existence and uniqueness theorems; primitive elements;
Unit III :
Minimal polynomials of elements; irreducible and primitive polynomials.
Unit IV :
Vector spaces: subspaces and quotient spaces; homomorphism and isomorphism theorems;
Unit V :
Bases and dimension of a vector space.

Reference Books :

1. M. Artin: Algebra.

2. S. D. Dummit and M. R. Foote: Abstract Algebra.

3. I. N. Herstein: Topics in Algebra.

4. C. R. Rao: Linear Statistical Inference and Its Applications.

5. A. Ramachandra Rao and P. Bhimasankaram: Linear Algebra.

6. K. Ho_man and R. Kunze: Linear Algebra.

7. F. E. Hohn: Elementary Matrix Algebra.

8. P. R. Halmos: Finite Dimensional Vector Spaces.

9. R. B. Ash: Abstract Algebra: The Basic Graduate Year. Free download from http://www.math.uiuc.edu/ rash/Algebra.html.

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

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM	MST	Q/A	END SEM	Q/A				
BSMHMA 303	DC	**Metric Topology**	60	20	20	-	-	4	1	-	5

Course Objective

To introduce the students with the Metric Topology.

Course Outcomes

After the successful completion of this course students will be able to understand and apply the basics of the Metric Space.

Course Content:

Unit I :
Elements of metric space theory, sequences and Cauchy sequences and the notion of completeness,
Unit II:
Construction of real numbers, elementary topological notions for metric spaces i.e. open sets, closed sets, compact sets, connectedness,
Unit III:
Continuous and uniformly continuous functions on a metric space. The Bolzano - Weierstrass theorem, supremum and infimum on compact sets.
Unit IV:
Separability. Completeness. The Baire Category Theorem. R_n as a metric space.
Unit V:

Banach contraction principle. C(X) as a metric space.. Arzela-Ascoli Theorem (statement only: proof can be given if time permits). Stone-Weierstrass Theorem (statement only).

Reference Books :

1. W. Rudin: Principles of Mathematical Analysis.
2. Tom Apostol: Mathematical Analysis.
3. Tom Apostol: Calculus I and II.
4. Terence Tao : Analysis I.
5. W. Rudin: Real and Complex Analysis.

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SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM	MST	Q/A	END SEM	Q/A				
BSMHMA 304	DC	**Complex Analysis**	60	20	20	-	-	3	1	-	4

Course Objective

To introduce the students with the Calculus of the Complex Variables.

Course Outcomes

After the successful completion of this course students will be able to understand and apply the basics of the Calculus of the Complex Variables.

Course Content:

Unit I:
Holomorphic functions and the Cauchy-Riemann equations, Power series, Functions defined by power series as holomorphic functions,

Unit II:
Complex line integrals and Cauchys theorem, Cauchys integral formula. Representations of holomorphic functions in terms of power series.

Unit III:

Liouvilles theorem, Zeros of analytic functions, The fundamental theorem of algebra. Poles, Singularity, Meromorphic functions and Laurent series.

Unit IV:

The maximum modulus principle, Schwarzs lemma, The argument principle, The open mapping property of holomorphic functions, Conformality, Mobius transformations and The Cross Ratio.

Unit V:

The calculus of residues and evaluation of integrals using contour integration. Complex Logarithm.

Reference Books :

1. Elias M. Stein, Rami Shakarchi: Complex Analysis.
2. Lars Ahlfors: Complex Analysis.
3. T. W. Gamelin: Complex Analysis.
4. J.B.Conway: Functions of One Complex Variable.

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

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

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			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BSHCH 305	HONS	ANALYTICAL CHEMISTRY & ADVANCE CONCEPT OF GENERAL CHEMISTRY - I	60	20	20	0	0	4	0	0	4

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

DEGREE PROGRAM

B.Sc III Sem

Semester III (B.Sc. Honours) Chemistry Syllabus for Physics & Maths Honours

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 Analytical Chemistry and General Chemistry.
(ii) To give basic knowledge of Analytical Chemistry.

Course Outcomes:

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

(i) Fundamentals of Chemistry.

(ii) Fundamentals of Analytical Chemistry.

Analytical Chemistry & Advance Concept of General Chemistry - I

Unit I: Periodicity of Elements:

s, *p*, *d*, *f* block elements, the long form of periodic table. Detailed discussion of the following properties of the elements, with reference to *s* & *p*- block.

(a) Effective nuclear charge, shielding or screening effect, Slater rules, variation of effective nuclear charge in periodic table.

(b) Atomic radii (van der Waals)

(c) Ionic and crystal radii.

(d) Covalent radii (octahedral and tetrahedral)

(e) Ionization enthalpy, Successive ionization enthalpies and factors affecting ionization energy. Applications of ionization enthalpy.

(f) Electron gain enthalpy, trends of electron gain enthalpy.

(g) Electro negativity, Pauling's/ Mulliken's/ Allred Rachow's/ and Mulliken-Jaffe's Electro negativity scales. Variation of electro negativity with bond order, partial charge, hybridization, group electro negativity. Sanderson's electron density ratio.

Unit II : Chemistry of Aliphatic Hydrocarbons

A. Carbon-Carbon sigma bonds

Chemistry of alkanes: Formation of alkanes, Wurtz Reaction, Wurtz- Fittig Reactions, Free

radical substitutions: Halogenation - relative reactivity and selectivity.

B. Carbon-Carbon pi bonds

Formation of alkenes and alkynes by elimination reactions, Mechanism of E1, E2, E1cb

reactions. Saytzeff and Hofmann eliminations.

Reactions of alkenes: Electrophilic additions their mechanisms (Markownikoff/ Anti

Markownikoff addition), mechanism of oxymercuration-demercuration, hydroboration-

oxidation, ozonolysis, reduction (catalytic and chemical), syn and anti hydroxylation (oxidation). 1, 2- and 1, 4- addition reactions in conjugated dienes and, Diels-Alder reaction; Allylic and benzylic bromination and mechanism, e.g. propene, 1-butene, toluene, ethyl benzene.

Reactions of alkynes: Acidity, Electrophilic and Nucleophilic additions. Hydration to form

carbonyl compounds, Alkylation of terminal alkynes.

Unit III :Solid State:

Nature of the solid state, law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, qualitative idea of point and space groups, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, a simple account of rotating crystal method and powder pattern method. Analysis of powder diffraction patterns of NaCl, CsCl and KCl. Defects in crystals.

Unit IV: Chemical Kinetics

Order and molecularity of a reaction, rate laws in terms of the advancement of a reaction, differential and integrated form of rate expressions up to second order reactions, experimental

methods of the determination of rate laws, kinetics of complex reactions (integrated rate

expressions up to first order only): (i) Opposing reactions (ii) parallel reactions and (iii) consecutive reactions and their differential rate equations (steady-state approximation in reaction mechanisms) (iv) chain reactions. Temperature dependence of reaction rates; Arrhenius equation; activation energy. Collision theory of reaction rates, Lindemann mechanism, qualitative treatment of the theory of absolute reaction rates.

Surface chemistry: Physical adsorption, chemisorption, adsorption isotherms. nature of adsorbed state. Catalysis: Types of catalyst, specificity and selectivity.

Unit V : 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.

Books:

1. Lee, J.D. *Concise Inorganic Chemistry*, ELBS.

2. Douglas, B.E. and Mc Daniel, D.H., *Concepts & Models of Inorganic Chemistry*,

Oxford.

3. Atkins, P. W. & Paula, J. de *Atkin's Physical Chemistry* 8th Ed., Oxford University Press.
4. Ball, D. W. *Physical Chemistry* Thomson Press, India.
5. Vogel, Arthur I: *A Test book of Quantitative Inorganic Analysis* (Rev. by GH Jeffery and others). The English Language Book Society of Longman.
6. Willard, Hobert H. *et. al*: *Instrumental Methods of Analysis*, Wardsworth Publishing Company, Belmont, California, USA.