Arts, Science and Commerce College, Indapur, Dist. Pune

TEACHING AND EVALUATION PLAN

Name of the teacher	**Dr. Veer Shivaji Shamrao**	**Year: 2022-23**	**Semester: 3**
Subject: Physics		**Paper PH212: ELECTRONICS**	**Class: S.Y.B.Sc.**

Part I : Teaching Plan						**Part II : Evaluation of Plan**			
1	2	3	4	5	6	7	8	9	10
Sr. No.	**Month**	**Week**	**No. of working days**	**No. of periods available**	**Topics to be taught**	**No. of periods engaged**	**Topics taught**	**Deviation in periods**	**Remarks**
1	Sep	1&2	10	3	**NETWORK THEOREMS** Kirchhoff's laws (revision) Voltage and Current divider circuits Thevenin's theorem Norton's theorem	3	**NETWORK THEOREMS** Kirchhoff's laws (revision) Voltage and Current divider circuits Thevenin's theorem Norton's theorem	Nil	
		3&4	12	6	Super-position theorem Maximum power transfer theorem (All theorems to with proof) Problems. **BIJUNCTION TRANSISTOR** Revision of bipolar junction transistor, types, symbols and basic action. Configurations (Common Base, Common Emitter & Common Collector)	6	Super-position theorem Maximum power transfer theorem (All theorems to with proof)Problems. **BIJUNCTION TRANSISTOR** Revision of bipolar junction transistor, types, symbols and basic action. Configurations (Common Base, Common Emitter & Common Collector)	Nil	
		5	4	3	. Current gain factors (α &β) and their relations. Input, output and transfer characteristics of CE, CB & CC configurations. Biasing methods: Base bias, Emitter feedback and voltage divider DC load lines (CE), Operating point (Q point) Transistor as a switch Problems.	3	. Current gain factors (α &β) and their relations. Input, output and transfer characteristics of CE, CB & CC configurations. Biasing methods: Base bias, Emitter feedback and voltage divider DC load lines (CE), Operating point (Q point) Transistor as a switch Problems.	Nil	
2	Oct.	1&2	6	3	**OPERTAIONAL AMPLIFIERS** Introduction Ideal and practical Characteristics Operational amplifier: IC 741- Block diagram and Pin diagram Concept of virtual groundInverting and non-inverting operational amplifiers with concept of gain	3	**OPERTAIONAL AMPLIFIERS** Introduction Ideal and practical Characteristics Operational amplifier: IC 741- Block diagram and Pin diagram Concept of virtual groundInverting and non-inverting operational amplifiers with concept of gain	Nil	

	3&4	12	6	Operational amplifier as an adder and substracter.Problems **OSCILLATROS** Concept of positive and negative feedback Barkhausein criteria for an oscillator Construction, working and applications ofPhase shift oscillator using IC-741Problems	6	Operational amplifier as an adder and substracter.Problems **OSCILLATROS** Concept of positive and negative feedback Barkhausein criteria for an oscillator Construction, working and applications ofPhase shift oscillator using IC-741Problems	Nil	
Nov	1&2	10	6	**POWER SUPPLY** Concept and working of rectifier half wave, full wave and bridge rectifierRipple voltageRC filter circuit	2	**POWER SUPPLY** Concept and working of rectifier half wave, full wave and bridge rectifierRipple voltageRC filter circuit	Nil	
	3&4	8	4	Unregulated and regulated power supplyConcept of load and line regulation Zener as regulator Problems. **NUMBER SYSTEM AND LOGIC GATES** Number systems: Binary, Binary coded decimal (BCD),	6	Unregulated and regulated power supplyConcept of load and line regulation Zener as regulator Problems. **NUMBER SYSTEM AND LOGIC GATES** Number systems: Binary, Binary coded decimal (BCD),	Nil	
	5	5	3	Octal, Hexadecimal Addition and subtraction of binary numbers and binary fractions using one's and two's complement. Basic logic gates (OR, AND, NOT) Derived gates: NOR, NAND, EXOR, EXNOR with symbols and truth tables Boolean Algebra De Morgan's theorems and its verification Problems	4	Octal, Hexadecimal Addition and subtraction of binary numbers and binary fractions using one's and two's complement. Basic logic gates (OR, AND, NOT) Derived gates: NOR, NAND, EXOR, EXNOR with symbols and truth tables Boolean Algebra De Morgan's theorems and its verification Problems	Nil	

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Signature of Teacher

Signature of Head of Department

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Signature of Faculty In-charge

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TEACHING AND EVALUATION PLAN

Name of the teacher	**Prof.(Dr.) Veer Shivaji Shamrao**	**Year: 2022_23**	**Semester: 1**
Subject: Physics		**Paper: PHCT-113 Electronics**	**Class: M.Sc.**

Part I : Teaching Plan						**Part II : Evaluation of Plan**			
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Sr. No.	**Month**	**Week**	**No. of working days**	**No. of periods available**	**Topics to be taught**	**No. of periods engaged**	**Topics taught**	**Deviation in periods**	**Remarks**
1	Sep	1&2	10	6	**Semiconductor Devices and its Applications** **SCR:** Construction, working, Characteristics and applications as half wave and full waverectifier **DIAC and TRIAC:** Construction, working, characteristics and applications as fan regulator	6	**Semiconductor Devices and its Applications** **SCR:** Construction, working, Characteristics and applications as half wave and full waverectifier **DIAC and TRIAC:** Construction, working, characteristics and applications as fan regulator	Nil	
		3&4	12	6	**1.3 DC-DC converter and SMPS:** Concept and applications **FOperational Amplifier** Function generator using two OPAMPS with variable controls, Astable and Monostable multivibrators using OPAMPs, Precision recifiers (Half wave andFullwave)Instrumentationamplifier **2.2 Timer IC 555:** Applications as PAM, PWM, FM and FSK generator	6	**1.3 DC-DC converter and SMPS:** Concept and applications **FOperational Amplifier** Function generator using two OPAMPS with variable controls, Astable and Monostable multivibrators using OPAMPs, Precision rectifiers (Half wave and Full wave), Instrumentationamplifier **2.2 Timer IC 555:** Applications as PAM, PWM, FM and FSK generator	Nil	
		5	4	2	**2.3 Voltage Controlled Oscillator (IC566):** Block diagram and working	2	**2.3 Voltage Controlled Oscillator (IC566):** Block diagram and working	Nil	
2	Oct	1&2	6	3	**2.4 Phase Locked Loop (IC565):** Block diagram and working and applications as FM detector,FSK detector, Frequency multiplier and Frequency Translator	3	**2.4 Phase Locked Loop (IC565):** Block diagram and working and applications as FM detector, FSK detector, Frequency multiplier and Frequency Translator	Nil	
		3&4	12	6	**Digital Logic Circuits I: Combinational Logic** Review ofBoolean identities and its use to minimize Boolean expressionsUse of Karanaugh Map to design 4-variable logic circuits like BCD to 7-segment decoder,	6	**Digital Logic Circuits I: Combinational Logic** Review ofBoolean identities and its use to minimize Boolean expressionsUse of Karanaugh Map to design 4-variable logic circuits like BCD to 7-segment decoder, Binary-to-Gray and Gray-	Nil	

					Binary-to-Gray and Gray-to-Binary code converter. **Digital Logic Circuits II: Sequential Logic** 4-bit serial, parallel and combinational counter. Study of IC 7490 with applications as MODcounters (01 to 99)Study of IC 7495 and its use as SISO, SIPO, PIPO and PISO.UP-DOWN counters, Ring counter and their applications.		to-Binary code converter. **Digital Logic Circuits II: Sequential Logic** 4-bit serial, parallel and combinational counter.Study of IC 7490 with applications as MODcounters (01 to 99) Study of IC 7495 and its use as SISO, SIPO, PIPO and PISO.UP-DOWN counters, Ring counter and their applications.		
3	Nov	1&2	10	6	**Data Converters Credit-1** **4.1 Digital to Analog converters:** Binary weighted and R-2R ladder type with practical circuit (Using Input switches, Level amplifiers, Control gates and Buffer amplifier)	6	**Data Converters Credit-1** **4.1 Digital to Analog converters:** Binary weighted and R-2R ladder type with practical circuit (Using Input switches, Level amplifiers, Control gates and Buffer amplifier)	Nil	
		3	6	3	Control gates and Buffer amplifier	3	Control gates and Buffer amplifier)	Nil	
		4&5	9	6	**4.2 Analog to Digital converters:** Single slope, Dual slope, Flash (Simultaneous) type, Counter ramp type, Continuous type and Successive approximation type	6	**4.2 Analog to Digital converters:** Single slope, Dual slope, Flash (Simultaneous) type, Counter ramp type, Continuous type and Successive approximation type	Nil	

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TEACHING AND EVALUATION PLAN

Name of the teacher: Mr. Kamble Akin Vasant **Year: 2022_23** **Semester: 5**

Subject: Physics **Paper: PHY-354: Atomic and Molecular Physics** **Class: T.Y.B.Sc.**

Part I : Teaching Plan						Part II : Evaluation of Plan			
1	2	3	4	5	6	7	8	9	10
Sr. No.	Month	Week	No. of working days	No. of periods available	Topics to be taught	No. of periods engaged	Topics taught	Deviation in periods	Remarks
1	Sep.	1&2	10	6	**Atomic structure** Revision of various atomic models Vector atom model (Concepts of space quantization and electron spin) Pauli Exclusion Principle and electron configuration, Quantum states, Spectral notations of quantum states. Problems	6	**Atomic structure** Revision of various atomic models Vector atom model (Concepts of space quantization and electron spin) Pauli Exclusion Principle and electron configuration, Quantum states, and Spectral notations of quantum states. Problems	Nil	
		3&4	12	6	**One and Two Valence electron systems** 1. Spin-Orbit Interaction (Single valence electron atom), Energy levels of Na-atom, Selection rules, Spectra of sodium atom, Sodium doublet	6	**One and Two Valence electron systems** 1. Spin-Orbit Interaction (Single valence electron atom), Energy levels of Na-atom, Selection rules, Spectra of sodium atom, Sodium doublet	Nil	
		5	4	2	Spectral terms of two electron atoms, terms for equivalent electrons	2	Spectral terms of two electron atoms, terms for equivalent electrons	Nil	
2	Oct.	1&2	6	3	Single-Triplet separations for interaction energy of LS coupling, Lande's interval rule, Spectra of Helium atom. . Problems	3	Singlet-Triplet separations for interaction energy of LS coupling, Lande's interval rule, Spectra of Helium atom. Problems	Nil	
		3&4	12	6	**Zeeman Effect** Zeeman Effect Experimental arrangement Normal and anomalous Zeeman Effect	6	**Zeeman Effect** Zeeman Effect Experimental arrangement Normal and anomalous Zeeman Effect	Nil	
3	Nov.	1&2	10	6	Stark effect (Qualitative discussion) Applications of Zeeman effects Problems	6	Stark effect (Qualitative discussion) Applications of Zeeman effects Problems	Nil	

		3	6	3	**Molecular spectroscopy** Introduction of molecular spectra and its types Rotational energy levels, Rotational spectra of rigid diatomic molecule Vibrational energy levels Rotational and Vibrational spectra Electronic spectra of molecules Applications of UV-Vis spectroscopy; Problems	3	**Molecular spectroscopy** Introduction of molecular spectra and its types Rotational energy levels, Rotational spectra of rigid diatomic molecule, Vibrational energy levels Rotational and Vibrational spectra Electronic spectra of molecules Applications of UV-Vis spectroscopy Problem	Nil	
		4&5	9	6	**Raman spectroscopy** History of Raman effect, Molecular polarizability Classical theory and Quantum theory of Raman Effect Characteristics Raman Lines and Applications of Raman spectroscopy; Problems	6	**Raman spectroscopy** History of Raman effect, Molecular polarizability Classical theory and Quantum theory of Raman Effect Characteristics Raman Lines and Applications of Raman spectroscopy; Problems	Nil	

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TEACHING AND EVALUATION PLAN

Name of the teacher	**Holkunde Viresh Chandrakant**	**Year: 2022_23**	**Semester: 5**
Subject: Physics		**Paper: PHY-352: Electrodynamics**	**Class: T.Y. B.Sc**

Part I : Teaching Plan						Part II : Evaluation of Plan			
1	2	3	4	5	6	7	8	9	10
Sr. No.	**Month**	**Week**	**No. of working days**	**No. of periods available**	**Topics to be taught**	**No. of periods engaged**	**Topics taught**	**Deviation in periods**	**Remarks**
1	Sep	1&2	10	6	**Electrostatics** Revision of Coulomb's law, Gauss law, Electric field, Electrostatic Potential. Potential energy of system ofcharges.Statement of Poisson's and Laplace's equation, Boundary Value problems in electrostatics- Solution of Laplace equation in Cartesian system, Boundary conditions.	6	**Electrostatics** Revision of Coulomb's law, Gauss law, Electric field, Electrostatic Potential. Potential energy of system of charges. Statement of Poisson's and Laplace's equation, Boundary Value problems in electrostatics- Solution of Laplace equation in Cartesian system, Boundary conditions.	Nil	
		3&4	12	6	Polarization **P**, Electric displacement **D**, Electric susceptibility and dielectric constant, bound volume and surface charge densities. **e.** Electric field at an exterior and interior point of dielectric	6	Polarization **P**, Electric displacement **D**, Electric susceptibility and dielectric constant, bound volume and surface charge densities. Electric field at an exterior and interior point of dielectric	Nil	
		5	4	2	**Magnetostatics** Concepts of magnetic induction, magnetic flux and magnetic field. Magnetic induction due to straight current carrying conductor, magnetization of matter, relationship between **B, H** and **M.**	2	**Magnetostatics** Concepts of magnetic induction, magnetic flux and magnetic field. Magnetic induction due to straight current carrying conductor, magnetization of matter, relationship between **B, H** and **M**	Nil	
2	**Oct**	1&2	6	3	Boundary conditions at the interface of two magnetic media (Normal and tangential components).	3	Boundary conditions at the interface of two magnetic media (Normal and tangential components).	Nil	
		3&4	12	6	Biot-Savart's law, Ampere's force law, Magnetic force between two current carrying loops, Ampere's circuital law.Equation of continuity, Magnetic vector potential **A,** Magnetic susceptibility and permeability	6	Biot-Savart's law, Ampere's force law, Magnetic force between two current carrying loops, Ampere's circuital law.Equation of continuity, Magnetic vector potential **A,** Magnetic susceptibility and permeability	Nil	
3	**Nov**	1&2	10	6	Day to day applications of Electrodynamics. Concept of electromagnetic induction, Faradays law of induction, Lenz's law, displacement current, generalization of	6	Day to day applications of Electrodynamics. Concept of electromagnetic induction, Faradays law of induction, Lenz's law, displacement current, generalization of	Nil	

					Amperes' law. Maxwell's equations (Differential and Integral form) and their physical significance		Amperes' law. Maxwell's equations (Differential and Integral form) and their physical significance		
		3	6	3	Polarization, reflection and refraction of electromagnetic waves through media.	3	Polarization, reflection and refraction of electromagnetic waves through media	Nil	
		4&5	9	6	Wave equation and plane waves in free space. Poynting theorem and Poynting vector.	6	Wave equation and plane waves in free space. Poynting theorem and Poynting vector.	Nil	

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TEACHING AND EVALUATION PLAN

Name of the teacher : Mrs. Raut Swati Amol	**Year: 2022_23**	**Semester: 3**
Subject: Physics	**Paper: PHOT234M2: Material Science-I**	**Class: M Sc-II**

Part I : Teaching Plan						Part II : Evaluation of Plan			
1	2	3	4	5	6	7	8	9	10
Sr. No.	Month	Week	No. of working days	No. of periods available	Topics to be taught	No. of periods engaged	Topics taught	Deviation in periods	Remarks
1	Sep	1&2	9	8	**Properties of Materials and Defects in Solids** a) Mechanical, electrical, magnetic, thermal and optical properties (in brief – 2L only) b) Point defects - Vacancies, interstitials, non-stoichiometry, substitution, Schottky and Frenkeldefects with proofs Line defects - Edge and screw dislocations, properties of dislocations – force on dislocation	8	**Properties of Materials and Defects in Solids** a) Mechanical, electrical, magnetic, thermal and optical properties (in brief – 2L only) b) Point defects - Vacancies, interstitials, non-stoichiometry, substitution, Schottky and Frenkel defects with proofs Line defects - Edge and screw dislocations, properties of dislocations – force on dislocation	Nil	
		3&4	12	8	Surface defects – grain boundaries with explanation of high angle, low angle, tilt and twist boundaries, stacking fault Volume defect- twin boundary	8	Surface defects – grain boundaries with explanation of high angle, low angle, tilt and twistboundaries, stacking fault Volume defect-twin boundary	Nil	
		5	4	3	**Expt-1Humidity measurement**	3	**Expt-1Humidity measurement**	Nil	
2	Oct	1	1	1	**Solid Solutions and Diffusion in Solids** a) Solid solubility with few examples, Types of solid solutions Substitutional	1	, **Solid Solutions and Diffusion in Solids** a) Solid solubility with few examples, Types of solid solutions Substitutional	Nil	
		2&3	11	8	Interstitial, Factors governing solid solubility (Hume - Rothery rule), Atomic size and size factor in solid solutions, Vegard's law, Explanation of strain in solid solutions b) Mechanism of Diffusion, Fick's first and second laws of diffusion, solution to Fick's second law	8	Interstitial, Factors governing solid solubility (Hume - Rothery rule), Atomic size and size factor in solid solutions, Vegard's law, Explanation of strain in solid solutions b) Mechanism of Diffusion, Fick's first and second laws of diffusion, solution to Fick's second law	Nil	

					(without proof, introduction of error function), Factors governing diffusion, Experimental determination of D, Applications of diffusion: Corrosion resistance of duralumin, Carburization of steel, Decarburization of steel, Doping of semiconductors		(without proof, introduction of error function), Factors governing diffusion, Experimental determination of D, Applications of diffusion: Corrosion resistance of duralumin, Carburization of steel, Decarburization of steel, Doping of semiconductor		
		4	6	4	**Expt-2** To determine specific heat of graphite	4	**Expt-2** To determine specific heat of graphite	Nil	
3	Nov	1	5	4	**Expt-3** Temperature dependent resistivity measurement of a material	4	**Expt-3** Temperature dependent resistivity measurement of a material	Nil	
		2&3	11	8	**Expt-4** To determine the dipole moment of a given liquid **Expt-5** To determine the magnetic susceptibility of FeCl3	8	**Expt-4** To determine the dipole moment of a given liquid **Expt-5** To determine the magnetic susceptibility of FeCl3	Nil	
		4&5	9	8	**Expt-6** Plotting of crystal structures using Software **Expt-7** Density of ceramic material using XRD	8	**Expt-6** Plotting of crystal structures using Software **Expt-7** Density of ceramic material using XRD	Nil	

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TEACHING AND EVALUATION PLAN

Name of the teacher: Mrs. Raut Swati Amol	**Year: 2022_23**	**Semester: 5**
Subject:Physics	**Paper: PHY-351: Mathematical Methods in Physics-II**	**Class: T.Y.B.Sc.**

Part I : Teaching Plan						**Part II : Evaluation of Plan**			
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Sr. No.	**Month**	**Week**	**No. of working days**	**No. of periods available**	**Topics to be taught**	**No. of periods engaged**	**Topics taught**	**Deviation in periods**	**Remarks**
1	Sep	1&2	10	6	**Curvilinear Co-ordinates** Review of Cartesian, spherical and cylindrical co-ordinate, transformation equation, General Curvilinear co-ordinate system: Co-ordinate surface, co-ordinate lines, length, surfaces and volume elements in curvilinear co-ordinate system.	6	. **Curvilinear Co-ordinates** Review of Cartesian, spherical and cylindrical co-ordinate, transformation equation, General Curvilinear co-ordinate system: Co-ordinate surface, co-ordinate lines, length, surfaces and volume elements in curvilinear co-ordinate system.	Nil	
		3&4	12	6	Orthogonal curvilinear co-ordinate system, expressions for gradient, divergence, Laplacian, and curl, special case for gradient, divergence and curl in Cartesian, spherical polar and cylindrical co-ordinate system, Problems.	6	Orthogonal curvilinear co-ordinate system, expressions for gradient, divergence, Laplacian, and curl, special case for gradient, divergence and curl in Cartesian, spherical polar and cylindrical co-ordinate system, Problems.	Nil	
		5	4	2	**The Special Theory of Relativity** Introduction and applications, Newtonian relativity	2	**The Special Theory of Relativity** Introduction and applications, Newtonian relativity	Nil	
2	Oct	1&2	6	3	Galilean transformation equation, Michelson-Morley experiment, Postulates of special theory of relativity	3	Galilean transformation equation, Michelson-Morley experiment, Postulates of special theory of relativity	Nil	
		3&4	12	6	Lorentz transformations, Kinematic effects of Lorentz transformation, Length contraction, Proper time, Problems	6	Lorentz transformations, Kinematic effects of Lorentz transformation, Length contraction, Proper time, Problems	Nil	

3	Nov	1&2	10	6	**Partial Differential Equations** Introduction and applications of Partial differential equations (PDE), General methods for solving second order PDE, Method of separation of variables in Cartesian, Spherical polar and cylindrical co-ordinate system (two dimensional Laplace's equation, one dimensional Wave equation), Singular points (x = x0), Solution of differential equation-Statement of Fuch's theorem, Frobenius method of series solution.	6	**Partial Differential Equations** Introduction and applications of Partial differential equations (PDE), General methods for solving second order PDE, Method of separation of variables in Cartesian, Spherical polar and cylindrical co-ordinate system (two dimensional Laplace's equation, one dimensional Wave equation), Singular points (x = x0), Solution of differential equation-Statement of Fuch's theorem, Frobenius method of series solution.	Nil	
		3	6	3	**Special Functions** Introduction, generating function for Legendre Polynomials: Pn(x), Properties of Legendre.	3	**Special Functions** Introduction, generating function for Legendre Polynomials: Pn(x), Properties of Legendre.	Nil	
		4&5	9	6	Polynomials, Generating function for Hermite Polynomials: Hn(x), Properties of Hermite Polynomials, Bessel function of first kind: Jn (x), Properties of Bessel function of first kind, Applications of Special Functions in Physics, Problems	6	Polynomials, Generating function for Hermite Polynomials: Hn(x), Properties of Hermite Polynomials, Bessel function of first kind: Jn (x), Properties of Bessel function of first kind, Applications of Special Functions in Physics, Problems	Nil	

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TEACHING AND EVALUATION PLAN

Name of the teacher: Patel Saddamhusen Hamid | **Year: 2022-23** | **Semester: 3**

Subject: Physics | **Paper: Solid State Physics (PHCT-232)** | **Class: M Sc-II**

Part I : Teaching Plan						Part II : Evaluation of Plan			
1	2	3	4	5	6	7	8	9	10
Sr. No.	Month	Week	No. of working days	No. of periods available	Topics to be taught	No. of periods engaged	Topics taught	Deviation in periods	Remarks
1	Sep.	1&2	9	8	**Crystal Structure and Band Theory of Solids** Revision of crystal structures, structure of atomic form factor, Geometrical structure factor, Atomic scattering factor, calculations for SC, BCC, FCC, HCP and diamond structureRevision of nearly free electron model, DC and AC electrical conductivity of metals	8	**Crystal Structure and Band Theory of Solids** Revision of crystal structures, structure of atomic form factor, Geometrical structure factor, Atomic scattering factor, calculations for SC, BCC, FCC, HCP and diamond structure Revision of nearly free electron model, DC and AC electrical conductivity of metals,	Nil	
		3&4	12	8	Bloch theorem (with proof), Kronig-Penney model, Motion of electron in 1-D according to band theory, Fermi sphere, Tight binding approximation, Band structure (in R space) of semiconductor crystal, Cyclotron resonance, Quantization of electronic orbit in a magnetic field	8	Bloch theorem (with proof), Kronig-Penney model, Motion of electron in 1-D according to band theory, Fermi sphere, Tight binding approximation, Band structure (in R space) of semiconductor crystal, Cyclotron resonance, Quantization of electronic orbit in a magnetic field	Nil	
		5	4	3	**Diamagnetism and Paramagnetism** Classicaltheor of diamagnetism, Langevin theory of Paramagnetism, Quantum theory of Paramagnetism	3	**Diamagnetism and Paramagnetism** Classical theory of diamagnetism, Langevin theory of Paramagnetism, Quantum theory of Paramagnetism	NIl	
2	Oct.	1	1	1	Paramagnetic susceptibility of conduction electron,	1	Paramagnetic susceptibility of conduction electron,	Nil	
		2&3	11	8	Magnetic properties of rare earth ions & iron group ions with graphical representation, Crystal field splitting, quenching of orbital angular momentum	8	Magnetic properties of rare earth ions & iron group ions with graphical representation, Crystal field splitting, quenching of orbital angular momentum	Nil	

		4	6	4	**Ferromagnetism and Antiferromagnetism** Wiess theory, Curie point, Exchange integral, saturation magnetization and its temperature dependence, Saturation magnetization at absolute zero, ferromagnetic domains, Anisotropy energy, Bloch wall.	4	**Ferromagnetism and Antiferromagnetism** Wiess theory, Curie point, Exchange integral, saturation magnetization and its temperature dependence, Saturation magnetization at absolute zero, ferromagnetic domains, Anisotropy energy, Bloch wall.	Nil
3	Nov.	1	5	4	Antiferromagnetism- Neel temperature and Ferrimagnetism (Explanation only for both)	4	Antiferromagnetism- Neel temperature and Ferrimagnetism (Explanation only for both)	Nil
		2&3	11	8	**Superconductivity Dielectric Properties of Solids** Properties of Superconductors: Meissner effect, Heat capacity, Energy gap, Isotope effect; Type I and II superconductors; Thermodynamics of superconductivity; London equation and London penetration depth; BCS theory;	8	**Superconductivity Dielectric Properties of Solids** Properties of Superconductors: Meissner effect, Heat capacity, Energy gap, Isotope effect; Type I and II superconductors; Thermodynamics of superconductivity; London equation and London penetration depth; BCS theory;	Nil
		4&5	9	8	Quantization in a superconductivity ring and Qualitative discussion of Josephson superconductor tunnelling Macroscopic and local electric field, Polarizability, Dielectric constant, Clausius–Mossotti relation, Piezoelectricity, Dielectric behavior in $BaTiO_3$	8	Quantization in a superconductivity ring and Qualitative discussion of Josephson superconductor tunnelling Macroscopic and local electric field, Polarizability, Dielectric constant, Clausius– Mossotti relation, Piezoelectricity, Dielectric behavior in $BaTiO_3$	Nil

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Department of Physics
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TEACHING AND EVALUATION PLAN

Name of the teacher		**Patel Saddamhusen Hamid**			**Year: 2022-23**			**Semester: 1**	
Subject:	**Physics**				**Paper:**	**Classical Mechanics**		**Class: . M Sc-1**	
Part I : Teaching Plan						**Part II : Evaluation of Plan**			
1	2	3	4	5	6	7	8	9	10
Sr. No.	**Month**	**Week**	**No. of working days**	**No. of periods available**	**Topics to be taught**	**No. of periods engaged**	**Topics taught**	**Deviation in periods**	**Remarks**
1	Sep	1&2	9	8	**Analytical Dynamics** Variational principle and its applications to problems like shortest distance, brachistochrone, geodesics etc. Lagrangian and Hamiltonian equations of motion - derivation using Hamilton's principle of least action and their applications to various problems	8	**Analytical Dynamics** Variational principle and its applications to problems like shortest distance, brachistochrone, geodesics etc. Lagrangian and Hamiltonian equations of motion - derivation using Hamilton's principle of least action and their applications to various problems	Nil	
		3&4	13	8	Hamiltonian for a charged particle. Properties of kinetic energy function. Time-dependence of total energy (theorem on total energy). Symmetry and conservation laws (energy and momentum). Gauge function for Lagrangian. Invariance under Galilean transformation	8	Hamiltonian for a charged particle. Properties of kinetic energy function. Time-dependence of total energy (theorem on total energy). Symmetry and conservation laws (energy and momentum). Gauge function for Lagrangian. Invariance under Galilean transformation.	Nil	
		5	4	3	Canonical transformations and their applications.Canonical transformations of the free particle Hamiltonian. Liouville's theroem.	3	Canonical transformations and their applications. Canonical transformations of the free particle Hamiltonian. Liouville's theroem.	Nil	
2	**Oct**	1	1	1	Area conservation properties of canonical flows	1	Area conservation properties of canonical flows	Nil	
		2&3	11	8	Poisson Brackets. Jacobi-Poisson theorem on Poisson Brackets. Invariance of Poisson brackets under canonical transformations. Dirac's formulation of generalized Hamiltonian.	8	Poisson Brackets. Jacobi-Poisson theorem on Poisson Brackets. Invariance of Poisson brackets under canonical transformations. Dirac's formulation of generalized Hamiltonian.	Nil	
		4	6	4	Central Forces and Non-inertial Frames of Reference Lagragian formulation of motion under central forces. Kepler problem.	4	Central Forces and Non-inertial Frames of Reference Lagragian formulation of motion under central forces. Kepler problem.	Nil	

3	Nov	1&2	10	8	Stability of orbits. Motion of satellites. Rotating frames of reference. Coriolis force, banking of rivers, Foucault's pendulum,,tides.	7	Stability of orbits. Motion of satellites. Rotating frames of reference. Coriolis force, banking of rivers, Foucault's pendulum, and tides.	1
		3&4	12	8	**Rigid Body Dynamics and Small Oscillations** Moment of inertia tensor. Euler angles. Euler equation of motion for rigid body motion. Symmetric top. Small oscillations.	8	**Rigid Body Dynamics and Small Oscillations** Moment of inertia tensor. Euler angles. Euler equation of motion for rigid body motion. Symmetric top. Small oscillations.	Nil
		5	3	3	System of couple oscillators. Normal modes and normal coordinates.	3	System of couple oscillators. Normal modes and normal coordinates.	Nil

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TEACHING AND EVALUATION PLAN

Name of the teacher Patel Saddamhusen Hamid **Year:** 2022_23 **Semester:** 5

Subject: Physics **Paper:** Elements of Materials Science (PHY-356(B)) **Class:** T.Y. B.Sc

Part I : Teaching Plan						Part II : Evaluation of Plan			
1	2	3	4	5	6	7	8	9	10
Sr. No.	Month	Week	No. of working days	No. of periods available	Topics to be taught	No. of periods engaged	Topics taught	Deviation in periods	Remarks
1	Sep	1&2	10	6	**Defects in Solids** Material Properties Mechanical, Electrical, and thermal Material Properties – Mechanical, Electrical, and thermal Impurities in solids.Solid solutions in metals.Rules of solid solubility. Imperfection in crystals.Defects in solids point, line, surface, and volume.	6	Defects in Solids Material Properties Mechanical, Electrical, and thermal Impurities in solids.Solid solutions in metals.Rules of solid solubility. Imperfection in crystals.Defects in solids point, line, surface, and volume.	Nil	
		3&4	12	6	Atomic diffusions definition, mechanism, Fick's laws.**Single Phase Metals**Single phase alloysDeformation Elastic Deformation and Plastic DeformationMechanism of plastic Deformation by slip	6	Atomic diffusions definition, mechanism, Fick's laws. **Single Phase MetalsSingle phase alloys** DeformationElastic Deformation and Plastic Deformation Mechanism of plastic Deformation by slip	Nil	
		5	4	2	Critical resolved shear stress (CRSS) Plastic deformation in poly crystalline materials	2	Critical resolved shear stress (CRSS) Plastic deformation in poly crystalline materials	Nil	
2	Oct	1&2	6	3	**Ceramic Materials** Ceramic Phases, Classification of ceramic materialsCeramic crystals (AX)	3	**Ceramic Materials** Ceramic Phases, Classification of ceramic materialsCeramic crystals (AX)	Nil	
		3&4	12	6	Mechanical behavior of ceramics Electromagnetic behavior of ceramics –Electric properties dielectrics,semiconductors,piezoelectric Magnetic Properties	6	Mechanical behavior of ceramics Electromagnetic behavior of ceramics – Electricpropertiesdielectrics,semiconductors, piezoelectricMagnetic Properties	Nil	
3	Nov	1&2	10	6	**Phase Diagrams** Basic terms System, Surrounding, Component, Coordinates, Phase, Equilibrium.Phase Diagramdefinition, importance, and objectiveLever ruleGibb's phase rule Phase diagram of a) Sugar water b) NaCl waterTypes of phase diagrams with construction	6	**Phase Diagrams** Basic terms System, Surrounding, Component, Coordinates, Phase, Equilibrium.Phase Diagram definition, importance, and objectiveLever ruleGibb's phase rule Phase diagram of a) Sugar water b) NaCl waterTypes of phase diagrams with construction	Nil	

		3	6	3	Type I Lens type CuNi phase diagramType II Only introduction Type III Eutectic type PbSn phase diagramIsothermal cuts	3	Type I Lens type CuNi phase diagram Type II introductionType III Eutectic type PbSn phase diagramIsothermal cuts	Nil	
		4&5	9	6	**Introduction to smart materi** Definition of smart materials Types and structure of smart materials, Properties of smart materials Applications of smart materials	6	**Introduction to smart materials** Definition of smart materials Types and structure of smart materials, Properties of smart materials Applications of smart materials.	Nil	

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TEACHING AND EVALUATION PLAN

Name of the teacher	**Prof.(Dr.) Veer Shivaji Shamrao**	**Year: 2022-23**	**Semester: 6**
Subject:	**Physics**	**Paper: PHY-365 (A): Electronics-II**	**Class: T.Y.B.Sc.**

Part I : Teaching Plan						**Part II : Evaluation of Plan**			
1	2	3	4	5	6	7	8	9	10
Sr. No.	**Month**	**Week**	**No. of working days**	**No. of periods available**	**Topics to be taught**	**No. of periods engaged**	**Topics taught**	**Deviation in periods**	**Remarks**
1	Jan	1&2	12	6	**Semiconductor Devices:** a. LED and Photodiode, Optocoupler. (Working Principles) Problems. Ref. 1. b. BJT: Transistor amplifier classifications - Class A, B, C and AB (working only), Differential amplifier (transistorized), Problems.	6	**Semiconductor Devices:** a. LED and Photodiode, Optocoupler. (Working Principles) Problems. BJT: Transistor amplifier classifications - Class A, B, C and AB (working only), Differential amplifier (transistorized), Problems.	Nil	
		3&4	11	6	Field Effect Transistor: JFET (Introduction, classification, principle, working and IV characteristics) MOSFETs (DE-MOSFET and E only MOSFET). Problems. Ref. 1 **Applications of Semiconductor Devices:** a. Three Pin Regulators: Block diagram of 3-pin IC regulator, study of IC-78XX, 79XX. Dual Power Supply using IC-78XX, 79XX. Switching Regulators (SMPS): Introduction, Block diagram, Advantages and Disadvantages	6	Field Effect Transistor: JFET (Introduction, classification, principle, working and IV characteristics) MOSFETs (DE-MOSFET and E only MOSFET). Problems. Ref. 1 **Applications of Semiconductor Devices:** a. Three Pin Regulators: Block diagram of 3-pin IC regulator, study of IC-78XX, 79XX. Dual Power Supply using IC-78XX, 79XX. Ref. 1 Switching Regulators (SMPS): Introduction, Block diagram, Advantages and Disadvantages.	Nil	
		5	2	2	Modulation and Demodulation : Concept of Carrier Wave, Need of Modulation and Demodulation, Methods of Modulation like AM, FM, PM Concept of Modulation Index, Upper and Lower Side Band Frequencies in AM. Problem	2	Modulation and Demodulation : Concept of Carrier Wave, Need of Modulation and Demodulation, Methods of Modulation like AM, FM, PM Concept of Modulation Index, Upper and Lower Side Band Frequencies in AM. Problems	Nil	

2	Feb	1&2	10	6	**Integrated Circuits:** a. Integrated Circuits: Introduction, Scale of Integration, Advantages and drawbacks of IC OP-AMP Applications as Integrator, Differentiator, Comparator.	6	**Integrated Circuits:** Integrated Circuits: Introduction, Scale of Integration, Advantages and drawbacks of IC OP-AMP Applications as Integrator, Differentiator, Comparator	Nil	
		3&4	11	5	Timer IC-555: Block diagram, Astable, monostable multivibrator Problems	5	Timer IC-555: Block diagram, Astable, monostable multivibrator Problems	Nil	
3	March	1&2	9	5	**Combinational and Sequential Circuits:** a. Combinational Circuits: Introduction to SOP and POS equation. Concept of Standard SOP and POS equation. Concept of K-map and their use in reduction of Boolean expressions, design of half adder,	5	**Combinational and Sequential Circuits:** a. Combinational Circuits: Introduction to SOP and POS equation. Concept of Standard SOP and POS equation. Concept of K-map and their use in reduction of Boolean expressions, design of half adder,	Nil	
		3	6	3	full adder, half subtract, Study of binary to gray and gray to binary code conversion. Problems. Sequential Circuits: RS flip flop using NAND/NOR, clocked RS, D, JK and T-flip flops. Application of flip flops in Sequential Circuits as Counters and Registers.	3	full adder, half subtract, Study of binary to gray and gray to binary code conversion. Problems.Sequential Circuits: RS flip flop using NAND/NOR, clocked RS, D, JK and T-flip flops. Application of flip flops in Sequential Circuits as Counters and Registers.	Nil	
		4&5	9	6	Asynchronous and Synchronous Counters. (3-bit Counter), Shift Registers and their types of operation -SISO, SIPO, PISO, PIPO	6	Asynchronous and Synchronous Counters. (3-bit Counter), Shift Registers and their types of operation -SISO, SIPO, PISO, PIPO	Nil	

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TEACHING AND EVALUATION PLAN

Name of the teacher Mrs Raut Swati Amol **Year:** 2022-23 **Semester:** II

Subject: Physics **Paper** PHCT242: Material Science **Class:** M.Sc.-I

Part I : Teaching Plan						Part II : Evaluation of Plan			
1 Sr. No.	2 Month	3 Week	4 No. of working days	5 No. of periods available	6 Topics to be taught	7 No. of periods engaged	8 Topics taught	9 Deviation in periods	10 Remarks
1	Jan	1&2	12	8	Module 1: Properties of Materials and Defects in Solids 1 Credit a Mechanical, electrical, magnetic, thermal and optical properties (in brief – 2L only) b Point defects - Vacancies, interstitials, non-stoichiometry, substitution, Schottky and Frenkel defects with proofs c Line defects - Edge and screw dislocations, properties of dislocations – force on dislocation, energy of dislocation, pinned dislocation (These properties with derivation), dislocation density, interaction between dislocations, motion of a dislocation (cross-slip and climb), dislocation generator (Frank Read source) d Surface defects – grain boundaries with explanation of high angle, low angle, tilt and twist boundaries, stacking fault e Volume defect- twin boundary	8	Module 1: Properties of Materials and Defects in Solids 1 Credit a Mechanical, electrical, magnetic, thermal and optical properties (in brief – 2L only) b Point defects - Vacancies, interstitials, non-stoichiometry, substitution, Schottky and Frenkel defects with proofs c Line defects - Edge and screw dislocations, properties of dislocations – force on dislocation, energy of dislocation, pinned dislocation (These properties with derivation), dislocation density, interaction between dislocations, motion of a dislocation (cross-slip and climb), dislocation generator (Frank Read source) d Surface defects – grain boundaries with explanation of high angle, low angle, tilt and twist boundaries, stacking fault e Volume defect- twin boundary	Nil	
		3	4	4	**Module 2: Solid Solutions and Diffusion in Solids Credit-1** **a** Solid solubility with few examples, Types of solid solutions – Substitutional and Interstitial, Factors governing solid solubility (Hume - Rothery rule), Atomic size and size factor in solid solutions, Vegard's law, Explanation of strain in solid solutions	4	Module 2: Solid Solutions and Diffusion in Solids Credit-1 a Solid solubility with few examples, Types of solid solutions – Substitutional and Interstitial, Factors governing solid solubility (Hume - Rothery rule), Atomic size and size factor in solid solutions, Vegard's law, Explanation of strain in solid solutions	Nil	

2	**Feb**	1&2	10	6	b Mechanism of Diffusion, Fick's first and second laws of diffusion, solution to Fick's second law (without proof, introduction of error function),	6	b Mechanism of Diffusion, Fick's first and second laws of diffusion, solution to Fick's second law (without proof, introduction of error function),	Nil	
		3&4& 5	13	10	Factors governing diffusion, Experimental determination of D, Applications of diffusion: Corrosion resistance of duralumin, Carburization of steel, Decarburization of steel, Doping of semiconductors	10	Factors governing diffusion, Experimental determination of D, Applications of diffusion: Corrosion resistance of duralumin, Carburization of steel, Decarburization of steel, Doping of semiconductors	Nil	
3	**March**	1&2	9	6	Module 3: Metallurgical Thermodynamics Credit-1 Revision of laws of thermodynamics, Auxiliary thermodynamic functions, measurement of changes in enthalpy and entropy, Richard's rule, Trouton's rule, Phase equilibrium in a one-component system, Chemical reaction equilibrium,	6	Module 3: Metallurgical Thermodynamics Credit-1 Revision of laws of thermodynamics, Auxiliary thermodynamic functions, measurement of changes in enthalpy and entropy, Richard's rule, Trouton's rule, Phase equilibrium in a one-component system, Chemical reaction equilibrium,	Nil	
		3&4& 5	15	12	Thermodynamic properties of solutions (mixing processes – Rault's law, activity coefficient; regular solution behavior – Henry's law), Gibb's phase rule: proof, explanation and application to single component (H2O) and binary phase diagram	12	Thermodynamic properties of solutions (mixing processes – Rault's law, activity coefficient; regular solution behavior – Henry's law), Gibb's phase rule: proof, explanation and application to single component (H2O) and binary phase diagram	Nil	
4	**April**	1&2	5	2	Thermodynamic origin of phase diagrams, Lever rule, Type I (Cu-Ni) phase diagram, Type II (explanation only) phase diagram, Type III (Pb-Sn) phase diagram, Maxima and minima in two-phase regions,	2	Thermodynamic origin of phase diagrams, Lever rule, Type I (Cu-Ni) phase diagram, Type II (explanation only) phase diagram, Type III (Pb-Sn) phase diagram, Maxima and minima in two-phase regions,	Nil	
		3&4	10	8	Miscibility gaps, Limited mutual solid solubility, Topology of binary phase diagrams (Explanation in short of eutectic, peritectic, Monotectic, eutectoid, peritectoid, syntactic reaction, extension rule), Experimental determination of phase diagrams	8	Miscibility gaps, Limited mutual solid solubility, Topology of binary phase diagrams (Explanation in short of eutectic, peritectic, Monotectic, eutectoid, peritectoid, syntactic reaction, extension rule), Experimental determination of phase diagrams	Nil	

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TEACHING AND EVALUATION PLAN

Name of the teacher: Patel Saddamhusen Hamid

Subject: Physics **Year: 2022-23** **Semester: II**

Paper: PHCT-122 Atoms and Molecules **Class: M.Sc.-I**

Part I : Teaching Plan						Part II : Evaluation of Plan			
1	2	3	4	5	6	7	8	9	10
Sr. No.	Month	Week	No. of working days	No. of periods available	Topics to be taught	No. of periods engaged	Topics taught	Deviation in periods	Remarks
1	Jan	1&2	12	8	(a) Revision of Atomic models, Revision of Hydrogen atom, Revision of quantum numbers, exclusion principle, electron configuration, Hund's rule origin of spectral lines, selection rules, One electron spectra, Coupling schemes, two electron spectra, fine structure and hyperfine structure, The Hartree Theory, Results of Hartree theory, X-ray line(c) Atoms in Electromagnetic field: Zeeman effect-Normal and Anomalous, Paschen- Back effect, Stark effect (weak field)	8	(a) Revision of Atomic models, Revision of Hydrogen atom, Revision of quantum numbers, exclusion principle, electron configuration, Hund's rule (b) origin of spectral lines, selection rules, One electron spectra, Coupling schemes, two electron spectra, fine structure and hyperfine structure, The Hartree Theory, Results of Hartree theory, X-ray line(c) Atoms in Electromagnetic field: Zeeman effect-Normal and Anomalous, Paschen- Back effect, Stark effect (weak field)	Nil	
		3	4	4	Bonding mechanism in molecules, Molecular orbital methods, Valence band method, Molecular Spectra – Rotational and vibrational spectra for diatomic molecules, Electronics spectra of diatomic molecules, vibration course structure, vibrational analysis of band system,	4	Bonding mechanism in molecules, Molecular orbital methods, Valence band method, Molecular Spectra – Rotational and vibrational spectra for diatomic molecules, Electronics spectra of diatomic molecules, vibration course structure, vibrational analysis of band system,	Nil	
2	Feb	1&2	10	6	Frank – Condon principle, Dissociation energy and dissociation products, rotational fine structure of electronicvibration transitions, electronic angular momentum in diatomic molecules	6	Frank – Condon principle, Dissociation energy and dissociation products, rotational fine structure of electronicvibration transitions, electronic angular momentum in diatomic molecules	Nil	
		3&4&5	13	10	(a) Microwave Spectroscopy: microwave spectrometer, information derived from rotational spectra and analysis of microwave absorption by H_2O (b) Infrared spectroscopy: IR spectrophotometer and instrumentation, sample handling techniques, FTIR spectroscopy and analysis of HCl spectrum Applications	10	(a) Microwave Spectroscopy: microwave spectrometer, information derived from rotational spectra and analysis of microwave absorption by H_2O (b) Infrared spectroscopy: IR spectrophotometer and instrumentation, sample handling techniques, FTIR spectroscopy and analysis of HCl spectrum, Applications	Nil	

3	**March**	1&2	9	6	c) Raman spectroscopy: Theory of Raman scattering, Rotational Raman spectra, Mutual exclusion, Raman spectrometer, sample handling techniques, Fourier transform Raman spectrometer, Structure determination using IR and Raman spectroscopy (diamond), Applications	6	c) Raman spectroscopy: Theory of Raman scattering, Rotational Raman spectra, Mutual exclusion, Raman spectrometer, sample handling techniques, Fourier transform Raman spectrometer, Structure determination using IR and Raman spectroscopy (diamond), Applications	Nil	
		3&4& 5	15	12	a)ESR- Principles of ESR, ESR spectrometer, total Hamiltonian, hyperfine structure	12	a) ESR- Principles of ESR, ESR spectrometer, total Hamiltonian, hyperfine structure	Nil	
4	**April**	1&2	5	2	(b)NMR-Magnetic properties of nucleus	2	(b)NMR-Magnetic properties of nucleus	Nil	
		3&4	10	8	resonance condition, NMR instrumentation, relaxation process, chemical shift, applications of NMR	8	resonance condition, NMR instrumentation, relaxation process, chemical shift, applications of NMR	Nil	

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TEACHING AND EVALUATION PLAN

Name of the teacher Patel Saddamhusen Hamid **Year:** 2022-23 **Semester:** IV

Subject: Physics **Paper:** PHCT 242 Experimental Techniques in Physics-II **Class** M.Sc.-II

Part I : Teaching Plan						Part II : Evaluation of Plan			
1	2	3	4	5	6	7	8	9	10
Sr. No.	Month	Week	No. of working days	No. of periods available	Topics to be taught	No. of periods engaged	Topics taught	Deviation in periods	Remarks
1	Jan	1&2	12	8	**Radiation Sources and Detectors** Electromagnetic spectrum, Sources of Electromagnetic Radiations:Different types of radiations (γ - rays, X-rays, UV-VIS, IR, microwaves) and their sources,	8	**Radiation Sources and Detectors** Electromagnetic spectrum, Sources of Electromagnetic Radiations:Different types of radiations (γ - rays, X-rays, UV-VIS, IR, microwaves) and their sources,	Nil	
		3	4	4	Detectors: γ-rays, X-rays, UV-VIS, IR, microwaves	4	Detectors: γ-rays, X-rays, UV-VIS, IR, microwaves	Nil	
2	Feb	1&2	10	6	**Structural Characterization and Thermal Analysis** X-ray Diffraction – Production of X-rays, Types (continuous and characteristics), Bragg's diffraction condition,	6	**Structural Characterization and Thermal Analysis** X-ray Diffraction – Production of X-rays, Types (continuous and characteristics), Bragg's diffraction condition,	Nil	
		3&4&5	13	10	principle, instrumentation (with filters) and working, Techniques used for XRD – Powder method, Derivation of Scherrer formula for size determination, Neutron Diffraction: Principle, Instrumentation and Working, Thermal analysis: Principle, Instrumentation and Working: Thermo-gravimetric (TGA), Differential Thermal Analysis (DTA), Numericals	10	principle, instrumentation (with filters) and working, Techniques used for XRD – Powder method, Derivation of Scherrer formula for size determination, Neutron Diffraction: Principle, Instrumentation and Working, Thermal analysis: Principle, Instrumentation and Working: Thermo-gravimetric (TGA), Differential Thermal Analysis (DTA), Numericals	Nil	
3	March	1&2	9	6	**Morphological and Magnetic Characterization** Optical Microscopy: Principle, Instrumentation and Working of optical microscope, Electron	6	**Morphological and Magnetic Characterization** Optical Microscopy: Principle, Instrumentation and Working of optical microscope, Electron Microscopy: Principle, Instrumentation and	Nil	

					Microscopy: Principle, Instrumentation and Working of Scanning Electron Microscope (SEM), Field Emission Scanning Electron Microscope (FESEM) –Advantages over SEM,		Working of Scanning Electron Microscope (SEM), Field Emission Scanning Electron Microscope (FESEM) –Advantages over SEM,		
		3&4 &5	15	12	Transmission Electron Microscope (TEM), Selected Area Electron Diffraction (SAED), Probe Microscopy : Principle, Instrumentation and Working of Scanning Tunnelling Microscope (STM) and Atomic Force Microscope (AFM), Magnetic Characterization: Principle, Instrumentation and Working of Vibrating Sample Magnetometer (VSM), Analysis of Hysteresis loop, SQUID Technique : Principle only, Numericals	12	Transmission Electron Microscope (TEM), Selected Area Electron Diffraction (SAED), Probe Microscopy : Principle, Instrumentation and Working of Scanning Tunnelling Microscope (STM) and Atomic Force Microscope (AFM), Magnetic Characterization: Principle, Instrumentation and Working of Vibrating Sample Magnetometer (VSM), Analysis of Hysteresis loop, SQUID Technique : Principle only, Numericals	Nil	
4	**April**	1&2	5	2	**Spectroscopic Analysis** Spectroscopic characterization (principle, instrumentation and working): Infra-Red (IR),	2	**Spectroscopic Analysis** Spectroscopic characterization (principle, instrumentation and working): Infra-Red (IR),	Nil	
		3&4	10	8	Fourier Transform Infra-Red (FTIR),Ultraviolet-Visible (UV-VIS),Diffused Reflectance Spectroscopy (DRS), X-ray Absorption (XPS), Electron Spin Resonance(ESR),	8	Fourier Transform Infra-Red (FTIR),Ultraviolet-Visible (UV-VIS), Diffused Reflectance Spectroscopy (DRS), X-ray Absorption (XPS), Electron Spin Resonance(ESR),	Nil	
		5	6	4	Nuclear Magnetic Resonance (NMR), Raman Spectroscopy. Numericals	4	Nuclear Magnetic Resonance (NMR). Raman Spectroscopy, Numericals	Nil	

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