

FOUR YEAR UNDER GRADUATE PROGRAM (2024-28)
DEPARTMENT OF MATHEMATICS
COURSE CURRICULUM

Part A: Introduction			
Program: Bachelor in Science (Degree/Honors)		Semester - V	Session:2024-2025
1	Course Code	MASC-05	
2	Course Title	Real Analysis	
3	Course Type	Discipline Specific Course (DSC)	
4	Pre-requisite(if any)	Knowledge of algebra, real numbers, set theory, functions and elementary calculus.	
5	Course Learning Outcome (CLO)	<p>This Course will enable the students to:</p> <ul style="list-style-type: none"> ➤ Understand basic properties of real number system such as least upper bound property and Order property. ➤ Realize importance of bounded, convergent, Cauchy and monotonic sequences of real numbers, find their limit superior and limit inferior. ➤ Learn about Riemann integrability of bounded functions and algebra of R-integrable functions. ➤ Determine various applications of the fundamental theorem of integral calculus. ➤ Relate concepts of uniform continuity, differentiation, integration and uniform convergence.. 	
6	Credit Value	4 C	1Credit = 15 hours- Learning and Observation
7	Total Marks	Maximum Marks : 100	Minimum Passing Marks:40

Part B: Content of the Course		
Total no of teaching – learning period =60 Periods (60 Hours)		
UNIT	Topics	No of Periods
I	<p>Contributions and Biography of Indian Mathematicians Swami Bharati Krishna Tirth, Madhav, Neelkanth Somayaji and Shrinivaas Ayanagar Ramanujan</p> <p>Real Numbers : The set of real numbers R as an ordered field, Least upper bound properties of R, Metric property and completeness of R, Archimedean property of R, Dense subsets of R, Nested intervals property; Neighborhood of a point in R, Open sets, limit point of a set, closed and perfect sets in R.</p>	15
II	<p>Convergence of sequences in R: Bounded and monotonic sequences, Convergent sequence and its limit, Limit theorems, Monotone convergence theorem, Subsequences, Bolzano-Weierstrass theorem, Limit superior and limit inferior, Cauchy sequence, Cauchy's convergence criterion.</p>	15
III	<p>Infinite Series: Convergence and divergence of infinite series of positive real numbers, Necessary condition for convergence, Cauchy criterion for convergence; Test for</p>	15

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	convergence of positive term series; Basic comparison test, Comparison test, D'Alembert's Ratio test, Cauchy root test, Raabe's test, Logarithmic test, Cauchy Integral test, Alternating series, Leibnitz's test, Series of arbitrary terms, Absolute and conditional convergence, Rearrangement of series and Riemann's theorem.	
IV	Riemann Integration and Improper Integrals: Riemann integrability of bounded functions, Examples of R- integrable and non-integrable functions, Algebra of Riemann integrable functions, Integrability of continuous and monotonic functions, Darboux theorems, Fundamental theorem of integral calculus, Improper Integral.	15

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Text Books Recommended-

1. T.M. Apostol (2008). *Mathematical Analysis: A Modern Approach to Advanced Calculus*. Pearson Education.
2. Charalambos D. Aliprantis & Owen Burkinshaw (1998). *Principles of Real Analysis*. Academic Press

Reference Books Recommended-

3. Robert G. Bartle & Donald R. Sherbert (2015). *Introduction to Real Analysis* (4th edition). Wiley India.
4. Gerald G. Bileau, Paul R. Thie & G.E. Keough (2015). *An Introduction to Analysis* (2nd edition), Jones and Bartlett India Pvt. Ltd.
5. E. Hewitt & K. Stromberg (2013). *Real and Abstract Analysis*. Springer-Verlag.
6. K.A. Ross (2013). *Elementary Analysis: The Theory of Calculus* (2nd edition). Springer.
7. Walter Rudin. *Principles of Mathematical Analysis* (3rd edition), Tata McGraw Hill.

E-resources: <https://onlinecourses.nptel.ac.in>
<https://epqp.inflibnet.aci.in>
<https://swayam.gov.in>
<https://www.mooc.org>

Part D: Assessment and Evaluation

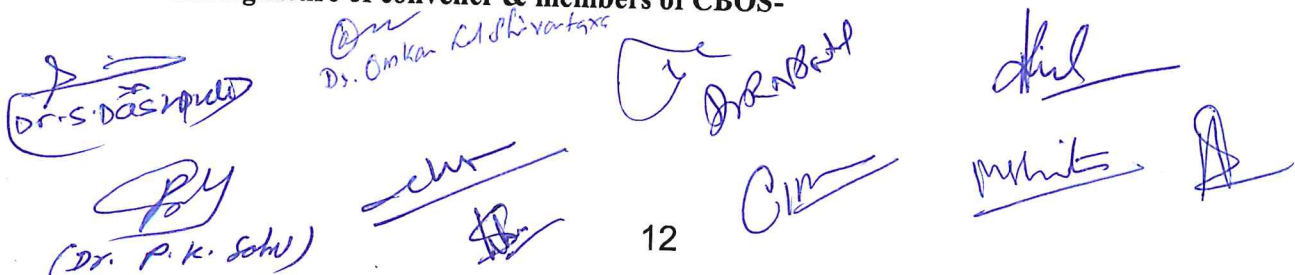
Suggested Continuous Evaluation Methods:

Maximum Marks: **100 Marks**
 Continuous Internal Assessment (CIA): **30 Marks**
 End Semester Examination (ESE): **70 Marks**

Continuous Internal Assessment (CIA) (Conducted by course teacher)	Test/Quiz – 20+20 Marks Assignment/Seminar- 10 Marks	Better marks out of two test/quiz + obtained marks in Assignment shall be considered against 30 marks
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End Semester Examination (ESE)	Two Section-A&B Section-A: Q1. Objective- 10x1=10 marks Q2. Short answer type question- 5x4=20 marks Section-B: Descriptive answer type question, 1 out of 2 from each unit- 10x4= 40 Marks
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Name and signature of convener & members of CBOS-



 Dr. S. Dasgupta
 Dr. Omkar
 Dr. P. K. Sahu
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FOUR YEAR UNDERGRADUATE PROGRAM(2024-28)
DEPARTMENT OF MATHEMATICS
COURSE CURRICULUM

Part A: Introduction			
Program: Bachelor in Science (Degree/Honors)		Semester - V	Session:2024-2025
1	Course Code	MASE-03	
2	Course Title	Numerical Methods	
3	Course Type	Discipline Specific Elective (DSE)	
4	Pre-requisite (if any)	Basic idea of Numerical solutions, Differential equation and theory of equation.	
5	Course Learning Outcome (CLO)	<p>This Course will enable the students to:</p> <ul style="list-style-type: none"> ➤ The aim of this course is to teach the student the application of various numerical techniques for variety of problems occurring in the daily life. ➤ The main outcome will be that student will be able to handle problems and finding approximated solution. ➤ Obtain numerical solutions of algebraic and transcendental equations. ➤ Find numerical solutions of system of linear equations and to check the accuracy of the solutions. ➤ Learn about various interpolating and extrapolating methods to find numerical solutions. 	
6	Credit Value	4 C	1Credit =15 hours-Learning and Observation
7	Total Marks	Maximum Marks : 100	Minimum Passing Marks:40

Part B: Content of the Course		
Total no of teaching – learning period =60 Periods (60 Hours)		
UNIT	Topics	No of Periods
I	Numerical Methods for Solving Algebraic and Transcendental Equations Round-off error and computer arithmetic, Local and global truncation errors, Algorithms and convergence; Bisection method, false position method, fixed point iteration method, Newton's method and secant method for solving equations.	15
II	Lagrange and Newton interpolations, Piecewise linear interpolation, Cubic spline interpolation, Finite difference operators, Gregory Newton forward and backward difference interpolations.	15
III	First order and higher order approximation for first derivative, Approximation for second derivative; Numerical integration: Trapezoidal rule, Simpson's rule and its error analysis, BulirschStoer extrapolation methods, Richardson extrapolation.	15
IV	Euler's method, RungeKutta methods, Higher order one step method, Multi-step methods; Finite difference method, Shooting method, Real life examples: Google search engine, 1D and 2D simulations, Weather forecasting.	15

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(Dr. P. K. Sahu)

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Part C - Learning Resource

Text Books, Reference Books, Other Resources

Text Books Recommended-

1. M.K. Jain, S. R. K. Iyengar & R. K. Jain (2012). Numerical Methods for Scientific and Engineering Computation (6th edition). New Age International Publishers.
2. C. F. Gerald & P. O. Wheatley (2008). Applied Numerical Analysis (7th edition), Pearson Education, India.

Reference Books Recommended-

3. Brian Bradie (2006), A Friendly Introduction to Numerical Analysis. Pearson.
4. Robert J. Schilling & Sandra L. Harris (1999). Applied Numerical Methods for Engineers Using MATLAB and C. Thomson-Brooks/Cole.

E-Recourses:

- <https://onlinecourses.nptel.ac.in>
- <https://epqp.inflibnet.aci.in>
- <https://swayam.gov.in>
- <https://www.mooc.org>

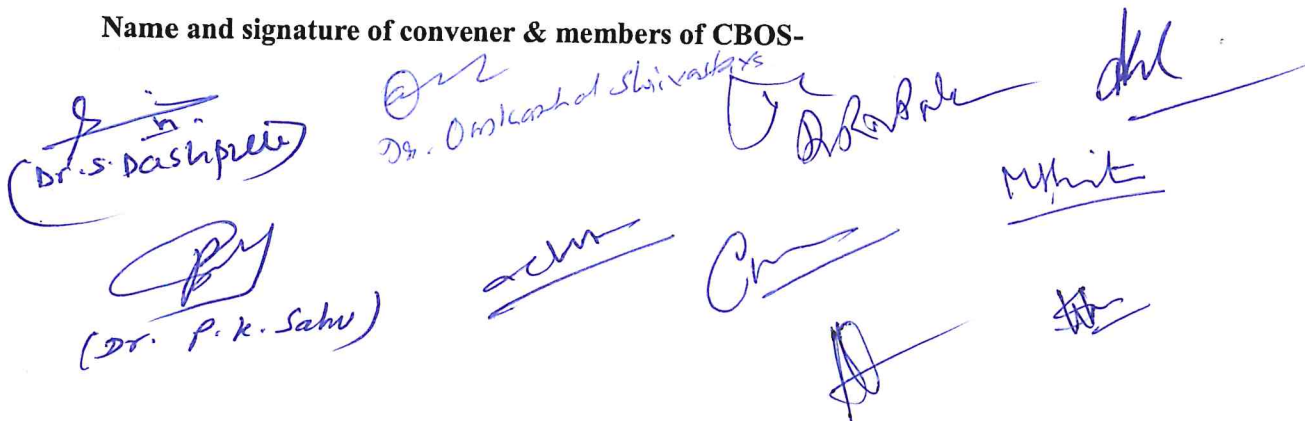
Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	100 Marks
Continuous Internal Assessment (CIA):	30 Marks
End Semester Examination (ESE):	70 Marks

Continuous Internal Assessment (CIA) (Conducted by course teacher)	Test /Quiz – 20+20 Marks	Better marks out of two test/quiz + obtained marks in Assignment shall be considered against 30 marks
	Assignment/Seminar- 10 Marks	
End Semester Examination (ESE)	Two Section-A&B	
	Section-A: Q1.Objective- 10x1=10 marks Q2. Short answer type question-5x4=20marks	
	Section-B: Descriptive answer type question, 1 out of 2 from each unit- 10x4= 40 Marks	

Name and signature of convener & members of CBOS-



 (Dr. S. Dashpreet) Dr. Omkeshwar Shivastava [Signature] [Signature]

 (Dr. P. K. Sahu) [Signature] [Signature] [Signature]

PART – C: LEARNING RESOURCES

Text Books, Reference Books and Others

Text Books Recommended

1. Unified Physics- III, R. P. Goyal, Shivalal Agrawal Publications
2. Unified Physics- III, Navbodh Publications

Reference Books Recommended

1. Quantum Physics, Berkeley Physics Course Vol.4. E.H. Wichman, 2008, Tata McGraw-Hill Co.
2. Modern Physics, G. Kaur and G.R. Pickrell, 2014, McGraw Hill
3. Quantum Mechanics: Theory & Applications, A.K.Ghatak&S.Lokanathan, 2004, Macmillan

Online Resources (e-books/ learning portals/ other e-resources)

1. All e-books of physics <https://www.e-booksdirectory.com/listing.php?category=2>
2. Free physics textbook in PDF https://www.motionmountain.net/?gclid=CjwKCAjwmq3kBRB_EiwAjkNDp5v8Yy6xK1s0Kma0VR0AWGlichRwFfCC0-vpZK1jrPoEOAnBq8fcqRoCILsQAvD_BwE
3. Cambridge University Books for Physics <https://www.cambridgeindia.org/>
4. Books for solving physics problems <https://bookboon.com/en/physics-ebooks>
5. NPTEL Online courses: https://onlinecourses.nptel.ac.in/noc21_ph05/preview
6. Quantum Mechanics <https://archive.nptel.ac.in/courses/115/101/115101107/>
7. Quantum Mechanics <https://nptel.ac.in/courses/115106066>

PART – D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: 100Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Examination (ESE): 70 Marks

Continuous Internal Assessment (CIA): (By course teacher)	Internal Test/ Quiz (2): 20+20 Assignment/ Seminar (1): 10 Total Marks: 30	Better marks out of the two Test / Quiz + marks obtained in Assignment shall be considered against 30 Marks
End Semester Exam(ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20Marks Section B: Descriptive answer type, 1 out of 2 from each unit- 4x10 =40 Marks	

Signature of Convener & Members (CBOS) :









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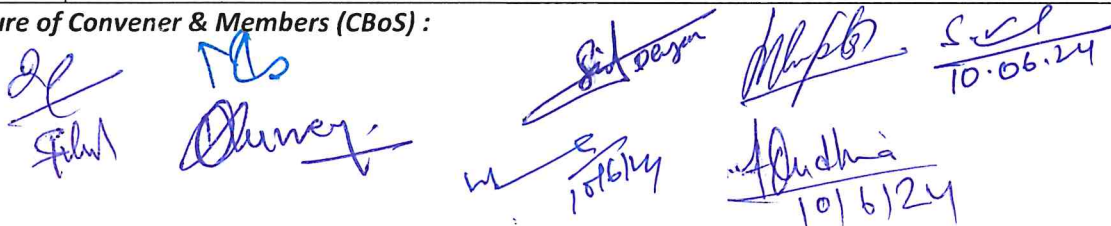





FOUR YEARS UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF PHYSICS
COURSE CURRICULUM

PART – A: INTRODUCTION			
Program : Bachelor in Science (Degree/ Honours)		Semester: V	Session: 2024-25
1	Course Code	PHSC- 05 P	
2	Course Title	Introduction to Quantum Mechanics	
3	Course Type	Discipline Specific Course	
4	Pre-requisite (if any)	As per Program	
5	Course Learning Outcomes (CLO)	<p>After the completion of the course, get opportunity to perform the following experiments on measurement and verification basic concepts of Quantum mechanics. The students are expected to:</p> <ul style="list-style-type: none"> ➤ Assemble required parts/devices and arrange them to perform experiments. Record/ observe data as required by the experimental objectives. ➤ Analyze recorded data and formulate it to get desired results. ➤ Interpret results and check for attainment of proposed objectives related to laws of Quantum Mechanics and its applications ➤ Apply the learnt concepts for different problems in laser systems, nuclear physics and EMW related problems. 	
6	Credit Value	01 Credit	1 Credit = 30 Hours Laboratory Work
7	Total Marks	Maximum Marks: 50	Minimum Pass Marks: 20
PART – B: CONTENT OF THE COURSE			
Total No. of learning-Training/performance Periods - 30 Periods (30 Hours)			
Sr. No.	Objects (At least 10 of the following or related Experiments)	No. of Period	
1	Measurement of Planck's constant using black body radiation and photo-detector	30	
2	Photo-electric effect: photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light		
3	To determine work function of material of filament of directly heated vacuum diode.		
4	To determine the Planck's constant using LEDs of at least 4 different colours.		
5	To determine the wavelength of H-alpha emission line of Hydrogen atom.		
6	To determine the ionization potential of mercury.		
7	To determine the absorption lines in the rotational spectrum of Iodine vapour.		
8	To determine the value of e/m by (a) Magnetic focusing or (b) Bar magnet.		
9	To setup the Millikan oil drop apparatus and determine the charge of an electron.		
10	To show the tunneling effect in tunnel diode using I-V characteristics.		
Keywords:	Planck's constant, tunneling effect, Photo-electric effect, spectrum –Rotational and vibrational, e/m		

Signature of Convener & Members (CBoS) :



PART – C: LEARNING RESOURCES

Text Books, Reference Books and Others

Text Books Recommended-

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, I. Prakash & Ramakrishna, 11th Edn, 2011, Kitab Mahal
4. Practical Physics B. Sc III : R P Goyal, Shival Publications

Reference Books Recommended-

1. Practical Physics by Dr. Giasuddin Ahmad and Md. Shahabuddin
2. Practical Physics by Dr. Harnam Singh
3. Practical Physics by R. K. Shukla and N. K.

Online Resources (e-books/ learning portals/ other e-resources)

1. Virtual Lab : <https://vlab.amrita.edu/?sub=1&brch=195>
2. <https://mpv-au.vlabs.ac.in/>
3. https://mpv-au.vlabs.ac.in/modern-physics/Hall_Effect_Experiment/
4. <https://www.falstad.com/qmatomrad/>
5. <https://www.falstad.com/mathphysics.html> : Quantum mechanics

PART – D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment(CIA):15 Marks

End Semester Exam(ESE):35 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2):	10 & 10	Better marks out of the two Test / Quiz +Marks obtained in Assignment shall be considered against 15 Marks
	Assignment/Seminar +Attendance – Total Marks -	05 15	
End Semester Exam (ESE):	Laboratory Performance: On spot Assessment Performed the Task based on lab. work - 20 Marks Spotting based on tools & technology (written) – 10 Marks Viva-voce (based on principle/technology) - 05 Marks		Managed by Course teacher as per lab. status

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FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF PHYSICS
COURSE CURRICULUM

PART-A: INTRODUCTION			
Program: Bachelor in Science (Degree/Honors)		Semester - V	Session: 2024-2025
1	Course Code	PHSE-03	
2	Course Title	Nuclear Physics	
3	Course Type	Discipline Specific Elective	
4	Pre-requisite (if, any)	As per Program	
5	Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> ➤ Describe nuclear constituents and their intrinsic properties. Analyze binding energy variations with mass number and understand the N/Z plot. ➤ Explain and apply nuclear models for clear understanding of stability of nuclei and nuclear processes. Differentiate alpha, beta, and gamma decay and interpret energy spectra. ➤ Apply conservation laws to compute Q-values, and analyze reaction mechanism. Explain significance of scattering and reaction cross section. ➤ Calculate and compare nuclear fission and fusion energy. Describe nuclear detectors and particle accelerators. ➤ Gain insights into cutting-edge research, accelerator technology, and interdisciplinary applications and apprehend the role of accelerators in advancing scientific knowledge and contributing to societal well-being. 	
6	Credit Value	4 Credits	Credit = 15 Hours - learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40

PART -B: CONTENT OF THE COURSE

Total No. of Teaching-learning Periods (01 Hr. per period) – 60 Periods (60 Hours)		
Unit	Topics (Course Contents)	No. of Period
I	General Properties of Nuclei: Constituents of nucleus and their Intrinsic properties, quantitative facts about mass, radii, charge density (matter density), binding energy, average binding energy and its variation with mass number, main features of binding energy versus mass number curve, N/A plot, angular momentum, parity, magnetic moment, electric moments.	15
II	Nuclear Models: Liquid drop model approach, semi empirical mass formula and, significance of its various terms, condition of nuclear stability, two nucleon separation energies, Fermi gas model, evidence for nuclear shell structure, nuclear magic numbers, basic assumption of shell model, concept of mean field.	15

<p>III</p>	<p>Nuclear decay and Reactions: Alpha, beta, gamma decay, energy spectrum, Geiger-Nuttel law, disintegration energy, quantum theory of alpha decay, types of beta decay and energy spectrum, Pauli's prediction of neutrino. Types of Reactions, Conservation Laws, kinematics of reactions, Q-value, reaction rate, reaction cross section, Concept of compound and direct Reaction, resonance reaction, Coulomb scattering (Rutherford scattering).</p> <p>Nuclear Energy Reactions: Nuclear Fission, Calculation of energy released, Nuclear fusion, Energy released in Fusion, Comparison of Fission and fusion energy, Fusion as source of stellar Energy, Nuclear reactors in India, Contribution of nuclear energy in total energy requirement.</p>	<p>15</p>
<p>IV</p>	<p>Nuclear Detector and Particle Accelerators: Interaction of charge particle through matter, Gas detectors: estimation of electric field, mobility of particle, for ionization chamber and GM Counter. Basic principle of Scintillation, Detectors and construction of photo-multiplier tube (PMT), Semiconductor Detectors. Accelerator facility available in India: Van-de Graaff generator, Pelletron accelerator, Linear accelerator, Cyclotron accelerator</p> <p>Nuclear Accelerators in India: RRCAT, VECC, BARC TIFR Pelletron Facility, IUC : working, evolution and contribution.</p>	<p>15</p>
<p>Keywords</p>	<p>Properties of Nucleus, Nuclear forces, Nuclear Models, Decay reaction, detectors and accelerators</p>	

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Signature of Convener & Members (CBoS) :









PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Introduction to Nuclear and Particle Physics V.K. Mittal, R. C. Verma, S. C. Gupta, Eastern Economy Edition.
2. Basic ideas and concepts in Nuclear Physics - An Introductory Approach by K. Heyde (IOP-Institute of Physics Publishing, 2004)
3. Nuclear Physics by S.N. Ghoshal, S. Chand Publishing, 2019
4. Unified Physics-III by R P Goyal, Shivlal Agrawal & Sons Publication
5. Nuclear Physics -6Ed by D. C. Tayal, Himalaya Publishing House

Reference Books Recommended –

1. Introductory nuclear Physics by Kenneth S. Krane (Wiley India Pvt. Ltd., 2008).
2. Concepts of nuclear physics by Bernard L. Cohen. (Tata Mc-Graw Hill, 1998).
3. Introduction to the physics of nuclei & particles, R.A. Dunlap. (Thomson Asia, 2004).
4. Nuclear Physics An Introduction S. B. Patel New Age International Publishers.

Online Resources– e-Resources / e-books and e-learning portals

1. [NPTEL :: Physics - NOC:Nuclear and Particle Physics](#)
2. [NPTEL :: Physics - Nuclear Physics: Fundamentals and Applications](#)
3. [Fundamentals of Nuclear Power Generation - Course \(nptel.ac.in\)](#)
4. [eGyanKosh: Unit-13 Nuclear Physics](#)
5. [eGyanKosh: Block-4 Nuclear Physics](#)
6. [NPTEL :: Physics - Nuclear Science & Engineering](#)
7. Official Websites of Raja Ramanna Centre for Advanced Technology (RRCAT), Variable Energy Cyclotron Centre (VECC), BARC–TIFR Pelletron Facility, Inter-University Accelerator Centre (IUAC)

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

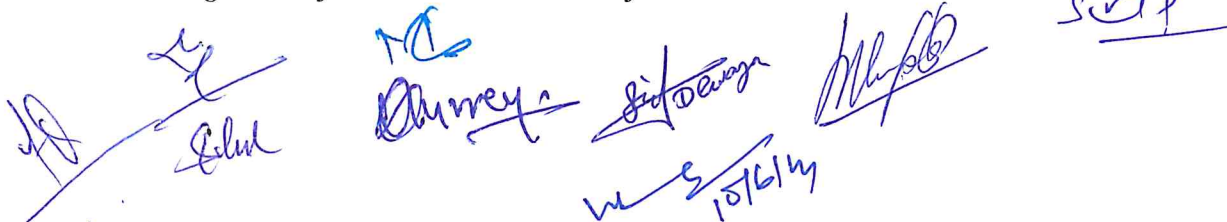
Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2):	20 & 20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
	Assignment / Seminar - Total Marks -	10 30	
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20Marks Section B: Descriptive answer type qts., 1 out of 2 from each unit-4x10=40 Marks		

Name and Signature of Convener & Members of CBoS:



FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM

PART-A: Introduction			
Program: Bachelor in Science (Degree/Honors)		Semester -V	Session: 2024-2025
1	Course Code	CHSC-05T	
2	Course Title	ORGANIC AND INORGANIC CHEMISTRY - I	
3	Course Type	DSC	
4	Pre-requisite(if,any)	As per Program	
5	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> ➤ Explore role of nitrogen in organic chemistry by studying N-containing compounds and heterocycles. ➤ Unravel molecular structures using techniques like rotational, vibrational, and Raman spectroscopy. ➤ Demystify bonding in transition metal complexes, including stability, lability, and magnetic properties. ➤ Understand the importance of organometallic and inorganic compounds in biological systems. 	
6	Credit Value	3 Credits	Credit = 15 Hours -learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks:40
PART -B: Content of the Course			
Total No. of Teaching-learning Periods(01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics(Course contents)		No. of Periods
I	(A)Organic Compound of Nitrogen Preparation of Nitroalkanes and Nitroarenes, Chemical properties of nitroalkanes, Mechanism of nucleophilic substitutions in nitroarenes, Reduction of nitroalkane in acidic, neutral, and alkaline medium. Picric acid Amines:- Nomenclature, Structure and stereochemistry. Basicity, Structural feature effecting basicity of amines. separation of primary, secondary and tertiary amines. Amine salt as phase transfer catalyst. Preparation of alkyl and aryl amines:- reduction of nitro compound, reductive amination of aldehydic and ketonic compounds. Gabriel Phthalimide reaction, Hoffmann Bromamide reaction. Physical and chemical properties of amine: electrophilic aromatic substitution in aryl amines, reaction of amines with nitrous acid, synthetic transformation of aryl diazonium salts, Azo-coupling reaction.		12
II	Spectroscopy: General introduction, electromagnetic radiation, region of spectrum, representation of spectral width and intensity of spectral transition. (A)Rotational spectra of diatomic molecule as rigid rotor, selection rule, energy level, transition, spectra. Determination of bond length, Isotope effect, Qualitative description of non-rigid rotor. (B)Vibrational Spectra: Fundamental vibrational bands and their symmetry. Diatomic molecule as harmonic oscillator. Selection rule, pure vibrational spectrum, Determination of force constant Anharmonic oscillator. (C)Raman Spectra: introduction, concept of polarization, quantum theory, stoke and antistoke line, pure rotational and vibrational Raman spectra. Applications of Raman spectra.		11
III	(A)Metal Ligand Bonding in Transition Metal Complex: postulate of CFT. Splitting of d orbitals in octahedral, tetrahedral complex, Spectro-chemical series, Calculation of CFSE, Factors affecting CFSE, Applications of CFSE, Jahn-Teller Distortion, Limitations of CFT. (B) Thermodynamic and Kinetic aspects of Metal Complexes: A brief introduction of		11

	thermodynamic and kinetic stability of complex, Stepwise and overall stability constant. (C) Magnetic properties: Types of magnetic behavior, Methods of determining magnetic susceptibility, Spin Only formula, L-S Coupling, Calculation of effective magnetic moment, Orbital contribution to magnetic moment.	
IV	(A) Organometallic Chemistry: Definition, nomenclature, and Classification of organometallic compounds. Preparation, properties, bonding and application of alkyls and aryls of Li, Al. A brief account of metal ethylenic metal complexes special reference to Zeise's salt. Mononuclear carbonyls and nature of bonding in metal carbonyls. 18 electron rules (Effective Atomic Number Rule). Ziegler-Nata Catalyst for polymerization of alkene, Wilkinson Catalyst and Hydrogenation, Hydroformylation. (B) Bioinorganic Chemistry: Essentials and trace elements in biological system, metalloporphyrins, with special reference to hemoglobin and myoglobin. Biological role of alkali and alkaline earth metals with special reference to Na^+ K^+ Ca^{2+} and Mg^{+2} , Nitrogen fixation.	11
Keywords	<i>Amines, Nitro compounds, Zeigler-Nata Catalyst, Wilkinson Catalyst, rigid rotor, harmonic oscillator, Hemoglobin, myoglobin.</i>	

Signature of Convener & Members:

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

1. Bahl, A., & Bahl, B. S. (2020). *Organic chemistry (5th ed.)*. S. Chand & Company.
2. Madan, R. D. (2018). *Advanced organic chemistry*. S. Chand & Company.
3. Soni, P. L. (2019). *A textbook of organic chemistry*. S. Chand & Company.
4. Sharma, B. K. (2015). *Spectroscopy*. GOEL Publishing House.
5. Kaur, H. (2018). *Spectroscopy*. Pragati Prakashan.
6. Das, A. K. (2012). *Bioinorganic Chemistry*. Publisher.

Reference Books Recommended:

1. Skoog, D. A., Holler, F. J., & Crouch, S. R. (2017). *Principles of Instrumental Analysis*. Cengage Learning.
2. Mehrotra, R. C. (2010). *Organometallic Chemistry*. New Age International.
3. Carbtree, R. H. (2014). *Organometallic Chemistry of the Transition Metal*. University Science Books.
4. Housecroft, C. E., & Sharpe, A. G. (2012). *Inorganic Chemistry*. Pearson.
5. Miessler, G. L., Fischer, P. J., & Tarr, D. A. (2010). *Inorganic Chemistry*. Pearson.

Online Resource:

- > e-Resources / e-books and e-learning portals
- > https://onlinecourses.nptel.ac.in/noc23_cy01/preview
- > <https://pubs.rsc.org/en/content/articlelanding/1978/f2/f29787401203>
- > https://onlinecourses.swayam2.ac.in/cec23_cy03/preview
- > https://onlinecourses.nptel.ac.in/noc22_cy12/preview

PART-D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 / 20	Better marks out of the two Test / Quiz+ obtained marks in Assignment shall be considered against 30 Marks
	Assignment/Seminar- 10 Total Marks -30	
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20Marks Section B: Descriptive answer type qts., 1out of 2 from each unit-4x10=40Marks	

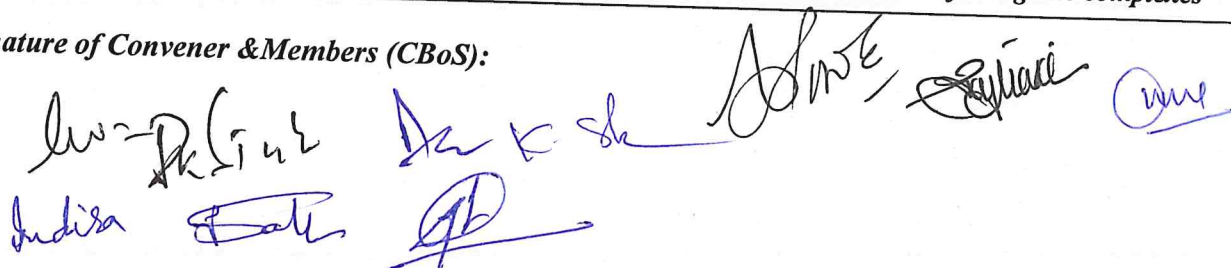
Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM

PART-A: Introduction			
Program: Bachelor in Science (Degree/Honors)		Semester -V	Session: 2024-2025
1	CourseCode	CHSC-05P	
2	CourseTitle	CHEMISTRY LAB COURSE -V	
3	CourseType	DSC	
4	Pre-requisite(if,any)	As per Program	
5	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> ➤ To apply the knowledge of qualitative and quantitative estimations in real sample analysis. ➤ To get 'Hands on Training' and develop skill for synthesis of various inorganic compounds. ➤ To learn the concept of gravimetric estimation. ➤ To learn use of conductometer and spectrophotometer for titration. 	
6	CreditValue	1 Credits	Credit =30 Hours Laboratory or Field learning/Training
7	Total Marks	Max.Marks:50	Min Passing Marks:20
PART -B: Content of the Course			
TotalNo.of learning-Training/performancePeriods:30 Periods (30 Hours)			
Module	Topics(Coursecontents)		No.ofPe riod
Lab./Field Training/ Experiment Contents of Course	1)To verify Beer-Lambert Law for $KMnO_4/ K_2Cr_2O_7$ and determine the concentration of the given solution of the substrate from absorbance measurement. 2)To Determine the strength of the given acid conductometrically using standard alkali solution. 3)Gravimetric estimation of Ba as $BaSO_4$ from given solution of $BaCl_2$. 4)Inorganic compound synthesis: (i) Synthesis of sodium trioxalato ferrate(III) $Na_2[Fe(C_2O_4)_3]$ and determination of its composition by permanganometry. (ii) Synthesis of Ni-dimethylglyoxime complex $[Ni(dmg)_2]$ (iii) Synthesis of Tetraaminecopper(II) sulphate $[Cu(NH_3)_4]SO_4$ (iv) Synthesis of Cis- and Trans-bisoxalatochromate(III)ion.		30
Keywords	<i>Spectrophotometer, Lambert beers law, Gravimetric estimation, synthesis of inorganic complexes</i>		

Signature of Convener & Members (CBoS):



PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books:

1. Chatwal, G. R., & Sharma, A. (n.d.). *Instrumental methods of chemical analysis*. Himalaya Publishing House.
2. Raj, G. (2009). *Advanced Practical Inorganic Chemistry*. Krishna Prakashan.

Reference Books:

1. Svehla, G. (Ed.). (1978). *A textbook of quantitative inorganic analysis* (by A. I. Vogel). ELBS Publishers and Distributors. (Original work published 1968)
2. Henderson, W. A. (n.d.). *Inorganic synthesis*. Benjamin-Cummings Publishing Company.
3. Fernelius, W. G. (2009). *Experimental inorganic chemistry* (Adapted by R. K. Sharma & G. Panda). New Age International Publishers. (Original work published 1972)
4. Mendham, J., Denney, R. C., Barnes, J. D., & Thomas, M. (Eds.). (2000). *Vogel's textbook of quantitative chemical analysis* (6th ed.). Pearson Education India. (Original work by A. I. Vogel)
5. Furniss, B. S., Hannaford, A. J., Smith, P. W. G., & Tatchell, A. R. (Eds.). (1989). *Vogel's textbook of practical organic chemistry* (5th ed.). Longman Scientific & Technical. (Original work by A. I. Vogel)

Online Resources:

- e-Resources / e-books and e-learning portals
- <https://www.youtube.com/watch?v=s7pXbV9dumI>
- <https://onlinelibrary.wiley.com/series/2146>
- [https://chem.libretexts.org/Ancillary_Materials/Laboratory_Experiments/Wet_Lab_Experiments/General_Chemistry_Labs/Online_Chemistry_Lab_Manual/Chem_11_Experiments/07%3A_Gravimetric_Analysis_\(Experiment\)](https://chem.libretexts.org/Ancillary_Materials/Laboratory_Experiments/Wet_Lab_Experiments/General_Chemistry_Labs/Online_Chemistry_Lab_Manual/Chem_11_Experiments/07%3A_Gravimetric_Analysis_(Experiment))
- <https://mas-iiith.vlabs.ac.in/exp/beer-lambert-law/>

PART-D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:






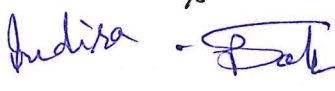

Maximum Marks: 50 Marks

Continuous Internal Assessment(CIA):15 Marks

End Semester Exam(ESE):35Marks

Continuous Internal Assessment(CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10	Better marks out of the two Test / Quiz +obtained marks in Assignment shall be considered against 15 Marks
	Assignment/Seminar +Attendance- 05 Total Marks -15	
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment	
	M. Performed the Task based on lab. work - 20 Marks	Managed by Course teacher as per lab. status
	N. Spotting based on tools & technology (written) - 10 Marks	
O. Viva-voce (based on principle/technology) - 05 Marks		

Name and Signature of Convener & Members of CBoS:

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FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM

PART-A: Introduction			
Program: Bachelor in Science (Degree/Honors)		Semester- V	Session: 2024-2025
1	CourseCode	CHSE-03T	
2	CourseTitle	DYES & POLYMER CHEMISTRY	
3	CourseType	DSE	
4	Pre-requisite(if,any)	As per Program	
5	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> ➤ To know about various synthetic dyes and their structures. ➤ To understand classification, colour and chemical constitution of dyes. ➤ To know about various types of polymeric materials. ➤ To understand preparation, structure, properties and application of polymers. 	
6	Credit Value	3 Credits	Credit = 15 Hours -learning & Observation
7	TotalMarks	Max.Marks: 100	Min Passing Marks:40
PART -B: Content of the Course			
TotalNo.of Teaching-learning Periods(01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics(Course contents)		No.ofP eriod
I	Introduction to dyes: Requirements of a good dye Solubility, Linearity, Co-planarity, Fastness, Substantivity, Economic viability. Definition of fastness and its properties and Mordants with examples Explanation of nomenclature or abbreviations of commercial dyes with at least one example suffixes – G, O, R. Naming of dyes by colour index (two examples) used in dye industries. Colour and chemical constitution of dyes: Absorption of visible light, colour of wavelength absorbed and complementary colour, chromogen, chromophore, auxochrome bathochromic and hypsochromic shifts. Relation of colour to resonance in the following classes of dyes: Azo, Triphenylmethane, Anthraquinone.		12
II	Classification of dyes based on application: Definition, fastness properties and applicability on substrates, examples with structures. (a) Acid dyes – Orange II, Alizarin Cyanine Green G. (b) Basic dyes – Crystal Violet, Bismark Brown. (c) Direct Cotton Dyes – Chrysophenine G. (d) Azoic dyes – Diazo components: Fast Red B Base, Fast Blue B Base; Coupling components: Naphthol AS, Naphthol AS-G. (e) Mordant dyes – Eriochrome Black T, Alizarin. (f) Vat dyes – Indigo, Indanthrene (g) Disperse dyes– Celliton Scarlet B, Disperse Yellow 6G		11
III	Introduction and history of polymeric materials: Different schemes of classification of polymers, Polymer nomenclature, Molecular forces and chemical bonding in polymers, Texture of Polymers. Functionality and its importance: Criteria for synthetic polymer formation, classification of polymerization processes, Relationships between functionality, extent of reaction and degree of polymerization. Bifunctional systems, Poly-functional systems.		11
IV	Determination of molecular weight of polymers (M_n, M_w, etc) by end group analysis, viscometry, light scattering and osmotic pressure methods. Molecular weight distribution and its significance. Polydispersity index Brief introduction to preparation, structure, properties and application: polyolefins, polystyrene and styrene copolymers, poly(vinyl chloride), polyamides and related polymers Phenol formaldehyde resins (Bakelite, Novalac), Conducting Polymers,		11

	[polyacetylene, polyaniline, poly(p-phenylene sulphide polypyrrole, polythiophene)].	
Keywords	Average molecular mass, PDI, Dyes, Polymer, diazodyes, bismarkbrown, Vat dyes, indigo dyes.	

Signature of Convener & Members (CBoS):

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

1. Bhatnagar, M. S. (2010). *A textbook of polymer chemistry*. S. Chand & Company.
2. Misra, G. S. (2004). *Introductory polymer chemistry*. New Age International Publishers & Distributors.
3. Gowariker, V. R., Vishvanathan, N. V., & Sreedhar, J. (2008). *Polymer science*. New Age International Publication.

Reference Books Recommended:

1. Braun, D., Cherdron, H., Rehahn, M., Ritter, H., & Voit, B. (Year). *Polymer synthesis: Theory and practice: fundamental method experiments (5th ed.)*. Springer.
2. Vogel, A. I. (Year). *A textbook of Organic Chemistry including Qualitative Organic Analysis*. Longman Publication.
3. Mann, F. G., & Saunders, B. C. (Year). *Organic Chemistry*. Pearson Publications.

Online Resources-

➤ e-Resources / e-books and e-learning portals

- https://onlinecourses.nptel.ac.in/noc22_cv53/preview
- <https://nptel.ac.in/courses/116104044>
- <http://ndl.iitkgp.ac.in/he document/swayam prabha/1tcmenbo3sk>
- <http://www.ndl.gov.in/he document/swayam prabha/cyvucniwcq>

PART-D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 + 20 Assignment/Seminar- 10 Total Marks -30	Better marks out of the two Test / Quiz+ obtained marks in Assignment shall be considered against 30 Marks
	End Semester Exam (ESE):	

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM

PART-A: Introduction			
Program: Bachelor in Science (Degree/Honors)		Semester-V	Session: 2024-2025
1	Course Code	CHSE-03P	
2	Course Title	DYES AND POLYMER CHEMISTRY LAB. COURSE	
3	Course Type	DSE	
4	Pre-requisite(if,any)	<i>As per Program</i>	
5	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> ➤ To learn the synthesis of organic dyes in laboratory. ➤ To learn the synthesis of common drugs. ➤ To learn the synthesis of polymer. ➤ To make aware the student about polymer in our day to day life. 	
6	Credit Value	1 Credits	<i>Credit =30 Hours Laboratory or Field learning/Training</i>
7	Total Marks	Max.Marks:50	Min Passing Marks:20
PART -B: Content of the Course			
Total No.of learning-Training/performance Periods:30 Periods (30 Hours)			
Module	Topics (Course contents)	No.of Period	
Lab./Field Training/ Experiment Contents of Course	<ol style="list-style-type: none"> 1. Synthesis of organic compound or dyes:- Methyl orange(azo coupling) phenolphthalein, Methyl red, Congo red, Fluorecein, Alizarin 2. Synthesis of drugs: Paracetamol, aspirin, sulphanilamide, Chlorobutanol, Tolbutamide, hexamine, 3. Synthesis of Some polymer or project work on some polymer: polyvinyl alcohol, Rayon,PVC,Nylon6, silicon based inorganic polymer, silicone, zeolite 4. Project work of identification of polymer around us in day to day life 	30	
Keywords	<i>Synthesis of organic compound, Crude test, Limit test, Pharmaceutical Packaging.</i>		

Indira P. Lin D. R. S. D. W. S. S. J. S.

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books:

1. Gupta, V. R., Kumar, R., & Gupta, A. (Year). *Organic Chemistry*. I. K. International Publishing House.
2. Bansal, R. K. (Year). *Industrial Organic Chemistry*. New Age International Publishers.
3. Kar, A. (Year). *Medicinal Chemistry*. New Age International Publishers.
4. Jain, A. K. (Year). *Introduction to Pharmaceutical Chemistry*. Pharma Book Publications.
5. Ghosh, B. (Year). *Polymer Chemistry*. New Age International Publishers.
6. Sinha, U. C., & Sinha, N. K. (Year). *Polymer Science*. Oxford University Press.

Reference Books:

1. Braun, D., Cherdron, H., Reham, M., Ritter, H., & Voit, B. (Year). *Polymer synthesis: Theory and practice: fundamental method experiments* (5th ed.). Springer.
2. Vogel, A. I. (Year). *A text book of Practical Organic Chemistry including Qualitative Organic Analysis*. Longman Publication London.
3. Mann, F. G., & Saunders, B. C. (Year). *Practical Organic Chemistry*. Pearson Publications.
4. Burrell, H. (Year). *Polymer Analysis*. John Wiley & Sons.
5. Griffiths, R. F. (Year). *Identification of Polymers*. John Wiley & Sons.

Online Resources:

- [https://chem.libretexts.org/Ancillary_Materials/Laboratory_Experiments/Wet_Lab_Experiments/Organic_Chemistry_Labs/Experiments/1%3A_Synthesis_of_Aspirin_\(Experiment\)](https://chem.libretexts.org/Ancillary_Materials/Laboratory_Experiments/Wet_Lab_Experiments/Organic_Chemistry_Labs/Experiments/1%3A_Synthesis_of_Aspirin_(Experiment))
- <https://edu.rsc.org/experiments/the-microscale-synthesis-of-azo-dyes/559.article#:~:text=In%20this%20experiment%2C%20students%20prepare,practical%20should%20take%2020%20minutes.>
- <https://www.scribd.com/doc/36584645/Polymers-Chemistry-Project>

PART-D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar + Attendance- 05 Total Marks -15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment G. Performed the Task based on lab. work - 20 Marks H. Spotting based on tools & technology (written) - 10 Marks I. Viva-voce (based on principle/technology) - 05 Marks	Managed by Course teacher as per lab. status

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 -2028)
DEPT. OF SPORTS: VALUE ADDITION COURSE
COURSE CURRICULUM (2024-25)

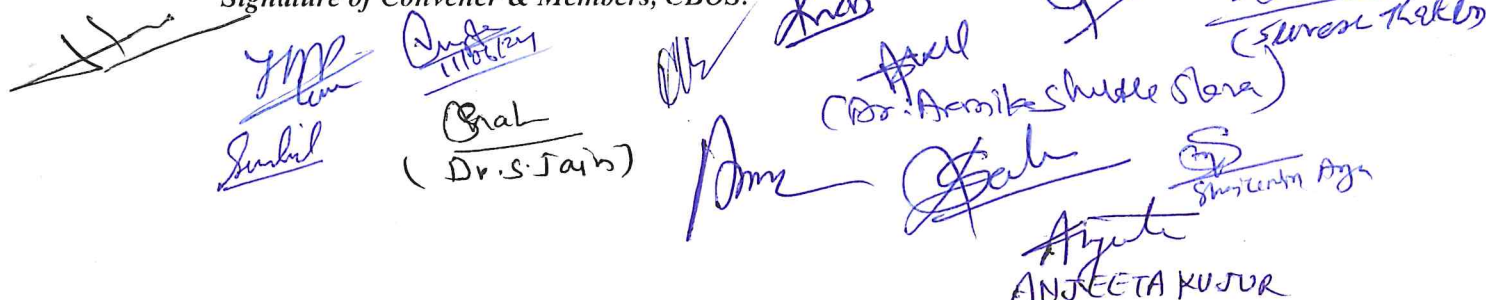
PART-A: Introduction		
Program: Undergraduate (Certificate / Diploma / Degree/Honors)		Semester - I/III/V
		Session: 2024-2025
1	Course Code	LIVAC-01
2	Course Title	Library & Information Resources
3	Course Type	VAC(Value Added Courses)
4	Pre-requisite (if, any)	<i>As per Program</i>
5	Course Learning Outcomes (CLO)	<input type="checkbox"/> Acquainted with library resources and their various types. <input type="checkbox"/> Understood general and reference sources. <input type="checkbox"/> Familiar with electronics and open resources. <input type="checkbox"/> Able to evaluate library resources and locate answer to reference queries. <input type="checkbox"/> Able to evaluate of Web-Based Resources.
6	Credit Value	2 Credits <i>Credit = 15 Hours - learning & Observation</i>
7	Total Marks	Max. Marks: 50 Min Passing Marks: 20

PART -B: Content of the Course

Total No. of Teaching-learning Periods (01 Hr. per period) - 30 Periods (30 Hours)

Module	Topics (Course contents): Learning and Practices	No. of Periods
I	Understanding Library Resources <ul style="list-style-type: none"> • Concept, Definition, Scope • Types of Library and Information Sources • Documentary and Non-Documentary Sources • Primary, Secondary and Tertiary Sources 	08 (08Hr)
II	General and Reference Sources <ul style="list-style-type: none"> • Meaning, Definition, Scope • General Resource Materials • Reference Sources-Nature and types • General Sources vs. Reference sources 	07 (07Hr)
III	Electronic and Open Access Resources <ul style="list-style-type: none"> • E-resources-meaning, concept and definition • Types, nature and scope • Open access resources-nature and accessibility • Web based resources-nature and accessibility 	08 (08Hr)
IV	Evaluation of Library Resources <ul style="list-style-type: none"> • Need and Purpose of Evaluation • Criteria for Evaluation • Evaluation of Documentary Resources • Evaluation of Web-Based Resources 	07 (07Hr)
Keywords		

Signature of Convener & Members, CBOS:



 (Dr. S. Jain)

 ANJEEETA KUMAR

PART-C

Learning Resources: Text Books, Reference Books and Others

Text Books Recommended-

1. Bopp, R. C. & Smith, L.C. Reference & Information Services, 2nd Ed. US Libraries Unlimited, 2011.
2. Cassell, K. A. & Hiremath, U. Reference & Information Services in the 21st Century: An Introduction, 2nd Ed. US, American Library Association, 2011.
3. Kaushal, C. & Mahapatra, R.K. Open Access E-Resources in Library & Information Science. New Delhi, Ess Ess Publication, 2013.
4. Kumar, K. Library Manual, 4th Ed. New Delhi, S. Chand, 2018.
5. Kumar, P.S.G. Information Sources and Services - Theory and Practice. Vol.6. New Delhi: BR Publishing Corporation, 2004.
6. Ranganathan, S.R. Library Book Selection. New Delhi. Ess Ess Publications, 2006
7. Ranganathan, S.R. Library Manual. New Delhi. Ess Ess Publications, 2008
8. Sharma, (J.S.) and Grover (DR). Reference Services and Sources of Information. New Delhi. Ess Ess Publications, 1987.
9. Singh, G. Information Sources, Services & Systems. New Delhi, Prentice Hall India Learning, 2013.

Online Resources-

- [LCh-009.pdf\(nios.ac.in\)](#)
- [LCh-001.pdf\(nios.ac.in\)](#)
- https://ebooks.lpude.in/library_and_info_sciences/DLIS/Year_1/DLIS001_FOUNDATION_OF_LIBRARY_AND_INFORMATION_SCIENCE.pdf
- [eGyanKosh:BLI-221Library,InformationandSociety](#)
- [MicrosoftWord-LG-Lesson1Lib\(nios.ac.in\)](#)
- [MicrosoftWord-BLIS-101.1\(uou.ac.in\)](#)
- [http://14.139.237.190/other_pdf/BLIS_01_N.pdf\(UPRTOU\)](http://14.139.237.190/other_pdf/BLIS_01_N.pdf(UPRTOU))
- [http://14.139.237.190/other_pdf/BLIS-01.pdf\(UPRTOU\)](http://14.139.237.190/other_pdf/BLIS-01.pdf(UPRTOU))
- [eGyanKosh:बीएलआई221पुस्तकालसूचनाएवंमाज](#)
- [LCh-001H.pdf\(nios.ac.in\)](#)
- [LCh-002H.pdf\(nios.ac.in\)](#)
- [e-PGPathshala\(inflibnet.ac.in\)](#)
- [ref1-1\(lpude.in\)](#)
- [eGyanKosh:BLIS-05ReferenceandInformationSources](#)
- [pssou.ac.in/read_e_book?id=424c49425f3036](#)
- [http://14.139.237.190/other_pdf/BLIS_06.pdf\(UPRTOU\)](http://14.139.237.190/other_pdf/BLIS_06.pdf(UPRTOU))

- [LCh-008H.pdf\(nios.ac.in\)](#)
- [LCh-007H.pdf\(nios.ac.in\)](#)
- [LCh-006H.pdf\(nios.ac.in\)](#)
- [LCh-005H.pdf\(nios.ac.in\)](#)
- [e-PGPathshala\(inflibnet.ac.in\)](#)
- [unit7\(egyankosh.ac.in\)Unit-3.pdf\(egyankosh.ac.in\)](#)
- [BLIS-106.pdf\(uou.ac.in\)](#)
- [BLIS6.pdf\(vmou.ac.in\)](#)

Online Resources-

□ e-Resources/e-books and e-learning portals

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
	Assignment/Seminar + Attendance - 05 Total Marks - 15	
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 05 x1 = 05 Mark; Q2. Short answer type- 5x2 =10 Marks Section B: Descriptive answer type qts., 1 out of 2 from each unit- 4x05 =20 Marks	

Name and Signature of Convener & Members of CBOS:

