Course Name: Bachelor of Science
Discipline : Mathematics
Rules and regulations, Course Scheme and Scheme of Examinations
(For those who join in June 2023 and later)

II year B.Sc. MATHEMATICS

Semester	Part	Subject Name	Hours	Credit	Int + Ext =Total	Local	Regional	National	Global	Professional Ethics	Gender	Human Values	Environment & Sustainability	Employability	Entrepreneurship	Skill Development	Subject Code	Revised / New / No Change / Interchanged & Percentage of Revision
III	Part I	**Tamil**	6	3	25+75=100												**U24PT31**	**Interchanged from II semester**
	Part II	**English**	6	3	25+75=100												**U24PE31**	**New**
	Core 5	**Differential Equations and Its Applications**	5	4	25+75=100	✔	✔	✔	✔					✔	✔	✔	**U24MAC31**	**New**
	Allied 3	Electricity & Electronics/ General Chemistry - III	4	4	25+75=100												**U24PHAX31/ U24CHAX31**	**Mark Change**
	Allied 3 Lab	**LAB:** Physics Practical – II / Organic Qualitative Analysis	2	--	40+60=100												-	--
	Allied 4	**Mechanics**	5	4	25+75=100	✔	✔	✔	✔					✔	✔	✔	**U24MAA31**	**New**
	SBE 3	**Applications of Vector Calculus**	2	2	25+75=100	✔	✔	✔	✔					✔	✔	✔	**U24MAS31**	**New**
	SL	**Value Education**	-	3	25+75=100												**U24VE31**	**New**
	Total		**30**	**23**														
IV	Part I	**Tamil**	6	3	25+75=100												**U24PT41**	**Interchanged from III semester**
	Part II	**English**	6	3	25+75=100												**U24PE41**	**New**
	Core 6	**Modern Algebra**	6	4	25+75=100	✔	✔	✔	✔					✔	✔	✔	**U24MAC41**	**Revised 2%**
	Allied 5	Optics & Photonics / General Chemistry – IV	4	4	25+75=100												**U24PHAX41/ U24CHAX41**	**Mark Change**

	Allied 5 Lab	**LAB: :** Physics Practical – II / Organic Qualitative Analysis	2	2	40+60=100												U22PHAXP41 U22CHAXP41	No Change
	Allied 6	**Numerical Methods**	4	4	25+75=100	✔	✔	✔	✔					✔	✔	✔	**U24MAA41**	**New**
	Allied 6 Practical Lab	**LAB: Office Automation**	2	1	40+60=100	✔	✔	✔	✔					✔	✔	✔	**U24MAAP41**	**New**
	SL	**Environmental Studies**	-	2	25+75=100												**U24ES41**	**New**
	Total		**30**	**23**														

Year	Part	Subject	Credit	Int = Total	Code
I & II	Part V	NSS / NCC / Physical Education/ YRC / RRC	3	100 = 100	U24NS4 / U24NC4 / U24PS4 / U24YR4 / U24RR4

SEMESTER III

CORE 5: DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS

Contact Hours per semester : 75 **Subject Code : U24MAC31**

Contact Hours per week : 5 **Credit : 4**

Objectives:

- To understand the basic terminologies in differential equations.
- To solve the differential equations of first order and higher degree.
- To facilitate a better understanding of some special methods of solving standard forms of differential equations.

Course Outcomes:

On completion of the course, the students can / will

COs	CO Statement
CO1	Solve the first order linear differential equations of different types.
CO2	Derive the complementary functions and the particular integral of higher order linear equations.
CO3	To convert the problems related with growth, decay, chemical reactions and falling bodies in to differential equations and solve them.
CO4	To use differential equations to Brachistochrone problem and simple electric circuits.
CO5	To derive Kepler's law from Newton's law of gravitation.

Unit : I **[15 hours]**

Introduction - Solutions of differential equations-Formation of differential equations-Equations of first order and of the first degree-Type A: Variables separable- Type B: Homogeneous equations - Type C: Non Homogeneous equations of the first degree in x *and* y- Type D: Linear equation - Type E: Bernouilli's equation - Type F: Exact differential equations – Sufficient Condition – Practical rule for an exact differential equation.

Unit: II **[15 hours]**

Equations of the first order but of Higher degree –Type A: Equations solvable for dy/dx - Type B: Equations solvable for y - Equations solvable for x, Clairaut's form - Linear Equations with constant coefficients: Definitions – The operator D - Complementary function of a linear equations with constant coefficients - Particular integral – General method of finding P.I – Special methods for finding P.I for X is of the form e^{ax}, $\cos ax$ or $\sin ax$.

Unit: III **[15 hours]**

Linear Equations with constant coefficients**:** Special methods for finding P.I for X is of the form $e^{ax}V, x^m$ - Linear Equations with variable Coefficients – Equations reducible to the linear Equations.

Unit : IV **[15 hours]**

Applications of first order equations: Growth, Decay and Chemical reactions– Flow of water from an orifice- Falling bodies and other rate problems.

Unit: V **[15 hours]**

Applications of first order equations: The Brachistochrone – Fermat and Bernoulli (Tautochronous property) - Simple Electric circuits. Newton's law of Gravitation and the motion of planets - Central forces - Central gravitational forces - Kepler's III law.

Text Book:

- DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS By S.Narayanan and T.K.Manickavachagom Pillay, S.Viswanathan (Printers &Publishers),Pvt.,Ltd;

Unit I: Chapter I: Sections 1,2,3. Chapter II: Sections 1,2,3,4,5,6.1, 6.2, 6.3.
Unit II: Chapter IV: Sections 1,2,3.1, 3.2. Chapter V: Sections 1, 2, 3, 4- 4.1, 4.2 (a), (b).
Unit III: Chapter V: Sections 4.2- (c), (d), 5-5.1, 5.2, 5.3, 5.4, 5.5 and 6.
Unit IV: Chapter III: Sections 1,2 and 3-3.1, 3.2.
Unit V: Chapter III: Sections 4,5,6, Chapter V: Section 8-8.1,8.2,8.3,8.4,8.5.

Reference Book:

- DIFFERENTIAL EQUATIONS ANDAPPLICATIONS By Dr. S. Arumugam , Thangapandi Issac, New Gamma Publishing House.

Course Title : **ELECTRICITY & ELECTRONICS**	Total Hours : 4
Course Code : **U24PHAX31**	Total Credits : 4

Course Outcomes

COs	CO Statement
CO1	Understanding the fundamentals electrostatic parameters, Gauss's law and its application, Electric Potential, Capacitance and different types Capacitors.
CO2	Learning about Kirchhoff's Laws and its applications, principle of potentiometer.
CO3	Studying the principle & working of galvanometer and LCR circuits.
CO4	Knowing about the performance of transistor amplifiers and op-amps.
CO5	Understanding Number systems and the principles of digital electronics.

UNIT - I: **12 Hours**

Electrostatics: Introduction – Coulomb's law – Electric Field – Electric Field due to a point charge – Flux of the electric field - Gauss's law – Proof – Applications: Electric field due to a uniformly charged sphere and an infinite plane sheet of charge – Field near a charged conducting cylinder – Coulomb's theorem – **Electric potential:** Potential difference – Potential at a point due to a point charge – Relation between electric field and electric potential – **Capacitor:** Introduction – Capacitance of parallel plate (with and without

dielectric slab), spherical (outer sphere earthed) and cylindrical capacitors – Energy stored in a charged capacitor – Loss of energy due to sharing of charges.

UNIT-II: **12 Hours**

Current Electricity: Kirchoff's laws – Application: Wheatstone's network – Sensitveness of bridge – Wheatstone's Network - Carey Foster's bridge – measurement of resistance and temperature coefficient of resistance – Principle of potentiometer – Calibration of ammeter and voltmeter (low range and high range) – measurement of resistance using potentiometer.

UNIT-III: **12 Hours**

Magnetic effect of Electric current: Oersted's experiment – Force on a current carrying conductor - Torque on a current loop – Moving coil ballistic galvanometer (B.G) & Damping correction – expression for charge sensitiveness – comparison of e.m.f's and comparison of capacitors using B.G.

Alternating Current: Electromotive force generated in a coil rotating in a uniform magnetic field – R.M.S and mean value of alternating voltage and current – LCR circuit: impedances – Series and Parallel resonant circuits.

UNIT-IV: **12 Hours**

Electronics: Formation of Junction diodes – Forward and reverse bias – Diode characteristics – Zener Diode and characteristics - LED – Bridge rectifier using junction diodes – π filter – Transistor: working (n-p-n) - characteristics (CE mode only) – Biasing – Voltage divider bias - Modulation (qualitative study) – Op-amp and its characteristics – CMRR – slew rate - Virtual earth – Voltage amplifier (inverting and non-inverting mode) – Op-amp as adder and subtractor.

UNIT-V: **12 Hours**

Number systems and codes: Decimal & Binary number system – binary to decimal and decimal to binary conversions – addition and subtraction of binary numbers – Logic circuits: Boolean algebra – De Morgan's theorem – OR, AND, NOT, NOR & NAND gates – NOR & NAND gates as universal building blocks – Ex-OR gate.

Book for study:

1. **R.Murugeshan. Electricity and Electronics. Madurai: Annani Print Park; 2017.**

Unit I : Chapter 1 – 1.1 – 1.19
Unit II : Chapter 2 – 2.1 – 2.6
Unit III : Chapter 3 – 3.1 – 3.3, 3.6 – 3.7, 3.9 - 3.17
Unit IV : Chapter 4 – 4.1 – 4.13, 4.16 - 4.25
Unit V : Chapter 5 – 5.1 – 5.18

Books for Reference:

1. B.L.Theraja. Solid State Electronics. New Delhi: S. Chand Pvt Ltd; 2003.

2. Brijlal and Subramanyam. Electricity and Magnetism New Delhi: S. Chand Pvt Ltd; 2007.

General Chemistry - III

Hours per week: 4 **Credits:4** **Subject Code:** U24CHAX31

Course Outcome:

CO1: To know the basic requirements of chemical calculation.
CO2: To acquire fundamental knowledge on bonding.
CO3: To get the basic knowledge on coordination compounds
CO4: To gain fundamental knowledge on adsorption and catalysis
CO5: To study the principles of water analysis, and sewage treatment

Unit I: Basic chemical calculation **12 Hours**

Significant numbers – SI Units – Dimensions – Calculation of formula weight – understanding Avogadro number – Mole concept – Mole fraction of the solvent and solute – conversion of grams into moles and moles into grams – Stoichiometric equations. Methods of expressing concentration of the solution – Normality, molarity, molality and mole fraction – Calculations on principle of volumetric analysis.

Unit II: Theories of bonding **12 Hours**

Types of the chemical bonds: Ionic bond, covalent bond and coordinate bond – Valence bond theory – Valence Shell Electron Pair Repulsion theory – Shapes of CH_4, H_2O and NH_3 molecules – Molecular orbital theory – Bonding and antibonding orbital – MO theory applied to homonuclear molecules – H_2, N_2 and O_2 – comparative study of VB and MO theories.

Unit III: Coordination compounds **12 Hours**

Introduction – nomenclature – Werner's theory – Coordination number and geometry – EAN rule – Valence Bond theory and Bonding in octahedral and tetrahedral complexes – Low spin and high spin complexes – Crystal field theory (octahedral and tetrahedral splitting only) .

Unit IV: Adsorption and catalysis **12 Hours**

Adsorption: Definition of various terms (adsorption, absorption, adsorbent, adsorbate, sorption & desorption) – Difference between adsorption and absorption – Factors affecting the adsorption of gases on solids – Physical and chemical adsorption – Adsorption isotherms (Langmuir & Freundlich basic ideas only) – Applications of adsorption.

Catalysis: Definition – Characteristics of catalysis – Promoters and poisons – Enzyme catalysis –characteristics of enzyme catalysis (Michaelis-Menton equation only) – Acid-base catalysis and autocatalysis – Applications of catalysis.

Unit V: Water treatment **12 Hours**

Water quality analysis – Chemical and physical analysis of water quality parameters - Standards prescribed for water quality by WHO and Indian standards – Sea water as a source of drinking water.

Sewage treatment: Sewage – objectives of sewage treatment – General purification reaction: aerobic and anaerobic process – Methods of sewage disposal (Bio chemical oxidation, chemical precipitation and chlorination process) – Sludge disposal (septic tank treatment and sludge digestion).

Reference Books:

Units-I & IV

1. B.R.Puri, L.R.Sharma and S.Pathania, Principles of Physical Chemistry, Vishal Publishing Co., 2005.
2. Arun Bahl, B.S. Bahl and G.D. Tuli, Essentials of Physical Chemistry, S.Chand & Co., 2004.

Units II & III

1. P.L. Soni, Textbook of Inorganic Chemistry, Sultan Chand & Sons, 2008.
2. R. Gopalan Textbook of Inorganic Chemistry, Universities Press Pvt. Ltd., 2012.
3. Puri, Sharma and Kalia, Principles of Inorganic Chemistry, S.Chand & Co., 2008.
4. R.D.Madan, Satya Prakash's Modern Inorganic Chemistry, S.Chand & Co. Ltd., New Delhi, 2008.

Unit V

1. A.K. De, Environmental Chemistry (seventh edition), New Age International Publishers New Delhi, 2010.
2. M.M.Uppal, A Text book of Engineering Chemistry, Khanna Publishers, New Delhi 1988.

e-Resources:

1. https://www.mlsu.ac.in/econtents/1844_SPOT%20I.pdf
2. https://www.pearson.com/content/dam/one-dot-com/one-dot-com/us/en/higher-ed/en/products-services/course-products/tro-chemistry-4e-info/pdf/chapter10.pdf
3. https://byjus.com/jee/coordination-compounds/
4. https://www.egyankosh.ac.in/bitstream/123456789/30954/1/Unit-7.pdf
5. https://www.vedantu.com/jee-main/chemistry-surface-chemistry
6. https://www.studyadda.com/notes/neet/chemistry/surface-nuclear-chemistry-भतल-और-नभकय-रसयन/adsorption-and-adsorption-isotherm/19355

ALLIED 4 - MECHANICS

Contact Hours per Semester : 75 **Subject Code : U24MAA31**
Contact Hours per Week : 4 **Credit : 4**

Objectives:

- To know the concepts of forces and resolution of forces and its applications
- To solve real life problems involving parallel forces.
- To introduce different types of frictional forces and enable to solve problems related to frictional forces.
- To acquire knowledge in Projectiles
- To study motion under the action of a central force

Course Outcomes:

On completion of the course, the students can / will

COs	CO Statement
CO1	Resolve forces , can apply Lami's theorem to solve problems
CO2	Differentiate like and unlike forces, Be able to find moments about a point
CO3	To solve real life problems involving limiting friction
CO4	Apply the characteristics of projectiles in solving problems
CO5	Can derive the law of force for a given orbit

Unit I: Forces Acting at a Point **(15 hours)**

Resultant and components – Parallelogram law of forces – Analytical expression of forces acting at a point – Triangle of forces and its converse – Lami's theorem – Resolution of forces – Theorem on resolved parts – Resultant of any number of coplanar forces – condition for equilibrium of forces.

Unit II: Parallel Forces and Moments **(15 hours)**

Resultant of two like and unlike parallel forces acting on a rigid body – Resultant of number of parallel forces acting on a rigid body – Conditions of equilibrium of three coplanar parallel forces –Moment of a force –Varigon's theorem -Moment of a force about an axis.

Unit III: Friction **(15 hours)**

Friction: Statical, dynamical and limiting friction – Equilibrium of a particle on a rough inclined plane – Equilibrium of a body on a rough inclined plane under a force parallel to the plane - Equilibrium of a body on a rough inclined plane under any force – Problems on Friction (up to problem number 7)

Unit IV: Projectiles **(15 hours)**

Definitions – Two fundamental Principles – Path of a Projectile – Characteristics of the motion of a projectile – Horizontal projection of a particle – Two directions of projections – velocity of the projectile – Range on an inclined plane – Greatest distance of the projectile from the inclinedplane-Time of flight – Maximum range on an inclined plane-

Unit V: Motion under the action of Central forces. **(15 hours)**

Introduction-Velocity and Acceleration in polar coordinates-Equation of motion in Polar coordinates-Note on the equiangular spiral-Motion under a central force-Differential Equation of central orbits-Perpendicular from the pole on the tangent-Pedal equation of some of the well-known curves-Velocities in a central orbit- Problems in central orbits (Given the orbit, to find the law of force to the pole).

***- Students are recommended to have an industrial visit for better understanding of the course.**

TEXT BOOKS:

1. M. K. Venkataraman, STATICS, Agasthiar Publications, 2007
2. M. K. Venkataraman, DYNAMICS, Agasthiar Publications, 2009

Unit I: Text Book 1 - Chapter II : Sections 1 to 16

Unit II: Text Book 1 - Chapter III: Sections 1 to 14

Unit III: Text Book 1 - Chapter VII: Sections 1 to 13

Unit IV: Text Book 2 - Chapter VI: Sections 6.1 to 6.15

Unit V: Text Book 2 - Chapter XI: Sections 11.1 to 11.11

REFERENCE BOOK:

- Mechanics, P. Duraipandian, S Chand & Co Ltd

SBE3 - APPLICATIONS OF VECTOR CALCULUS

Contact Hours per Semester : 30 **Contact Hours per Week : 2**
Subject Code : U24MAS31 **Credit : 2**

Objectives:

- To study the concept of Line and Surface integrals
- To know how they are connected with double and triple integrals using three famous theorems

Course Outcomes:
On completion of the course, the students can / will

COs	CO Statement
CO1	Understand the concept of gradient, curl and divergence.
CO2	Able to compute the double integrals much easier way by using the line integrals.
CO3	Much aware of link between the double integrals and triple integrals and use a proper (easier) dimension to resolve the given problem.
CO4	Able to apply the knowledge of line integrals or vector integrals to most of the physical problems but not limited branch of physics
CO5	Much flexible or well equipped in finding value of the double, triple integrals.

Unit I: **[6 Hours]**

Line integrals – Introduction – Line integrals – Definition – work done by a force.

Unit II : **[6 Hours]**

Surface integrals.

Unit III : **[6 Hours]**

Green's Theorem in plane.

Unit IV : **[6 Hours]**

Stoke's Theorem.

Unit V : **[6 Hours]**

Gauss Divergence Theorem.

Text Book :

Analytical Geometry 3D & Vector Calculus by S. Arumugam and A. Thangapandi Isaac, NewGamma publishing House, 2011.

Contents

Chapter 7: Sections 7.0,7.1, 7.2, 7.3.

Reference Book :

- Vector Calculus by T. K. Manickavasagam Pillay and others, S. Viswanathan Printers pvt. Ltd.

IV SEMESTER

CORE – 6: MODERN ALGEBRA

Contact Hours per semester : 90 Subject Code : **U24MAC41**

Contact Hours per week : 6 Credit : 4

Objectives:

- To learn about the properties and equivalent definitions of a group and subgroup.
- To develop the aspects of cyclic groups and order of an element.
- To acquire knowledge in normal and quotient groups. To know about homomorphism and isomorphism of groups.
- To inculcate knowledge in rings and their properties
- To expose the concepts of ideals and homomorphism of rings.

Course Outcomes:

On completion of this course, the students can / will

COs	CO Statement
CO1	Be able to determine whether a given binary operation on the given set gives a group structure by applying the axioms
CO2	Verify whether a given subset of a group is a subgroup by using the properties and theorems.
CO3	Describe all elements in a cyclic group by using generators
CO4	Understand the concept of Isomorphism and homomorphism of groups
CO5	Be familiar with the concept of ideals, Integral domain and fields.

UNIT I: **(18 hours)**

Groups: Introduction - Definition and Examples-Elementary properties of a group-Equivalent definitions of a group-Permutation groups.

UNIT II: **(18 hours)**

Subgroups - Cyclic groups – Order of an element -Cosets and Lagrange's Theorem.

UNIT III: **(18 hours)**

Normal subgroups and quotient groups - Isomorphism – Homomorphism of groups.

UNIT IV: **(18 hours)**

Definition of Examples - Elementary properties of rings –Isomorphism -Types of rings - Characteristics of a ring

UNIT V: **(18 hours)**

Subrings – Ideals – Quotient rings – Maximal and prime ideals – Homomorphism of rings.

Text Book :

- Modern Algebra by Dr. S. Arumugam, A. Thanga Pandi Isaac. Publishers: Scitech publications(India) Pvt. Ltd.,

Unit I : 3.0 ,3.1, 3.2, 3.3 and 3.4

Unit II : 3.5,3.6, 3.7 and 3.8

Unit III: 3.9, 3.10 and 3.11

Unit IV: 4.1, 4.2, 4.3, 4.4 and 4.5

Unit V : 4.6, 4.7, 4.8, 4.9 and 4.10

Reference Book:

1. Topics in Algebra, Second Edition, Herstein I. N, Wiley India Pvt. Ltd, India.

Course Title : **OPTICS & PHOTONICS**	Total Hours : 4
Course Code : **U24PHAX41**	Total Credits : 4

Course Outcomes:

COs	CO Statement
CO1	Understanding of the properties of lenses and working of system of lenses
CO2	Learning the basics of Dispersion and Aberrations.
CO3	Getting basic knowledge of Interference and Diffraction
CO4	Knowing about Polarization and Types of Polarization
CO5	Learning the Fiber optic communication system & Basic atom laser

UNIT: I **12 Hours**

Geometrical Optics : Introduction – Lenses – Terminology – Conjugate points, planes and distances – Image tracing – Location of the image – Sign conversion – Thin Lens – Lens equation – Lens maker's equation – Newton's lens equation – Magnification, smallest separation of object and real image – Displacement of lens when object and screen are fixed – Deviation by a thin lens – Power.

UNIT: II **12 Hours**

Dispersion and Aberrations: Dispersion by a prism – Refraction through a prism – Angular dispersion – Dispersive power – Angular and chromatic dispersions – Achromatic combination of prisms (Deviation without dispersion) – Dispersion without deviation – Direct vision spectroscope – Aberrations – Spherical aberration – Chromatic aberration- Chromatic aberration in a lens.

UNIT: III **12 Hours**

Interference and Diffraction: Thin film – Interference due to transmitted light variable thickness (wedge-shaped) film – Determination of the wedge angle – Determination of the thickness of the spacer – Newton's rings – Condition for bright and dark rings – Determination of wavelength of light – Fresnel diffraction – Huyens-fresnal theory – Zone

plate – Distinction between interference and diffraction - Plane diffraction grating – Theory of plane transmission grating.

UNIT: IV **12 Hours**

Polarization: Introduction – Polarization – Un-polarized and polarized light – Natural light is un-polarized light – Types of Polarization – Polarizer and Analyser – Double refraction in calcite crystal – Nicol prism.

UNIT: V **12 Hours**

Photonics: Fibre optics – Total internal reflection – Numerical aperture – Classification of optical fibre (single mode, multi-mode and graded index fibre) – Fibre optic communication system – Merits of optical fibre – Basic atom laser – Applications of atom laser.

Book for study:

1. N. Subrahmanyam Brijlal, M.N. Avadhanulu, A Text Book of Optics, 25th revised edition, 2018, S. Chand and company, New Delhi.

Unit I : Chapter 4 – 4.1 - 4.16.
Unit II : Chapter 8 – 8.1 - 8.8.
Chapter 9 – 9.2, 9.5, 9.10, 9.11.
Unit III : Chapter15–15.1, 15.3, 15.5, 15.5.1, 15.5.2, 15.6, 15.6.1, 15.6.7.
Chapter 17 & 18 – 17.1, 17.2, 17.6, 18.7, 18.7.1.
Unit IV : Chapter 20 – 20.1 - 20.5, 20.5.1 – 20.5.4, 20.8, 20.11, 20.12.
Unit V : Chapter 24 – 24.1, 24.3, 24.6, 24.10, 24.11.1–24.11.3, 24.21, 24.22.
Chapter 26 – 26.6, 26.6.1, 26.6.2, 26.7, 26.7.1- 26.7.3.

Book for Reference:

1. Fundamentals of Optics – Devraj Singh, second edition, 2015-PHI Learning Private Ltd. New Delhi.
2. Optics and Spectroscopy – R.Murugeshan, S. Chand and co., 6th Edition, New Delhi, 2008.
3. Optics, Ajoy Ghatak, (TMH), New Delhi, Fourth edition, 2009

Course Title : **ALLIED LAB: PHYSICS PRACTICAL –II**	Total Hours : 2
Course Code : **U22PHAXP41**	Total Credits : 2

Course Outcomes

COs	CO Statement
CO1	Applying optical principles to determine the wavelength of the light source.
CO2	Understanding the concepts of interference forming patterns.
CO3	Applying the principles of electromagnetism to determine the self-inductance of the coil.
CO4	Understanding the principles of digital electronics.

CO5	Studying the V-I characteristics of solid-state electronic devices.

1. Determination of number of lines per meter of the grating (N) and wavelength of prominent lines of the mercury spectrum (λ) using Spectrometer.
2. Determination of dispersive power of a prism using Spectrometer
3. Determination of Radius of curvature of convex lens using Newton's rings.
4. Determination of Thickness of hair using Air wedge
5. Determine of Self-inductance of the coil by LCR Series resonance.
6. Determine of Self-inductance of the coil by LCR Parallel resonance.
7. Comparison of Capacitances of Capacitors using De Sauty's Bridge.
8. Construction of Logic gates – AND, OR, NOT using discrete components.
9. Construction of Logic gates – NAND, NOR using discrete components.
10. Design and construction of Bridge rectifier.
11. V-I Characteristics of Zener diode.
12. Static characteristics of Transistor - CE mode.
13. Verification of De Morgan's laws
14. Construction of AND, OR, NOT using NAND as universal building block.

Semester IV
General Chemistry - IV
Hours per week: 4 **Credits: 4** **Subject Code: U24CHAX41**

CO1: To study the basics of chemical kinetics.
CO2: To acquire basic idea about drugs.
CO3: To gain knowledge on chromatographic techniques.
CO4: To understand the classification of proteins, structure of hormones and basics of vitamins
CO5: To study the chemistry of a few useful compounds

Unit I – Chemical Kinetics **12 Hours**

Introduction – rate of reaction – rate law - rate constant - rate equation – order and molecularity of a reaction. Derivation of first order rate constant – Definition and Examples of Pseudounimolecular reactions (Inversion of cane sugar and hydrolysis of ester by acid). Second, third and zero order reactions – examples – half-life period (no derivation required).

Unit-II- Drugs **12 Hour**

Chemotherapy –Anaesthetics – General anaesthetics and local anasethetics (definition and example only). Sulpha drugs (Sulphonamides) - Synthesis and applications of Sulpha drugs (sulphanilamide, sulphapyridine, sulphathiazole and sulphadiazine) – Mode of action of Sulpha drugs. Antibiotics: Penicillin –Streptomycin- Chloramphenicol (chloromycetin) – Structure and mode of action of these drugs (synthesis not required).

Unit III – Chromatography **12 Hours**

Basic principles of common types of chromatography – Paper chromatography – Thin layer chromatography – Column chromatography – Ion exchange chromatography. Applications of each techniques.

Unit IV – Proteins, Nucleic acids, Hormones and Vitamins **12 Hours**

Definition – Classification of proteins – Colour reaction of proteins – Nucleic acids – nucleoside – nucleotides and general structure of DNA. Hormones – Classification –s structure of some sex hormones – oestrone and progesterone. Vitamins – Classification of vitamins – Sources and deficiency diseases of vitamins A, B1, C, D, E and K (structure not required).

Unit V – Chemistry of a few useful compounds **12 Hours**

Preparation and uses of CH_2Cl_2, $CHCl_3$, CCl_4, CF_2Cl_2, Bleaching powder, Phenyl, Talcum powder, Shampoo, Shave lotion, Soaps and Detergents.

Reference Books:

Unit I

1. Arun Bahl, B.S. Bahl and G.D. Tuli, Essentials of Physical Chemistry, S.Chand & Co., 2004.
2. B.R.Puri, L.R.Sharma and S.Pathania, Principles of Physical Chemistry, Vishal Publishing Co., 2005.

Unit II

1. B.S.Bahl and Arun Bahl, A Textbook of Organic Chemistry, S.Chand & Company Ltd, Ram Nagar, New Delhi,16th edition, 2002.
2. K.S.Tewari, N.K.Vishnol and S.N. Mehrotra A Textbook of Organic Chemistry, 3rd revised edition, 2006.
3. P.L.Soni and H.M.Chawla, Textbook of Organic Chemistry, Sultan Chand & Sons, New Delhi, 2007.

Unit III

1. B.R. Puri, L.R. Sharma and K.C. Kalia, Principles of Inorganic Chemistry, Milestone Publishers, 2010.
2. B.K. Sharma, Instrumental methods of Chemical Analysis, Goel Publishing House 23rd Edition, 2004.

Unit IV

1. S.Bahl and Arun Bahl, Advanced Organic Chemistry, S.Chand & Co. Ltd., 2008.
2. K.S.Tewari N.K.Vishnol and S.N. Mehrotra A Text book of Organic Chemistry, 3rd revised edition, 2006.
3. Jaya shree Ghosh, Fundamental Concept of Applied Chemistry S.Chand & Company LTD, 2008.

Unit V

1. R.D.Madan, Satya Prakash's Modern Inorganic Chemistry, S.Chand & Co. Ltd., New Delhi, 2008.
2. B.R.Puri, L.R.Sharma and K.C.Kalia, Principles of Inorganic Chemistry, S.Chand & Co., 2008.
3. P.L. Soni, Textbook of Inorganic Chemistry, Sultan Chand & Sons, 2008.
4. P.K.Chattopadhyay, Modern Technology of Soaps, Detergents and Toiletries,2nd edition, 2005.
5. B.K.Sharma, Industrial Chemistry, Goel Publishing House, 6th edition, 1994.

e-Resources:

1. https://www.vssut.ac.in/lecture_notes/lecture1425072667.pdf
2. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8046889/
3. https://collegedunia.com/exams/chromatography-chemistry-articleid-4111
4. https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SMB1102.pdf

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Part III – LAB: Organic Qualitative Analysis

Hours per week: 2 **Credits: 2** **Subject Code: U22CHAXP41**

Course Outcome:

CO1: To acquire knowledge on the analysis of simple organic compounds.
CO2: To understand the basic principles to confirm the presence of saturation/unsaturation and aliphatic/aromatic nature of organic compounds
CO3: To confirm the presence of elements in the organic compounds other than carbon, hydrogen and oxygen
CO4: To get the knowledge on confirming the functional group present in an organic compound by preparing a solid derivative
CO5: To know the fundamental strategies of organic reactions.

Organic analysis

Analysis of an organic compound containing one or two functional groups and confirmation by the preparation of solid derivative / colour reaction – acids, phenols, aldehydes, ketones, esters, nitro compounds, primary amines, amides, anilides, aliphatic diamide and monosaccharides.

e-Resources:

- https://www.youtube.com/watch?v=JAQ060bSZG8
- https://www.youtube.com/watch?v=FUo428guKt0
- https://www.youtube.com/watch?v=9kD9sRAf2TM
- https://www.youtube.com/watch?v=o_Ehw_gFWtc

ALLIED 6 – NUMERICAL METHODS

Contact Hours per semester : 60 Subject Code : **U24MAA41**
Contact Hours per week : 4 Credit : 4

Objectives:

- Understanding the distinction between accuracy and precision.
- Learning how to quantify error.
- Understanding how to write forward, backward and centered finite- difference approximations of first and second derivatives

Course Outcomes:

Upon completion of this course, students are able

Cos	CO Statement
CO1	To solve algebraic and transcendental equations using various numerical techniques.
CO2	To understand the concept of difference operators.

CO3	To interpolate values using the difference operators.
CO4	To implement numerical differentiation and integration methods for a variety of multidisciplinary applications.
CO5	To solve ordinary differential equations numerically.

Unit I: Algebraic and Transcendental Equations (12 hours)
Introduction-Errors in Numerical computation– Iteration method -Bisection method (Balzano method) –Regula Falsi Method (Method of false position) -Newton Raphson method - **(Horner's method excluded)**-Simultaneous equations- Iterative methods-Gauss Jacobi iteration method-Gauss Seidel iteration method.

Unit II: Finite Differences (12 hours)
Introduction-Difference Operators-Other Difference Operators.

Unit III: Interpolation (12 hours)
Introduction-Newton's Interpolation Formulae – Central Difference Interpolation Formulae-Lagrange's Interpolation formula –Divided Differences - Newton's divided difference formula –Inverse interpolation.

Unit IV: Numerical Differentiation and Integration (12 hours)
Introduction-Derivatives using Newton's forward difference formula- Derivatives using Newton's backward difference formula- Derivatives using central difference formulae – Maxima and Minima of the interpolating polynomial-Numerical Integration .

Unit V: Numerical Solutions of Ordinary Differential Equations (12 hours)
Introduction – Taylor's series method – Picard's method – Euler's method- Runge - Kutta methods.

Text Book:

- Numerical Methods, 2nd Edition by S.Arumugam, A.Thangapandi Isaac, A. Somasundaram, Scitech publications

  Unit I: Chapter 3: All Sections except Horner's method.
  Chapter 4: Sections 4.1, 4.7, 4.8
  Unit II: Chapter 6: Sections 6.0 to 6.2,
  Unit III: Chapter 7: Sections 7.0 to 7.6
  Unit IV: Chapter 8: Sections 8.0 to 8.5
  Unit V: Chapter 10: Section 10.0 to 10.4

Reference Books:

1. Numerical methods in Science and Engineering by DR.M.K. Venkataraman
2. Numerical Methods by Dr.P.Kandasamy, Dr.K.Thilagavathy, Dr. K. Gunavathi, 1st Edition S.Chand company.

Allied 6 Practical LAB: Office Automation

(Examination to be conducted at the end of 4th semester)

Contact Hours per semester: 30 **Subject Code: U24MAAP41**
Contact Hours per week: 2 **Credit: 1**

Objectives:

- To develop the skills of the students to edit documents in MS Word
- To develop the skills of the students to handle data excel spreadsheets and to make effective PowerPoint presentations.

Course Outcomes:

- CO1: Able to create and edit documents in MSWord
- CO2: Able to handle data in Excel spreadsheets.
- CO3: Can develop an effective presentations using MS Powerpoint.

Program List:

1. Working with Explorer [Files/Folders: Create, Copy, Paste, Delete, Rename]
2. Create a document in MS word about Mathematics
3. Exploring Insert and Page layout tabs
4. Create an invitation and Visiting card design
5. Mail Merge
6. Creation of Worksheet in MS Excel
7. Manipulating Excel Functions
8. Creating different types of Charts
9. Sorting and Filtering Data in a Table
10. Creating an Amortization schedule
11. Errors in MSEXCEL
12. Creating a presentation in MS Power point
13. Slide Animation and transition
14. Animating Text and objects
15. Customizing the slide show - Adding Music, Sounds and Video

Text Book: Ed Bott, Woody Leonhard, Using Microsoft Office 2007, Pearson Education, 2007
