Syllabus-2023-2024

(SOS)(BSc_PCM)

Title of the Course	Organic Chemistry
Course Code	BSCH0401[T]

Part A

Year	2nd	Semester	4th	Credits	L	T	P	C
					3	0	1	4

Course Type	Embedded theory and lab
Course Category	Disciplinary Major

Pre-Requisite/s	The students should have basic knowledge of organic chemistry	Co-Requisite/s	The student must have studied organic chemistry in B.Sc. Certificate course

Course Outcomes & Bloom's Level	**CO1-** To remember concept of substitution reactions**(BL1-Remember)** **CO2-** To understand the concept of addition and elimination reactions **(BL2-Understand)** **CO3-** To apply the various reagents in the organic synthesis**(BL3-Apply)** **CO4-** To recognize mechanism of oxidation reaction.**(BL4-Analyze)** **CO5-** To know the chemistry of photochemical reactions. **(BL5-Evaluate)**

Coures Elements	Skill Development ✔ Entrepreneurship ✘ Employability ✔ Professional Ethics ✘ Gender ✘ Human Values ✘ Environment ✘	**SDG (Goals)**	SDG4(Quality education) SDG9(Industry Innovation and Infrastructure)

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Substitution Reactions: Aliphatic Nucleophilic Substitution : Introduction, the SN1, SN2 and SNi mechanisms, neighbouring group participation, effect of substrate, nucleophile, leaving group and reaction medium. Aliphatic Electrophilic Substitution : Elementary treatment	Lecture methods, short vedios, ABCA	8 hrs
Unit 2	Addition and Elimination Reactions Addition Renctions: Introduction, reactions involving addition of nucleophile, electrophile and frec radicals, regio-selectivity and chemo-selectivity, orientation and reactivity, Markovnikov and Anti-Markovnikov's addition. Elimination Reactions : Introduction, E1, E2 and ElcB mechanisms, effect of substrate, attacking species, leaving group and reaction medium, orientation Saytzeff and Hofmann rule	Audio/Video clips, group discussion, lecture with methods	8 hrs
Unit 3	Reagents and Catalysts (Mechanisms and Applications) Reagents and Catalysts : Preparation, properties and applications of important reagents and catalysts in organic synthesis with mechanistic details : Grignard reagent, N-bromo succinimide (NBS), diazomethane, anhydrous aluminium chloride ($AlCl_3$), sodamide ($NaNH_2$), Ziegler-Natta catalyst	Summarizing, PBL (small working models), Quiz, Virtual Lab, Tutorials sessions, Expert Lecture, lecture methods	8 hrs
Unit 4	Oxidation Reactions : Introduction, metal based and non-metal based oxidations, oxidation of alcohols to carbonyls (chromium, manganese, and silver based reagents), alkenes to epoxides (peroxides/ peracids based, alkenes to diols (manganese and osmium based), alkenes to carbonyls with bond cleavage (manganese and lead based), Oppenauer oxidation	Lecture methods, short vedios, ABCA	8 hrs
Unit 5	Photochemical Reactions : Introduction to photochemistry, electronic excitations, Jablonski diagram, Norrish type I and II reactions and cis-trans isomerization	Summarizing, PBL (small working models), Virtual Lab, Tutorials sessions, Expert Lecture	8 Hrs

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Qualitative analysis: Separtion of binary organic micture, Systematic identificationof separated organic compounds.	Experiments	BL4-Analyze	8 hrs
2	Oxidation of benzaldehyde to benzoic acid by KMnO4	Experiments	BL5-Evaluate	2hrs
3	Oxidation of cyclohexanone to adipic acid by HNO3	Experiments	BL5-Evaluate	2hrs
4	(4+2) Cycloaddition reaction of antracene and maleic anhydride	Experiments	BL4-Analyze	4hrs
5	Preparation and purification of product and determination of melting point of Acetanilide to p-nitro acietanilide to para nitroaniline	Experiments	BL6-Create	4 hrs
6	Preparation and purification of product and determination of melting point o azo dyesf	PBL	BL6-Create	8hrs
7	Application of Substitution reactions	Seminar	BL2-Understand	1hr
8	To see the use of reagents in organic synthesis	Industrial Visit	BL2-Understand	5hrs
9	To study the conversion of alkenes to diols (manganese and osimium based	Research Paper Presentation	BL3-Apply	5hrs

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	60	18	40	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	60	30	40	

Part E

Books	Unified Chemistry by MMN tondon
Articles	
References Books	Clayden, J., Greeves, N. and Warren S. Organic Chemistry, Oxford University Press, India, 1012, Second Edition Jerry March Advanced Organic Chemistry" John Wiley and Sons (Asia) Hornback, 1. M. "Organic Chemistry" Thomson Learning, Singapore, 2006, Second Edition. Ahluwalia, V. K. and Parashar R. K., "Organic Reaction Mechanisms", Narosa Publication, India, 2010, Fourth Edition. Goswami, C., "Snatkottar Prakash Rasayan evm Thos Avastha Rasayan", Hindi Granth Academy, Bhopal, Madhya Pradesh, 2019 .
MOOC Courses	https://nptel.ac.in/courses/104/101/10401115/ https://nptel.ac.in/courses/104/103/10403111/ https://nptel.ac.in/courses/104/106/10406077/
Videos	http://www.mphindigranthacademy.org/

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	-	-	-	3	2	3	3	3
CO2	3	2	2	2	-	-	-	-	-	-	2	2	2	2	2
CO3	3	2	2	1	-	-	-	-	-	-	1	2	2	2	1
CO4	3	3	1	1	-	-	-	-	-	-	1	2	1	1	1
CO5	3	2	1	1	-	-	-	-	-	-	1	1	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_PCM)

Title of the Course	Advance Calculus and Differential equations
Course Code	BSMA0401[T]

Part A

Year	2nd	Semester	4th	Credits	L	T	P	C
					4	0	0	4

Course Type	Theory only
Course Category	Disciplinary Minor

Pre-Requisite/s	Basics Differentiation , Integrations, , Continuity ,convergence and divergence of Sequence and Series ,partial differentiation	Co-Requisite/s	Function,, Limit , Sequence and Series and derivative

Course Outcomes & Bloom's Level	**CO1-** To remember basic concept of Real Analysis ,Partial Differentiationwhich used in various problems of sciences. **(BL1-Remember)** **CO2-** To understand and identify the Convergence of sequences various test for convergence of sequences , limit ,continuity and differentiability of function partial differentiation, Envelops , maxima and minima , Double and Triple Integral volume and surface of solids.also**(BL2-Understand)** **CO3-** To apply the concept of limit continuity and differentiability partial differentiation ,Taylors theorem , LaGrange's method , double and triple integrals to solve various problems of physical and allied sciences**(BL3-Apply)** **CO4-** To analyze and draw connection among the ideas of LaGrange's theorem and Beta Gama function , volume and surface and there properties to solve various problems of physical and allied sciences also Analyze behavior of the solution of the well-defined problems of differentiation **(BL4-Analyze)** **CO5-** To evaluate Double and Triple integral , Partial differentiation , Convergence of series also identifying and provide the various applications related to them also **(BL5-Evaluate)**

Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗	SDG (Goals)	SDG4(Quality education)

Part B

Modules	Contents	Pedagogy	Hours
UNIT01	Definition of a sequence, , Bounded and monotonic sequences, Theorems on limits of sequences, Cauchy's convergence criterion, series of non-negative terms, comparison test, Cauchy's integral test, Cauchy's root test, Ratio tests, Raabe's tests, Logarithmic tests, Alternating series, Leibnitz's test, Absolute and Conditional convergence	Audio/Video clips, group discussion, lecture with PPTs, quiz	10
UNIT02	imit and continuity of functions of two variables, Partial differentiation, Change of variables, Euler's theorem on homogeneous functions, Taylor's theorem for functions of two variables, Jacobins,, Maxima and Minima of functions of two variables	Audio/Video clips, group discussion, lecture with ppt	10
UNIT03	Beta and Gama function ,Double and triple integrals, Volumes and surfaces of solids of revolution, Change of order of integration in double integrals.	Audio/Video clips, group discussion, lecture with PPTs, classroom presentations, Analysis	10
UNIT04	Partial differential equations of the first order, Lagrange's solution, Some special types of equations which can be solved easily by methods other than the general method, Charpit's general method	Audio/Videoclips, group discussion, lecture with PPTs, Quiz	8
UNIT05	Partial differential equations of second and higher orders, Classification of partial differential equations of second order, Homogeneous and non-homogeneous equations with constant coefficients, Partial differential equations reducible to equations with constant coefficients.	Audio/Video clips, group discussion, lecture with PPTs, Quiz	8

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	22
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
0	0	0	0	0	0

<h1 style="text-align:center">Part E</h1>

Books	R. R. Goldbeg,Real Analysis,Oxford & I. B. H. Publishing Co. New Delhi Sharma and Gupta ,Integral Transform,Pragati, Prakashan Meerut
Articles	
References Books	D. Soma Sundaram and B. Choudhary,A first Course in Mathematical Analysis,Narosa Publishing House, New Delhi, 1997 D. A. Murray,Introductory Course in Differential Equation,Orient Longman, India, 1967.
MOOC Courses	
Videos	

<h2 style="text-align:center">Course Articulation Matrix</h2>

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	2	2	-	2	-	-	-	-	1	-	1
CO2	3	3	1	3	3	2	-	1	-	1	-	-	2	-	2
CO3	3	2	-	1	3	-	-	-	-	-	-	-	1	3	2
CO4	3	2	-	2	-	-	-	-	-	-	-	-	-	3	1
CO5	2	1	-	1	-	-	-	-	-	-	-	-	-	2	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_PCM)

Title of the Course	Electricity and Magnetism
Course Code	BSPH0401{T]

Part A

Year	2nd	Semester	4th	Credits	L	T	P	C
					3	0	1	4

Course Type	Embedded theory and lab		
Course Category	Disciplinary Major		
Pre-Requisite/s	Knowledge of Physics upto III Semester	Co-Requisite/s	Knowledge of Calculus
Course Outcomes & Bloom's Level	**CO1-** To remember the basic laws of Electricity and Magnetism **(BL1-Remember)** **CO2-** Understand the basic concepts of Electricity and Magnetism**(BL2-Understand)** **CO3-** To apply the concepts of Electricity and Magnetism to different system. **(BL3-Apply)** **CO4-** To Analyze the laws of Electricity and Magnetism**(BL4-Analyze)** **CO5-** To evaluate the laws of Electricity and Magnetism**(BL5-Evaluate)**		
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗	**SDG (Goals)**	SDG4(Quality education)

Part B

Modules	Contents	Pedagogy	Hours
1	Unit-I Vector Calculus : Differentiation of vectors, scalar and vector fields, conservative fields and potentials, line integrals, gradient of a scalar field, divergence of a vector field and divergence theorem, curl of a vector field and its physical significance, Stokes' theorem, combination of grad, div and curl	Audio/Video clips, group discussion, lecture with ppt, on white board, quiz	8
2	Unit- II Electric Field and Electric Potential: Electric field, electric field lines electric flux Gauss law with applications to charge distributions with Spherical, Cylindrical and Planer symmetry. Conservative nature of electrostatic field, electrostatic Potential, Potential and electric field of a dipole Force and Torque on a diploe	Audio/Video clips, group discussion, lecture with ppt, on white board	8
3	Unit-III Electrostatic energy and Capacitance of a System Electrostatic energy of system of charges, Electrostatic energy of a charged sphere, Conductors in an electrostatic field, Surface charge and force on a conductor, Capacitance of a System of charged conductors, Parallel plate capacitor	Audio/Video clips, group discussion, lecture with ppt, on white board	8
4	Unit-IV Magnetic Field Magnetic force between current elements and definition of magnetic field B Biot Savart's Law and its application to straight wire and circular loop. Dipole Moment and its analogy with electric dipole Ampere's Circuital law and its application to Solenoid.	Audio/Video clips, group discussion, lecture with ppt, on white board	8
5	Unit-V Electromagnetic Induction and Electrical Circuits Faraday's Law, Lenz's law, Self and Mutual Inductances Introduction to Maxwell equation charge conservation and displacement current. Electrical Circuits: Kirchhoff's law Complex reactance and impedance series and parallel LCR Circuit:: (1) Resonance (2) Power dissipation (3) Quality factor and (4) Band width	Audio/Video clips, group discussion, lecture with ppt, on white board	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Series Resonance for Different values of resistances, capacitances, Inductances and plotting of resonance curves and Q factor.	Experiments	BL4-Analyze	3
2	Measurement of Q factor for both Parallel resonances.	Experiments	BL2-Understand	3
3	To verify Kirchoff's Current and Voltage Law for D.C. Circuit	Experiments	BL2-Understand	3
4	To determination the resistance per unit length using Carey Foster's bridge wire.	Experiments	BL4-Analyze	3
5	To determine the value of unknown resistance using post office box.	Experiments	BL2-Understand	3

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	60	18	40	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	60	30	40	

Part E

Books	Electricity and Magnetism and Electromagnetic Theory by S Mahajan and Choudhury
Articles	
References Books	Introduction to Electrodynamics by D J Griffith
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3	2	2	-	2	-	-	-	-	-	-	-	-
CO2	2	3	2	2	2	-	-	-	-	-	-	-	-	-	-
CO3	2	2	2	3	1	-	1	-	-	-	-	-	-	-	-
CO4	1	1	3	2	3	-	-	-	-	-	-	-	-	-	-
CO5	3	2	1	1	1	-	3	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

(SOS)(BSc_PCM)

Title of the Course	Electromgnetic Theory
Course Code	BSPH0404[T]

Part A

Year	2nd	Semester	4th	Credits	L	T	P	C
					3	0	0	3

Course Type	Theory only		
Course Category	Disciplinary Major		
Pre-Requisite/s	Knowledge of Physics upto BSc III Semester	Co-Requisite/s	Knowledge of Vector Calculus
Course Outcomes & Bloom's Level	CO1- To remember the basic laws of Electrodynamics(BL1-Remember) CO2- Understand the basic concepts of Electromagnetic theory(BL2-Understand) CO3- To apply the concepts of Electrodynamics to different system. (BL3-Apply) CO4- To Analyze the laws of Electromagnetic theory(BL4-Analyze) CO5- To evaluate the laws of Electrostatics and Magneto statics (BL5-Evaluate)		
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗	SDG (Goals)	SDG4(Quality education)

Part B

Modules	Contents	Pedagogy	Hours
1	Unit-I Maxwell Equations: Review of Maxwell's equations. Displacement Current. Vector and Scalar Potentials. Gauge Transformations: Lorentz and Coulomb Gauge. Wave Equations. Plane Waves in Dielectric Media.	Audio/Video clips, group discussion, lecture with ppt, on white board, quiz	8
2	Unit-II EM Energy Density: Poynting Theorem and Poynting Vector. Electromagnetic (EM) Energy Density. Physical Concept of Electromagnetic Field Energy Density. Momentum Density and Angular Momentum Density	Audio/Video clips, group discussion, lecture with ppt, on white board, quiz	8
3	Unit-III Electromagnetic waves: E. M. waves in vacuum, linear and circular polarization, Poynting vector, refraction and reflection of EM waves at interface between two dielectrics, normal and oblique incidence, Brewster angle, total reflection, numerical problems.	Audio/Video clips, group discussion, lecture with ppt, on white board, quiz	8
4	Unit-IV Electromagnetic waves in a conducting medium, Complex refractive index, Boundary value problems in presence of metallic interface: reflection and refraction from metallic surface	Audio/Video clips, group discussion, lecture with ppt, on white board, quiz	8
5	Unit-V Wave Guides: Planar optical wave guides. Planar dielectric wave guide. Condition of continuity at interface. Phase shift on total reflection. Eigenvalue equations. Phase and group velocity of guided waves. Field energy and Power transmission	Audio/Video clips, group discussion, lecture with ppt, on white board, quiz	8

Part D(Marks Distribution)

Theory					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	60	18	40	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

Part E

Books	Introduction to Electrodynamics by D.J. Griffiths
Articles	
References Books	Classical Electrodynamics by J D Jakson
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	3	1	1	-	-	-	-	-	-	-	-	-	-
CO2	1	2	2	2	2	-	-	-	-	-	-	-	-	-	-
CO3	2	3	1	2	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	3	1	-	-	-	-	-	-	-	-	-	-
CO5	1	1	1	1	2	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-