RKUNIVERSITY	SYLLABUS
Course Title	**CLASSICAL MECHANICS**
Course Code	MPH101
Course Credit	Lecture : 04
	Tutorial : 00
	Practical : 00
	Total : 04

Detailed Syllabus:

Sr. No	Name of chapter & Details	Session Allotted
	SECTION-I	
1	**Lagrangian Formulation** Mechanics of a system of particles; constraints of motion, generalized coordinates, D'Alembert's Principle and Lagrange's velocity—dependent forces and the dissipation function, Applications of Lagrangian formulation.	**06**
2	**Rigid Body Motion** Coordinate system with relative translational motion, rotating coordinate system, Coriolis force, Eulerian Angles and Euler's theorem, infinitesimal rotation, Rate of change of a vector , angular momentum and kinetic energy of a rigid body, the inertia tensor, principal axis transformation, Euler equations of motion, Torque free motion of rigid body, motion of a symmetrical top	**10**
3	**Langrange's Equation** Calculus of Varation principle, application of variational principle , Hamilton's principle, Equivalence of Lagrange's and Newton's equation, Advantage of Langrangian formulation, Lagrange's equation from Hamilton's principle, extension to non-holonomic systems	**08**
4	**Hamilton's Equation** Hamilton's equation of motion, applications of Hamilton's formulations, phase space, problems	**04**
	SECTION-II	
5	**Canonical Transformation** Gauge transformation, Canonical transformation and its examples, Poisson's brackets, Canonical equation in terms Poisson bracket notation, infinitesimal canonical transformation	**07**
6	**Hamilton-Jacobi Theory** Hamilton-Jacobiequations for principal and characteristic functions Action-angle variables for systems with one degree of freedom, problems	**07**

7	**Small Oscillations** General case of coupled oscillations, Eigenvactors and eigenfrequencies, orthogonality of eigenvector, Normal Coordinates, Small oscillation of particle on string	**07**
8	**Special theory of relativity** Newtonian relativity, Micheksib-Morley experiment, Special theory of relativity, Lorentz transformations, mass-energy relation, problems	**07**

Instructional Method and Pedagogy:

1. Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
2. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
3. Surprise tests/Quizzes/Seminar/Tutorials will be conducted.
4. The course includes a laboratory, where students have an opportunity to buildan appreciation for the concepts being taught in lectures.

Students Learning Outcomes:

After Successful completion of the above course, students will be able to:

Recall the concept of Newtonian Mechanic.

Classify different equation of motion.

Use different equations for vector and functions.

Solve problems of oscillation and transformation.

Examine different theory of classical mechanics.

Text book:

1. Classical Mechanics of Particles and Rigid Bodies: K.C. Gupta (Wiley Eastern, New Delhi).
2. Classical Mechanics: N.C. Rana and P.J. Joag (Tata McGraw Hill, New Delhi)

Reference Books:

1. Classical Mechanics: H. Goldstein (Narosa)
2. Mechanics: L.D. Landau and E.M. Lifshitz (Pergamon, Oxford)

RK UNIVERSITY	**SYLLABUS**
Course Title	**MATHEMATICAL PHYSICS**
Course Code	MPH102
Course Credit	Lecture : 04
	Tutorial : 00
	Practical : 00
	Total : 04

Detailed Syllabus:

Sr. No	Name of chapter & Details	Session Allotted
	SECTION-I	
1	**Curvilinear Coordinates** Orthogonal Curvilinear Coordinates, Gradient, Divergence and Curl, ∇^2inspherical and cylindrical coordinates, Expression for angular momentum L and L^2 in spherical polar coordinates. Dirac delta function, Delta sequences for one dimensional function, properties of delta function, Gamma function, Beta function.	**12**
2	**Complex Variables** Introduction, Cauchy-Riemann conditions, Cauchy's Integral formula, Laurent expansion, singularities, calculus of residues, evaluation of definite integrals, Dispersion relation.	**08**
3	**Differential Equations:** Partial differential equations of theoretical physics, separation of variables, singular points, Second order liner One dimensional equations with variable coefficients, series solutions.	**08**
	SECTION-II	
4	**Bessel Functions:** Bessel functions of first and second kind, Generating function, integral representation and recurrence relations for Bessel's functions of first kind, orthogonality.	**07**
5	**Legendre function** Generating function, recurrence relations and special properties, orthogonality, various definitions of Legendre polynomials. Associated Legendre functions: recurrence relations, parity and orthogonality, Hermite functions, Laguerre functions.	**07**
6	**Fourier Series and Integral Transforms** Fourier series, Dirichlet conditions, General properties, Advantages and applications. Fourier transforms, Development of the Fourier integral, Inversion	**14**

	theorem, Fourier transforms of derivatives; Momentum representation. Laplace transforms, Laplace transforms of derivatives, Properties of Laplace transform, Inverse Laplace transformation.	

Instructional Method and Pedagogy:

1. Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
2. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
3. Surprise tests/Quizzes/Seminar/Tutorials will be conducted.
4. The course includes a laboratory, where students have an opportunity to buildan appreciation for the concepts being taught in lectures.

Students Learning Outcomes:

On the successful completion of the course, students will be able to:

Understand the concepts of curvilinear coordinates, complex variables, special functions for orthogonality.

Calculate different example of mathematical physics.

Compare Fourier series and integral transforms.

Apply mathematical physic concepts on different mechanics derivations.

Text book:

1. Mathematical Methods for Physicists: G. Arfken and H.J. Weber (Academic Press, San Diego).
2. Mathematical Physics by B. S. Rajput (Pragati Prakashan, Merruit)

Reference Books:

1. Special Functions: E.D. Rainville (MacMillan, New York).
2. Advanced Engineering Mathematics, Erwin Kreyszig, (Wiley Eastern Limited)

RK UNIVERSITY

SYLLABUS

Course Title	**QUANTUM MECHANICS**
Course Code	MPH113
Course Credit	Lecture : 04
	Tutorial : 00
	Practical : 00
	Total : 04

Detailed Syllabus:

Sr. No	Name of chapter & Details	Session Allotted
	SECTION-I	
1	**Towards Quantum Mechanics** Mechanics of material system, Electromagnetic fields and light, Photoelectric effect, Compton effect, Black body radiation, Matter Waves: De-Broglie's Hypothesis, motion of free wave packet, discussion Uncertainty principle with thought experiments, different forms of uncertainty principle with proof, problems	**10**
2	**The Schrodinger Equation** A free particle in one-dimension, generalization of three dimensions, the operator correspondence, Physical Interpretation & condition on ψ: Normalization and probability interpretation, non-normalized wave function and Box normalization, conservation of probability, problems	**12**
3	**Stationary states** Time-independent Schrödinger equation, a particle in Square well potential, bound state in square well (E<0), non-localized states (E>0), problems	**06**
	SECTION-II	
4	**General formalism of wave mechanics** Schrödinger equation and probability interpretation for an N- particle system, fundamental postulates of wave mechanics, adjoint of an operator and self-adjointness, Eigenvalue problem; degeneracy, eigenvalue and eigenfunction of self-adjoint operator, the Dirac Delta function, physical interpretation of eigen value, eigen function, momentum eigenfuncion	**10**
5	**Exactly Soluble Eigenvalue problem – I** The simple Harmonic oscillator: Schrödinger equation and energy eigen values, energy eigen function, properties of stationary states Angular momentum and parity: angular momentum operator, the eigenvalue equation for L^2, admissibility condition on solution, physical interpretation, problems	**10**

6	**Exactly Soluble Eigenvalue problem – II** The Hydrogen Atom: solution of the radial equation, stationary state wave function, discussion of bound states Other problems in three dimensions: anisotropic oscillator, isotropic oscillator, normal modes coupled systems of particles	**08**

Instructional Method and Pedagogy:

1. Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
2. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
3. Surprise tests/Quizzes/Seminar/Tutorials will be conducted.
4. The course includes a laboratory, where students have an opportunity to buildan appreciation for the concepts being taught in lectures.

Students Learning Outcomes:

On the successful completion of the course, students will be able to:

Recall the concept of basic optical phenomena.
Relate wave & particle.
Review wave functions.
Solve physical problems using quantum mechanics.

Text book:

1. A text book of Quantum Mechanics by Mathews and Venkatesan
2. Introductory Quantum Mechanics byV.K. Wagh and M.K. Yeole, NiraliPrakashan, Pune
3. Quantum Physics by H C Verma, Surya Publications, Ghaziabad

Reference Books:

1. Quantum Mechanics – Schiff (McGraw Hill)
2. Fundamental of Quantum Mechanics – Vaghmare
3. Modern Quantum Mechanics – J. J. Sakurai
4. Quantum Mechanics – J. P. E. Peebles
5. Quantum Mechanics – K. K. Chopra, G. C. Agarwal

RK UNIVERSITY

SYLLABUS

Course Title	**ELECTRONICS DEVICES & CIRCUIT**
Course Code	MPH104
Course Credit	Lecture : 04
	Tutorial : 00
	Practical : 00
	Total : 04

Detailed Syllabus:

Sr. No	Name of chapter & Details	Session Allotted
	SECTION-I	
1	**Vacuum Tubes** Thermionic Emitter. Gas filled tube. Thyratron. Application of Thyratron, Triode. Vacuum Tube Voltmeter. Cathode Ray Oscilloscope.	**04**
2	**Basics and Circuit** Introduction to electronics (i.e. Rectification, Amplification, Control, Generation only definitions). Voltage Source, Current Source, Maximum Power Transfer theorem. Thevenin's Theorem. Nortan's Theorem.	**06**
3	**Solid State Devices for Special Applications** PN Junction diode, Zener diode, Varactor diode, Schottky diode, Voltage dependent resistors, Silicon controlled rectifier, DIAC, TRIAC, Uni-Junction transistor, UJT-relaxation oscillator, Thermistors, Photo voltaic cells	**08**
4	**Optoelectronic Devices** Classification, Radiative and non-radiative transitions, Light emitting diodes, seven-segment displays, Light dependent resistors, photoconductive cells, Photo-diode, semiconductor Laser, population inversion at junction optical gain and threshold current for lasing, PIN Photodiode, Photo-transistor, Liquid crystal displays, Opto-couplers.	**10**
	SECTION-II	
5	**Field Effect Transistor** Introduction to BJT, Junction Field Effect Transistors, Comparison with BJT, basic Construction, polarity conventions, Characteristics, JFET parameters, JFET-biasing, Common source amplifier, Source-follower.	**08**
6	**MOSFETS** MOSFETS, DE-MOSFETS: Construction and Characteristics, E-MOSFETS: Construction and Characteristics, Complementary MOS (CMOS).	**06**

7	**Combinational logic Circuits Designing Using SSI** Various gates, Review of Boolean algebra, De-Morgan's theorems, Canonical and standard Boolean functions, Designing of combinational logic circuits using gates, Various implementations, Design examples	**08**
8	**Integrated Logic** Characteristics of Digital IC, DTL logic, The RTL logic family, The TTL logic family, Loading and fan-out, MOS digital ICs, CMOS ICs.	**06**

Instructional Method and Pedagogy:

1. Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
2. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
3. Surprise tests/Quizzes/Seminar/Tutorials will be conducted.
4. The course includes a laboratory, where students have an opportunity to buildan appreciation for the concepts being taught in lectures.

Students Learning Outcomes:

On the successful completion of the course, students will be able to:

Recall the concept of basic electronics.
Review electrical and electronic circuit.
Analyze different circuits.
Choose proper component for circuits.
Design electronic circuit using Boolean algebra.

Text book:

1. Principal of Electronics, V.K. Mehta & Rohit Mehta, S. Chand Publication
2. Electronic Principles, Albert Malvino & David Bates, Tata McGraw-Hill Publishing

Reference Books:

1. Electronic Circuits: Discrete and Integrated, Donald Schilling & Charles Belove, MaGraw Hill International
2. Electronic devices and circuit theory, Robert Boylestad & Louis Nahselsky, PHI
3. Solid State Devices and integrated circuits, W.D. Cooper Weisbecker, Reston Pub (USA)
4. Solid state Devices & applications, Frederick Driscoll & Robert Coughlin, Prantice Hall
5. Digital Systems: Principles and Applications, Ronald J. Tocci, PHI
6. Electronics devices and circuits by J.B. Gupta, 3rd Edition, S.K. Kataria & Sons

RK UNIVERSITY

SYLLABUS

Course Title	**PHYSICS EXPERIMENTS – I**
Course Code	MPH105
Course Credit	Lecture : 00
	Tutorial : 00
	Practical : 09
	Total : 09

Detailed Syllabus:

Sr. No	Name of Experiments	Session Allotted
1	To design & study series, parallel & mixed combinations of resistor using PCB	
2	To design & study unregulated DC power supply using bridge rectifier using PCB.	
3	To design &study Thevenin theorem for given network using PCB.	
4	To design & study Norton theorem for given network using PCB.	
5	To design & study RC charge and discharge characteristics using PCB.	
6	To design PN junction diode, Zener diode & LED characteristics using PCB.	
7	To design & study CE characteristic for NPN transistor using PCB.	
8	To design & study diode clipper and clampers.	
9	To design & study NPN transistor as an amplifier.	
10	To design & study UJT characteristics.	
11	To design & study the characteristics of photo transistor.	
12	To design & study AND gate, OR gate using DDL circuit and NOT gate using TTL circuit.	
13	To design & prove NAND gate as a Universal gate using DDL & TTL circuit.	
14	To design & prove NOR gate as a Universal gate using DDL & TTL circuit.	
15	To solve five problems related to Fourier series.	
16	To solve five problems related to Laplace transform.	
17	To calculate the expectation value of observables for the given wave function.	
18	To solve the Schrodinger equation for a given potential.	
19	To find the generating function using canonical transformation.	
20	To find the Langrangian and solve the equation of motion of a given physical system	

Students Learning Outcomes:

On the successful completion of the course, students will be able to:

- **Identify** active and passive components.
- **Apply** experimental skill during practical session
- **Calculate** the unknown physical quantity using obtained data.
- **Explain** the obtained result using scientific background.

RKUNIVERSITY

SYLLABUS

Course Title	**STATISTICAL MECHANICS**
Course Code	MPH201
Course Credit	Lecture : 04
	Tutorial : 00
	Practical : 00
	Total : 04

Detailed Syllabus:

Sr. No	Name of chapter & Details	Session Allotted
	SECTION-I	
1	**Basic concept of Probability** Introduction to statistical mechanics, Probability & its rules, continuous random variable, Binomial distribution, random walk problem.	**09**
2	**Macroscopic state & microscopic state** Macroscopic state, microscopic state, phase space, μ-space, G-space, Postulate of equal a priori probabilities, Liouville's theorem.	**10**
3	**Ensemble** Microcanonical ensemble, canonical ensemble, Alternative method for the derivation of canonical distribution, Grand canonical ensemble, alternative derivation of grand canonical ensemble, problems.	**09**
	SECTION-II	
4	**Some applications of statistical mechanics related to classical mechanics** Rotating bodies, the probability distribution for angular momenta and angular velocities of rotation of molecules, problems.	**06**
5	**Some applications of statistical mechanics related tothermodynamics** Energy and work, pressure, entropy, Halmholtz free energy, Physical interpretation of α, chemical potential, ideal gas, Gibbs paradox, Equipartition theorem, the statistic of paramagnetism, problems.	**12**
6	**Quantum Statistical Mechanics** Postulate of Quantum Statistical mechanics, Density matrix, Ideal Bose systems: Basic concepts and thermodynamic behavior of an ideal Bose gas, Bose- Einstein condensation, discussion of gas of photons (the radiation fields) and phonons (the Debyefield), problems	**10**

Instructional Method and Pedagogy:

1. Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
2. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.

3. Surprise tests/Quizzes/Seminar/Tutorials will be conducted.
4. The course includes a laboratory, where students have an opportunity to buildan appreciation for the concepts being taught in lectures.

Students Learning Outcomes:

After Successful completion of the above course, students will be able to:

Recall concepts of probability.

Identify micro entities of the Nature.

Solve problem related to classical mechanics & thermodynamics using statistical mechanics.

Text book:

1. Fundamental of Statistical Mechanics by B. B. Laud, New Edge International
2. Statistical Mechanics by Gupta Kumar, Pragati Prakashan

Reference Books:

1. Statistical Mechanics by R.K. Pathria (Butterworth-Heinemann, Oxford).
2. Statistical Mechanics by K. Huang (Wiley Eastern, New Delhi).
3. Statistical Mechanics by B.K. Agarwal and M. Eisner (Wiley Eastern, New Delhi).
4. Elementary Statistical Physics by C. Kittel (Wiley, New York).
5. Statistical Mechanics by S.K. Sinha (Tata McGraw Hill, New Delhi).
6. Statistical Mechanics by ESR Gopal

RKUNIVERSITY	SYLLABUS

Course Title	**ATOMIC & MOLECULAR PHYSICS**	
Course Code	MPH202	
Course Credit	Lecture	: 04
	Tutorial	: 00
	Practical	: 00
	Total	: 04

Detailed Syllabus:

Sr. No	Name of chapter & Details	Session Allotted
	SECTION-I	
1	**Bohr's theory and spectrum of Hydrogen atom** Investigation of spectra, Production of spectra, types of spectra, absorption spectra in aeveryday life, wave number, spectrum of hydrogen atom, Failure of electromagnetic theory of radiation, Bohr's theory and spectrum of hydrogen atom, Explanation of spectral series in hydrogen atom, energy level diagram, evidence in favour of Bohr's theory, problems.	**12**
2	**Atomic Physics** Pauli's exclusion principle, maximum number of electrons in a given group or subgroup, different series in alkali spectra, term values in alkali spectra and quantum defect, silent futures in alkali spectra, transition rules, intensity rules, L-S coupling, JJ coupling, fine structure and hyperfine structure (general idea).	**10**
3	**Zeeman Effect** normal and anomalous Zeeman effect, Paschen-back effect and Stark effect, Problems.	**6**
	SECTION-II	
4	**Rotational Motion of Molecules - I** Rotation of molecules, classification of molecules, interaction of radiation with rotating molecule, rotational spectra of rigid diatomic molecules, isotope effect in rotational spectra, intensity of rotation lines, non-rigid rotator, linear polyatomic molecules.	**10**
5	**Rotational Motion of Molecules - II** Symmetric top molecules, asymmetric top molecules, Stark effect, microwave spectrometer, information derived from rotational spectra, vibrational energy of a diatomic molecule, infrared spectra (preliminaries), morse curve and the energy levels of a diatomic molecules.	**10**
6	**Vibrational Motion of Molecules** Vibrating diatomic molecule, diatomic vibrating rotator, vibration of polyatomic molecules, normal modes of vibration in crystal, interpretation of vibrational spectra, I-R spectrophotometer-instrumentation.	**08**

Instructional Method and Pedagogy:

1. Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
2. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
3. Surprise tests/Quizzes/Seminar/Tutorials will be conducted.
4. The course includes a laboratory, where students have an opportunity to buildan appreciation for the concepts being taught in lectures.

Students Learning Outcomes:

On the successful completion of the course, students will be able to:

Recognize types of spectra

Explain types of alkali spectra

Distinguish rotational motion & vibrational motion of molecules.

Text book:

1. Elements of Spectroscopy by Gupta Kumar Sharma
2. Molecular Structure & Spectroscopy by G. Aruldhas

Reference Books:

1. Introduction to Atomic Spectra by H. E. White
2. Introduction to Molecular Spectroscopy by G. M. Barrow

RKUNIVERSITY

SYLLABUS

Course Title	**ELECTRODYNAMICS AND PLASMA PHYSICS**
Course Code	MPH203
Course Credit	Lecture : 04
	Tutorial : 00
	Practical : 00
	Total : 04

Detailed Syllabus:

Sr. No	Name of chapter & Details	Session Allotted
	SECTION-I	
1	**Vector analysis** Introduction, Representation of vectors, Addition of vectors, Subtraction of vectors, Scalar multiple of a vector, Unite vectors, Product of vectors, Scaler product, Vector product.	**06**
2	**Maxwell's Equations** Introduction to electrodynamics, Electrodynamics before Maxwell, Ampere's law, Maxwell equations in matter and boundary conditions.	**11**
3	**Electromagnetic Waves, Potentials and Fields** The wave equation for E and B, propagation in linear media, reflection and transmission at normal and oblique incidence, electromagnetic waves in conductors, scalar and vector potentials, Gauge transformations, Retarded potentials, Lienard - Wiechert potentials, the field of a moving point charge.	**11**
	SECTION-II	
4	**Fundamental of Plasma:** Occurrence of Plasma, Plasma as a state of matter, Definition of Plasma, Shaha Equation of Plasma, Debye shielding, Debye length, plasma frequency, Criteria of plasma, collisions, dc conductivity.	**10**
5	**Plasma Production and measurements:** Dc discharge, rf discharge, photo – ionization. Tunnel ionization, avalanche breakdown, laser produced plasmas, Langmuir probe.	**09**
6	**Behaviors of plasm** Plasma behavior in Uniform E and B field, effect of gravitational field, Dielectric constant of Plasma, Fluid equation of Plasma, convective derivative, fluid drifts perpendicular to B, plasma instabilities **Applications of Plasma** Gas discharge, controlled Thermonuclear fusion, Space Physics, Modern Astrophysics, Solid State Plasma, and Gas Laser.	**09**

Instructional Method and Pedagogy:

1. Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
2. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
3. Surprise tests/Quizzes/Seminar/Tutorials will be conducted.
4. The course includes a laboratory, where students have an opportunity to buildan appreciation for the concepts being taught in lectures.

Students Learning Outcomes:

On the successful completion of the course, students will be able to:

Understand the concepts of Maxwell's equations, electromagnetic waves, fundamental of plasma.

Calculate different example for plasma application and use of Maxwell's equation for electrodynamic problems.

Apply plasma parameters in different experiment

Text book:

1. MIntroduction to Plasma Physics & controlled fusion (IInd edition): Vol. 1: Plasma Physics By F.F. Chen.
2. Introduction to electrodynamics, D.J. Griffith (PHI, New Delhi)

Reference Books:

1. Plasma Physics by Bittencourt
2. Plasma Physics by Chakraborty

RK UNIVERSITY	**SYLLABUS**
Course Title	**SOLID STATE PHYSICS**
Course Code	MPH204
Course Credit	Lecture : 04
	Tutorial : 00
	Practical : 00
	Total : 04

Detailed Syllabus:

Sr. No	Name of chapter & Details	Session Allotted
	SECTION-I	
1	**Crystalline Solids and Crystal Imperfections** Crystalline state, Basic definitions, Bravais and non Bravais lattices, Elements of symmetry, Crystal planes and Miller indices, Examples of Simple Crystal structures, Principals of X-Ray, Neutron and Electron Diffraction in Crystalline solids, Bragg's Law, Concept of Reciprocal lattice, Experimental techniques of X-Ray Diffraction. Types of defects; point defects, line defects, surface defects; Grain boundaries, tilt boundary, twist boundary, twin boundary, stacking faults, Frank-Read Source, dislocations, Diffusion in solids.	**13**
2	**Free Electron theory of metals** Conduction in Metals, Electrical conductivity and Thermal conductivity, Wiedemann-Franz law and its application, free electron theory and drawbacks of classical free electron theory, Thermoelectricity: Seebeck Effect, Thermoelectric power and Thermocouple.	**07**
3	**Band Theory of Solids** Band Model, classification of solids; Semiconductors, Insulators and Metals, Effect of Thermal energy, Electrical field and Electromagnetic radiation one excitation mechanism, Concept of Effective mass, Direct & Indirect band gap, concept of photon and phonon, Electron in periodic potential, Bloch Theorem, Kronig-Penney model, Fermi surfaces.	**08**
	SECTION-II	
4	**Superconductivity** Definition, Types of superconductors, Properties, Meissner effect, Isotope effect, BCS theory – Qualitative approach, outcomes of BCS theory, Josephson effects, SQUID, Applications of superconductivity.	**08**
5	**Diamagnetism and Paramagnetism** Classical theory, Paramagnetism-origin of paramagnetic moment, Langevin's theory, Quantum theory, Paramagnetism in rare earth and iron group ions, paramagnetism of conduction electrons.	**10**

6	**Ferromagnetism, Antiferromagnetism and Ferrimagnetism** Weiss theory, Temperature dependence of Saturation magnetization (MS), Heisenberg's exchange model, Slater's criterion, concept of magnons, Ferromagnetic domains, origin of domains, Antiferromagnetism and ferrimagnetism, ferrites.	**10**

Instructional Method and Pedagogy:

1. Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
2. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
3. Surprise tests/Quizzes/Seminar/Tutorials will be conducted.
4. The course includes a laboratory, where students have an opportunity to buildan appreciation for the concepts being taught in lectures.

Students Learning Outcomes:

On the successful completion of the course, students will be able to:

- **Identify** the phase of materials**.**
- **Classify** the solid materials.
- **Apply** the concept of X-ray diffraction to interpret crystalline structure.
- **Compare** different solids using band theory.
- **Distinguish** magnetic materials.

Text book:

1. A Text Book of Solid State Physics by S.L. Kanani & C. Hemrajani, S. Chand & Sons Publication
2. Elementary Solid State Physics by M. Ali Omar, Addison Wesley Publication

Reference Books:

1. Introduction to Solid State Physics by C. Kittel, Wiley Eastern Publication
2. Elements of solid state physics by J. P. Srivastava (Prentice Hall India)
3. Solid State Physics by M.A. Wahab (Nerosa Publishers) Solid State Physics - Dan Wei (Cengage Learning)
4. Material Science and Engineering an Introduction 6^{th} Edition, by William D. Callister, Jr., John Wiley & Sons, Inc.

RK UNIVERSITY	**SYLLABUS**
Course Title	**PHYSICS EXPERIMENTS – II**
Course Code	MPH205
Course Credit	Lecture : 00
	Tutorial : 00
	Practical : 09
	Total : 09

Detailed Syllabus:

Sr. No	Name of Experiments	Session Allotted
1	Prove that NAND gate as a Universal gate using IC 7400.	
2	Prove that NOR gate as a Universal gate using IC 7402.	
3	Verify Demorgan's theorems using IC 7400, 7402 and 7408.	
4	Simplify the given five logical expressions and construct a logic circuit for same & verity their truth tables.	
5	To design & study I-V characteristics of FET and use FET as voltmeter.	
6	To study DIAC characteristics.	
7	To study TRIAC characteristics.	
8	To study thermistor characteristics.	
9	To design and construct +5 V D.C. power supply using IC 7805.	
10	To design & study astable multivibrator using IC 555 timer.	
11	To design & study monostable multivibrator using IC 555 timer.	
12	To find out Hall coefficient of a semiconductor material using Hall effect apparatus.	
13	To find out charge carrier density of a semiconductor material using Hall effect apparatus.	
14	To find Seeback coefficient of Cu-Fe thermocouple.	
15	To find out semiconductor band gap of a semiconductor using four probe method.	
16	To calculate interplanner spacing using X-ray image.	
17	To study magnetic hysteresis loop & magnetization curve of a magnetic materials using ready-made kit.	
18	To solve five problems related to probability.	
19	To calculate work, pressure, entropy, Helmholtz free energy and specific heat in terms of partition function for a given statistical system.	
20	To estimate the position of the band centre and B value of the two different molecules from their given spectra.	

Students Learning Outcomes:

On the successful completion of the course, students will be able to:

- **Identify** active and passive components.

- **Apply** experimental skill during practical session
- **Calculate** the unknown physical quantity using obtained data.
- **Explain** the obtained result using scientific background.

RKUNIVERSITY

DETAILED TEACHING SCHEM

SCHOOL OF SCIENCE

PROGRAM: M.Sc. - MICROBIOLOGY

ACADEMIC YEAR – 2023-24

SEMESTER – III (Batch - 2022-24)

DEFINATION OF CREDIT: **1. Lecture (L):** 1 hour/week/semester, **2. Practical (P)**: 2 hours/week/semester **3. Tutorial(T):** 2 hours/week/semester

TEACHING SCHEME											
Course Code	**Course Name**	**Teaching Hours per week**			**SSH**	**Credits**	**Max. Marks of TSEE**	**CIE**	**PSEE**	**TCIE - I Assessment Method**	**Remarks any**
		TH	**TU**	**PR**							
MB315	Medical Microbiology	4	0	3	4	7	100	Y	Y	Assignment	
MB306	Food, Agriculture and Environmental Microbiology	4	0	0	4	4	100	Y	N	Assignment	
MB307	Fermentation and Microbial Technology	4	0	3	4	7	100	Y	Y	Assignment	
MB328	Bioinformatics and Biostatics	4	0	3	5	7	100	Y	Y	Assignment	
	TOTAL	**16**	**0**	**9**	**17**	**25**					
		Total Teaching Hours 25									

Signature of HOD

Signature of Director

RK UNIVERSITY

DETAILED TEACHING SCHEM

SCHOOL OF SCIENCE

PROGRAM: M.Sc. - MICROBIOLOGY

ACADEMIC YEAR – 2023-24

SEMESTER – Iv (Batch - 2022-24)

DEFINATION OF CREDIT: **1. Lecture (L):** 1 hour/week/semester, **2. Practical (P)**: 2 hours/week/semester **3. Tutorial(T):** 2 hours/week/semester

TEACHING SCHEME											
Course Code	Course Name	Teaching Hours per week			SSH	Credits	Max. Marks of TSEE	CIE	PSEE	TCIE - I Assessment Method	Remarks any
		TH	TU	PR							
	Elective	-	-	-	10	25	100	Y	Y		
	TOTAL	**-**	**-**	**-**	**10**	**25**					**-**

Departmental Elective – I (Anyone Offered)											
Course Code	Course Name	Teaching Hours per week			SSH	Credits	Max. Marks of TSEE	CIE	PSEE	TCIE - I Assessment Method	Remarks any
		TH	TU	PR							
MB413	Project (Dissertation)	-	-	-	10	25	-	Y	Y		
MB404	Internship	-	-	-	10	25	-	Y	Y		

Signature of HOD

Signature of Director