Syllabus-2023-2024

(SOS)(BSc_PCM)

Title of the Course	Physical Chemistry
Course Code	BSCH0501[T]

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Knowledge of Quantum Mechanics Plank Theory of Radiation			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To remember Knowledge of Quantum Mechanics, Spectroscopy, Photochemistry**(BL1-Remember)** **CO2-** To understand Mechanism of Quantum Mechanics, Spectroscopy, Photochemistry**(BL2-Understand)** **CO3-** To Apply the concept in the different application**(BL3-Apply)** **CO4-** To Analyze the Physical Pope ties of compounds**(BL4-Analyze)** **CO5-** To Evaluate the results analyzed**(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
Module 1	Elementary Quantum Mechanics: Black-body radiation. Planck's radiation law, photoelectric effect, heat capacity of solids, Bohr's model of hydrogen atom (no derivation) and its defects. Compton Effect. De-Broglie hypothesis, the Heisenberg's uncertainty principle, Sinusoidal wave equation, Hamiltonian operator, Schrodinger wave equation and its importance, physical interpretation of the wave function, postulates of quantum mechanics, Particle in a one- dimensional	Story telling Experienced examples, Quizzes Summarizing, PPT's Leaving Questions Interactive videos	8
Module 2	Spectroscopy introduction: electromagnetic radiation. Regions of the spectrum, basic features of different spectrometers, statement of the Born-Oppenheimer approximation, Degrees of freedom Rotational Spectrum: Diatomic molecules, Energy levels of a rigid rotor (semi-classical principles), selection rules, spectral intensity, distribution using population distribution (Maxwell-Boltzmann distribution) determination of bond length, qualitative description of non-rigid rotor, isotope effect. Vibrational Spectrum: Infra-red spectrum: Energy levels of simple harmonic oscillator, selection rules, pure Vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effect of an harmonic motion and isotope on the spectrum, Idea of Vibrational frequencies of different functional groups	Demonstrations, Tutorials Experienced examples, , Videos , PPT's Quizzes', Group discussions	8
Module 3	Ra man Spectrum: Concept of polarisability, pure rotational and pure Vibrational Raman spectra of diatomic molecules, Selection rules. Electronic Spectrum: Concept of potential energy curves for bonding and anti bonding molecular orbitals, qualitative description of selection rules and Franck-Condon principle. Qualitative description of σ,π and n M. O. their energy levels and the respective transition UV Spectroscopy: Electronic excitation, elementary idea of instrument used. Application to organic molecules, Woodward- Fieser rule for determining λmax of enes, polyenes and a,β unsaturated carbonyl compounds	Demonstrations, Videos, PPT's Quizzes', Virtual labs	8
Module 4	Unit -IV: Photochemistry Interaction of radiation with matter, difference between thermal and photochemical processes, Laws of photochemistry: Grothus-Draper law, Stark-Einstein law, Jablonski diagram depicting various processes occurring in the	Interactive videos PPT's Experienced examples, Quizzes' Seminar	8

	excited state, qualitative description of fluorescence, phosphorescence, non-radioactive processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions energy transfer processes (simple examples.)		
Module 5	V: Physical Properties and Molecular Structure Optical activity, Polarisation (Clausius – Mossotti equation), Oriented of dipoles in an electric field, dipole moment, induced dipole moment measurement of dipole moment, temperature method and refractive method, dipole moment and structure of molecules, magnetic properties – paramagnetism, diamagnetism and ferromagnetism	Interactive videos , PPT's Experienced examples, Quizzes', Seminar	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
Module 2	Determination of Concentration of the solution using colorimetry	Experiments	BL3-Apply	6
Module 3	Determination of wavelength maxima using UV-Visible spectroscopy	PBL	BL3-Apply	6
Module 2	Determination of functional groups using IR Spectroscopy	PBL	BL3-Apply	6
Experiment	Deterime the strength of NaOH using N/10 HCl BY PH Metric titration	Experiments	BL3-Apply	2
Experiment	Determine the strength of NaOH using N/10 Acetic Acid	Experiments	BL3-Apply	2
Experiment	Determine the strength of Base using Acid BY Conductometric titration	Experiments	BL3-Apply	2
Experiment	Determine the strength of Strong Base with weak acid by Conductometric titration	Experiments	BL3-Apply	2
Experiment	Verify Lambert - Beer Law by Colorimetric method	Experiments	BL3-Apply	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	40	12	60	
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	40	20	60	

Part E

Books	M.N.N Tandon Unified Chemistry 2010
Articles	
References Books	Puri Sharma Pathania Physical Chemistry Fourth Edition
MOOC Courses	https://nptel.ac.in/courses/104101126
Videos	https://nptel.ac.in/courses/104101126

Course Articulation Matrix

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

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CELEBRATING DREAMS

Syllabus-2023-2024

(SOS)(BSc_PCM)

Title of the Course	Computer Oriented Statistical Methods
Course Code	BSMA0501[T]

Part A

<table>
<tr><td rowspan="2">Year</td><td rowspan="2">3rd</td><td rowspan="2">Semester</td><td rowspan="2">5th</td><td rowspan="2">Credits</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="8">Theory only</td></tr>
<tr><td>Course Category</td><td colspan="8">Disciplinary Minor</td></tr>
<tr><td>Pre-Requisite/s</td><td colspan="3">Understanding of algebra, basic calculus, and probability theory. Familiarity with descriptive statistics, such as measures of central tendency and dispersion, is necessary. Basic computer skills are helpful for using statistical software like R or Python. Critical thinking, problem-solving, and logical reasoning skills are essential for analyzing data and drawing valid conclusions. Continuous learning and practice are crucial in statistics due to its dynamic nature.</td><td>Co-Requisite/s</td><td colspan="4">Concurrent study of experimental design, to understand how data is collected and its impact on analysis. Familiarity with a programming language such as Python or R is beneficial for data manipulation and analysis. Basic knowledge of probability theory, calculus, and algebra supports a deeper understanding of statistical concepts. An understanding of research methods aids in interpreting statistical results within context. Additionally, critical thinking skills are essential for evaluating the validity of statistical methods and conclusions. Practical experience applying statistical techniques to real-world problems enhances understanding and proficiency.</td></tr>
<tr><td>Course Outcomes & Bloom's Level</td><td colspan="8">CO1- To remember the data collection plans and basic tools of descriptive statistics (BL1-Remember)
CO2- To analyze the relationship between two variables using scatter plot and Interpret a simple correlation. (BL4-Analyze)
CO3- To apply the concept of sampling distribution of a statistic and hypothesis(BL3-Apply)
CO4- TO Understand the concept of sampling distribution of a statistic and its properties, difference between parameter and statistic(BL2-Understand)
CO5- To evaluate the correlation and regression analysis and measure of central tendency(BL5-Evaluate)</td></tr>
<tr><td>Coures Elements</td><td colspan="2">Skill Development ✓
Entrepreneurship ✕
Employability ✓
Professional Ethics ✕
Gender ✕
Human Values ✕
Environment ✕</td><td>SDG (Goals)</td><td colspan="5">SDG4(Quality education)</td></tr>
</table>

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction: Frequency distribution and Frequency charts, Histogram, Frequency polygons, Frequency curves and Cumulative frequency distribution. Measures of Central Tendency: Arithmetic mean median, mode.	Audio/Video clips, group discussion, lecture with ppt, quiz	8
2	Measures of Dispersion: Moments, Skewness and kurtosis, Range, mean deviation, standard deviation, coefficient of variation	Audio/Video clips, group discussion, lecture with ppt, Review Analysis	10
3	Combinatorics: Permutation and Combination, Repetition and Constrained Repetition, Binomial Coefficients, Binomial Theorem. Elementary Probability Theory: Sample space, events, classical definition of probability, theorems on total and compound probability, independent and dependent events, mutually exclusive events	Audio/Video clips, group discussion, lecture with ppt, classroom presentations, Analysis	8
4	Regression and Correlation: Coefficient of correlation, rank Correlation, Regression analysis, Curve fitting: Method of Least square	Audio/Video clips, group discussion, lecture with ppt, quiz	8
5	Testing of Hypotheses: Simple and composite hypothesis, errors of kind-I and kind-II, critical region, level of significance. Tests of Significance: Tests for simple hypotheses, Student's t test, F-test and applications.	Audio/Video clips, group discussion, lecture with ppt, 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

Part E

Books	H. C. Saxena and J. N. Kapoor Mathematical Statistics S. Chand and sons Co.
Articles	
References Books	M. Ray Statistical Methods Ram Prasad Publication
MOOC Courses	https://onlinecourses.nptel.ac.in/noc24_ec03/preview
Videos	https://onlinecourses.nptel.ac.in/noc24_ec03/preview

Course Articulation Matrix

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

Syllabus-2023-2024

(SOS)(BSc_PCM)

Title of the Course	Atomic and Nuclear Physics
Course Code	BSPH0501[T]

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Disciplinary Major							
Pre-Requisite/s	Knowledge of Classical Physics			**Co-Requisite/s**	Knowledge of Mathematics upto BSc IV Semester			
Course Outcomes & Bloom's Level	**CO1-** To remember the basic laws of Atomic and Nuclear Physics **(BL1-Remember)** **CO2-** Understand the basic concepts of Atomic and Nuclear Physics**(BL2-Understand)** **CO3-** To apply the concepts of Atomic and Nuclear Physics to different system. **(BL3-Apply)** **CO4-** To Analyze the laws of Atomic and Nuclear Physics**(BL4-Analyze)** **CO5-** To evaluate the laws of Atomic and Nuclear Physics**(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 Atomic Physics: Brief review of Bohr and Somerfield model of atom. Effect of finite nuclear mass in relation to Rydberg constant. Idea of discrete energy levels and electron spin: Fanck – Hertz and Stern – Gerlach experiments Significance of four quantum numbers and concept of atomic orbitals.	Audio/Video clips, lecture with ppt, on white board, quiz	8
2	Unit-II One valence electron atom: Orbital magnetic dipole moment, Orbital, spin and total angular momenta, Larmor precession, Paulis exclusion principle, Vector model of atom, Many particles in one dimensional box, Electronic configuration and atomic states, Spin-orbit interaction and fine structure, Intensity of spectral lines, General selection rules.	Audio/Video clips, lecture with ppt, on white board, quiz,	8
3	Unit-III Many electron atom Zeeman Effect and Paschen Bach effect. Two valence electron atoms: LS and JJ coupling schemes and resulting spectra. Idea of normal and inverted doublet. Basics of Stark effect. Doublet structure of alkali spectra.	Audio/Video clips, lecture with ppt, on white board, quiz,	8
4	Unit-IV General Properties of Nuclei and Nuclear Modals: Basic properties of nucleus: Shape, Size, Mass and Charge of the nucleus. Stability of the nucleus and Binding energy. Liquid-Drop Model, Shell Model, Meson Theory of Nuclear Forces.	Audio/Video clips, lecture with ppt, on white board, quiz,	8
5	Unit-V Radioactivity decay and Nuclear Reaction: Alpha particle spectra – velocity and energy of alpha particles. Geiger-Nuttal law. Nature of beta ray spectra. The neutrino hypothesis. Energy levels and decay schemes. Positron emission and electron capture. Nuclear reactions, Q-values and threshold of nuclear reactions. Cross-sections. Nuclear Fission, Nuclear Reactors, Nuclear Fusion in Stars.	Audio/Video clips, lecture with ppt, on white board, quiz,	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	e/m by Thomson method	Experiments	BL2-Understand	3
2	To study the characteristics of the GM Counter and hence determine the operating voltage	Experiments	BL2-Understand	3
3	Planck Constant using LEDs by observing reverse photo electric effect	Experiments	BL3-Apply	3
4	To determine the excitation potential of gas (Argon) by Franck- Hertz experiment	Experiments	BL2-Understand	3
5	To draw the Hysteresis loop of a given ferromagnetic substance	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	Concepts of Modern Physics by Arthur Beiser
Articles	
References Books	1 Physics of Atoms & molecules by B.H. Bransden & C.J.Joachain 2 Nuclear Physics by Kaplan
MOOC Courses	
Videos	

Course Articulation Matrix

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

Syllabus-2023-2024

(SOS)(BSc_PCM)

Title of the Course	Elementry quantum mechanics
Course Code	BSPH0502[T]

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Student must have knowledge about classical mechanics, black body radiation, photo electric effect and Compton effect etc.			**Co-Requisite/s**	After the completion of the course, student developed the basic concept quantum mechanics such as wave function, probability density, wave-particle duality, Schrodinger equation etc. They have also clearly differentiate between classical and quantum mechanics.			
Course Outcomes & Bloom's Level	**CO1-** To remember the basic laws of Quantum Mechanics**(BL1-Remember)** **CO2-** To understand the basic concepts of Quantum Mechanics**(BL2-Understand)** **CO3-** To apply the concepts of Quantum Mechanics to different system. **(BL3-Apply)** **CO4-** To Analyze the laws/postulates of Quantum Mechanics**(BL4-Analyze)** **CO5-** To evaluate the laws/postulates of Quantum Mechanics**(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	ORIGIN OF QUANTUM MECHANICS Particles and Waves: Photoelectric effect. Black body radiation. Compton effect. De Broglie hypothesis. Wave particle duality. Davisson-Germer experiment. Wave packets. Concept of phase and group velocity. Two slit experiment with electrons. Probability. Wave amplitude and wave functions. Heisenberg's uncertainty principle with illustrations.	Audio/Video clips, group discussion, lecture with ppt, on white board, quiz	8
2	WAVE MECHANICS Wave Packet - Schrodinger Wave Equation- Interpretation of the Wave Function, Probability Interpretation, Probability Current Density and Equation of Continuity- Ehrenfest theorem-Time Independent Schrodinger Wave Equation-Stationary States	Audio/Video clips, group discussion, lecture with ppt, on white board, quiz	8
3	ONE DIMENSIONAL UNBOUND STATES One dimensional potential Step and barrier, Reflection and transmission coefficients for a rectangular barrier in one dimension. Explanation of alpha decay. Quantum phenomenon of tunneling. Free particle in one-dimensional box, Eigen functions and Eigen values of a free particle	Audio/Video clips, group discussion, lecture with ppt, on white board, quiz	8
4	ONE DIMENSIONAL BOUND STATES One dimensional potential well, Boundary conditions. Bound states. Infinite Square Well Potential, Finite Square Well Potential One-dimensional simple harmonic oscillator, energy Eigen values from Hermite differential equation, wave function for ground state	Audio/Video clips, group discussion, lecture with ppt, on white board, quiz	8
5	Unit-V THREE-DIMENSIONAL BOUND STATES Particle Moving in a Spherically Symmetric Potential – Radial and Angular Part of Schrodinger Equation - System of Two Interacting Particles -Rigid Rotator – Hydrogen Atom- Radial Equation –Solution to Radial Equation- Energy Eigen Values and Eigen Functions	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	40	12	60	18
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	Introduction to Quantum Mechanics by David Griffith Quantum Mechanics: Concept and Applications by Nouredine Zettili Concept of Modern Physics by Aurther Beiser
Articles	
References Books	Introduction to Quantum Mechanics by David Griffith Quantum Mechanics: Concept and Applications by Nouredine Zettili Concept of Modern Physics by Aurther Beiser
MOOC Courses	https://nptel.ac.in/courses/115101010 https://nptel.ac.in/courses/115102023 https://nptel.ac.in/courses/115104096 https://nptel.ac.in/courses/115104096
Videos	https://nptel.ac.in/courses/115101010 https://nptel.ac.in/courses/115102023 https://nptel.ac.in/courses/115104096 https://nptel.ac.in/courses/115104096

Course Articulation Matrix

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

Syllabus-2023-2024

(SOS)(BSc_PCM)

Title of the Course	Electronics
Course Code	DSE1[T]

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Embedded theory and lab							
Course Category	Discipline Specific Elective							
Pre-Requisite/s	Knowledge of basic Circuit Analysis			**Co-Requisite/s**	Know,edge of basic electricity			
Course Outcomes & Bloom's Level	**CO1-** To remember the different biasing technique, amplification, transformation of waves, oscillation, basic of differential and operational amplifier**(BL1-Remember)** **CO2-** To understand the continuity equation, pn junction and operating point and different amplifier circuit**(BL2-Understand)** **CO3-** To apply in designing the new circuit for amplifier using RC, OPAM, wave shaping and oscillation.**(BL3-Apply)** **CO4-** To analysis amplification by a circuit, wave shaping, basic oscillation circuit and its conditions, differential and operational amplifier**(BL4-Analyze)** **CO5-** To evaluate the operating point of diode and transistor, gain in various amplifier circuits, wave shaping circuit, class A, class B and class C amplifiers**(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	Biasing techniques and linear amplifier Continuity equation and its application to p-n junction under forward and reverse bias, Solution of Continuity equation for reversed and forward biased abrupt p-n junctions, Load line for a transistor, Location of Q-point for the bipolar transistor, variation of bias current, RC coupled CE amplifier, its frequency response and gain frequency plot, Gain band product, cascading of amplifiers.	Audio/Video clips, lecture with ppt, on white board, quiz	8
2	Power Amplifier and Oscillators Operating conditions for power amplifier, power relations, the ideal transformer, voltage limitations of eh transformer, non-linear distortion, idea of intermodulation distortion. The class A power amplifier, The push-pull amplifier, Feedback requirements of oscillations, Basic oscillator analysis, Hartley and Compitt oscillators, Piezo-electric, frequency control, RC oscillators.	Audio/Video clips, lecture with ppt, on white board, quiz,	8
3	Wave Shaping Circuits Linear wave shaping, High pass RC Circuit, High pass RC circuit as a differentiator, Low pass RC circuit, Low pass RC circuit as a integrator, Non- linear wave shaping, Shunt diode clipper and series diode clippers, Double ended p-n junction and Zener diode clipper circuits, Clamping circuits, Zero level and given level clamping, Fundamentals of voltage and current sweep generates, sweep wave forms, Miller integrating sweep circuits, Blocking and Triggered transistor blocking oscillator	Audio/Video clips, lecture with ppt, on white board, quiz,	8
4	Basic of Differential and Operational Amplifiers Differential amplifier, Differential amplifier circuit configuration, Dual input balanced output differential amplifier, Voltage gain, differential input resistance, inverting and non-inverting inputs. Common mode rejection ratio, Operational amplifier, input offset voltage supply, rejection ratio, Ideal OPAmp, equivalent circuit of an OP Amp, ideal voltage transfer curve, inverting,dual and non-inverting amplifier, measurement of OP Amp parameters, frequency response.	Audio/Video clips, lecture with ppt, on white board, quiz,	8
5	Application of Operational Amplifier Use of OP Amp as sign changer, scale changer, phase shifter, voltage to current converter differential dc amplifier, bridge amplifier, ac voltage follower, analog integration and differentiation, electronic analog	Audio/Video clips, lecture with ppt, on white board, quiz,	8

	computation, Non-linear function generator , series and shunt regulator.		

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Functions of CRO	Experiments	BL2-Understand	3
2	Half Wave Rectifier	Experiments	BL4-Analyze	3
3	Full Wave Rectifier	Experiments	BL4-Analyze	3
4	PNP Transistor CB Mode	Experiments	BL2-Understand	3
5	Transistor as an amplifier	Experiments	BL4-Analyze	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	Integrated Electronics- Analog and Digital Circuit and Systems by Millman
Articles	
References Books	Electronic Devices and Circui by ROBERT L BOYLESTAD and LOUIS NASHELSKY
MOOC Courses	https://onlinecourses.nptel.ac.in/noc21_ee55/preview by Prof. M.B. Patil of IIT Bombay
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	1	-	-	-	-	-	-	-	-	-	-
CO2	2	1	3	2	2	-	-	-	-	-	-	-	-	-	-
CO3	2	1	2	1	2	-	-	-	-	-	-	-	-	-	-
CO4	1	2	1	3	1	-	-	-	-	-	-	-	-	-	-
CO5	2	1	3	2	2	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-