Rayat Shikshan Sanstha's

Sadguru Gadge Maharaj College, Karad

(Autonomous College)

Revised Syllabus As per Maharashtra Gov. GR. dated-20 April, 2023 for Implementing NEP-2020

B.Sc. II (MN) w.e.f. June 2024 (A.Y: 2024-2025)

Structure of Course:

1. **Name of Course:** B.Sc.
2. **Title:** Physics
3. **Year of Implementation:** The syllabus will be implemented from June, 2024.
4. **Duration:** The course shall be a full time.
5. **Pattern:** Semester examination.
6. **Medium of Instruction:** English

B. Sc.-II Semester-III

Sr. No.	Course Title	Theory			Practical		
		Course Code	Lectures per week	Credit	Course Code	Lectures per week	Credit
1.	Mathematical and Thermal Physics	MN-BPT23-301	04	02	MN Practical (MN-BPP23-302)	04	02

B: B.Sc. P: Physics T: Theory, P: Practical

B. Sc. -II Semester-IV

Sr. No.	Course Title	Theory			Practical		
		Course Code	Lectures per week	Credit	Course Code	Lectures per week	Credit
1.	Introduction of Basic Electronics	MN-BPT23-401	04	02	MN Practical (MN-BPP23-402)	04	02

B: B.Sc. P: Physics T: Theory, P: Practical

Evaluation Structure: B. Sc. II (MN) Semester-III & IV (Physics)

SEM	Theory			Practical				Total
	Paper No. &Code	SEE	CCE	Paper Code	Exam	Journal	Day to Day Performance	
III	MN Paper-V MN-BPT23-301	40	10	MN Paper-V Practical (MN-BPP23-302)	40	05	05	**50**
	Total	**40**	**10**		**40**	**05**	**05**	**100**
IV	MN Paper-VI MN-BPT23-401	40	10	MN Paper-VI Practical (MN-BPP23-402)	40	05	05	**50**
	Total	**40**	**10**		**40**	**05**	**05**	**100**
Total (Sem. III + IV)		**80**	**20**		**80**	**10**	**10**	**200**

Titles of Courses for B.Sc. II

B. Sc. II (MN) (Semester-III)

Theory Course: 30 lectures, 30 hours

MN Paper-V-MN-BPT23-301- Mathematical and Thermal Physics

Physics Practical –III Practical:
60 lectures: 60 hours (Total)

B. Sc. II (MN) (Semester-IV)

Theory Course: 30 lectures, 30 hours

MN Paper-VI-MN-BPT23-401- Introduction of Basic Electronics

Question Paper Pattern

Rayat Shikshan Sanstha's

Sadguru Gadge Maharaj College, Karad

(An Autonomous College, Affiliated to Shivaji University, Kolhapur)

SEE Examination, March/April-2024-25

Course Name - B.Sc.- II Semester – III
Subject - Physics,(MN)
Subject Code No. - MN-BPT23-301 (Mathematical and Thermal Physics)

Day: **Total Marks: 40**

Date: **Time: 02 Hours**

Q.1) Choose correct alternative from the following. **08 marks**

Q.2) Attempt any two of the following. (Given Three) **16 marks**

Q.3) Attempt any four of the following. (Given Six) **16 marks**

Syllabus for B.Sc.-II,

SEM-III: Minor-V (Theory Paper)

MN-BPT23-301- Mathematical & Thermal Physics (Credit-02)

w. e. f. from June 2024 onwards

Learning Objectives: Students can able to learn-

1. To develop required mathematical skills to solve problems in quantum mechanics, electrodynamics and other fields of theoretical physics.
2. To develop abilities and skills to solve problems.
3. To explain the differences between work, heat and energy stored in a system.
4. To apply the first law of thermodynamics to closed system.

Unit-I

1: Complex Numbers: (08)

Introduction, complex numbers geometrical representation of imaginary number, Argand diagram, Addition of complex numbers, Addition of complex numbers by geometry, Subtraction, Types of complex numbers, power of 'i', De-Moivre's theorem(statement only),problems.

2: Matrix (06)

Introduction, definition, types of matrix, addition of matrix, Subtraction of matrix, scalar multiple of matrix, multiplication, properties of multiplication, inverse of matrix, rank of matrix, problems.

Unit II:

3: Basic Concepts of Thermodynamics: **(08)**

Thermodynamic state of a system, Thermal Equilibrium, Zeroth law of Thermodynamics, Internal Energy of System-Concept of heat, Equation of State for a perfect Gas, First law of Thermodynamics, Thermodynamic Processess-Isothermal, Adiabatic, Isobaric, Isochoric, Adiabatic relations of system for perfect gas. Work done during Isothermal and Adiabatic changes. Reversible and Irreversible changes. Problems.

4: Laws of Thermodynamics: (08)

Conversion of Heat into Work , Reversible and Irreversible Processes. Carnot's Cycle and Carnot's Heat Engine and its efficiency, Second law of Thermodynamics-(Statements only),Carnot Theorem, Entropy, Principle of Increase in Entropy Generalized form of the First and Second laws:1) Entropy changes for an Ideal Gas.2) Entropy of van der Waals' gas, Problems.

Learning Outcomes:

1.Describe basic concepts of Thermodynamics..
2.Calculate absolute and gage pressure, and absolute temperature.
3.Calculate changes in kinetic, potential, enthalpy and internal energy.
4.Student should able to understand Theorem and applications of matrices.
5.Student should able to define Eigenvalues and Eigenvectors.

References:

1. An introduction to Thermodynamics – Y.V.C.RAO

2. An introduction to Thermodynamics – Sanjeev Chandra

3. Engineering thermodynamics – R.K.Rajput.

4. Mathematical Physics – Sadri Hassani

5. Introduction and basic concept of Physics – M.B ahrami

6. Mathematical Physics – H.K.DASS and Dr.RAMA VERMA

MN Paper-V SEM-3 (MN-BPP23-302) (Practical Paper) (Credit-02)

Practical No.	Practical Name
1.	To determine Coefficient of Thermal Conductivity of a bad conductor by Lees method.
2.	To determine temperature coefficient of resistance by platinum resistance thermometer.
3.	To calibrate Resistance Temperature Device (RTD) using null method / off-balance bridge.
4.	To determine the Young's modulus of a material by bending a bar.
5.	Determination of R.I. of given liquid by Liquid Lens.
6.	Determination of Wavelength of He-Ne Laser using grating.
7.	Surface Tension of liquid by Capillary method.
8.	Determination of Cauchy's Constants.
9.	Measurement of Velocity of Sound by Resonating Bottle.
10.	Measurement of log decrement by Exponential Decay.

Learning Outcomes:

1. Students will be able to learn measuring skills in practical.
2. Students will be able to measure period of oscillations, frequency of a wave and acceleration due to gravity.
3. Students will be able to measure the length of vibrating air columns and velocity of sound.
4. Students will be able to determine thermal conductivity, temperature coefficient of resistance, thermo-emf and specific heat.

REFERENCE BOOKS:

1. Advanced Practical Physics for Students: B. L. Worsnop and H. T. Flint, 1971 Asia Publ. House.

2. **Practical Physics:** S. L. Gupta and V. Kumar, Pragati Prakashan, 27th Edition, 2010.

3. **An Advanced course in Practical Physics**: D. Chattopadhyay and P. C. Rakshit, 7th edition, 2005 New Central Book Agency Pvt. Ltd.

4. Experimental College Physics: White and manning, McGRAW-HILL Book Company. 3rd edition.

5. B.Sc. Practical Physics - H. Singh and P.S. Hemne, S. Chand Publication

6. Practical Physics – Arora, S. Chand Publication

Learning Objectives:

1. To understand the basics of Digital Electronics, Logic gates, different electronic circuits and to designed different electronic circuits.
2. To understand design and construction of the basic electronic devices like Resistor, Capacitor, Inductor, Transformer, Relays, and Switches etc.
3. Understanding and comparing difference between AC, DC circuits and their circuit configurations.
4. To understand, analyze and design various combinational circuits.
5. To understand and analyze Amplifier, power supply and oscillator.
6. To understand the basic theory and applications of Cathode Ray Oscilloscope

Unit-I :

1.Basic Circuit Elements: (08)

Study of basic circuit elements and passive components: Resistor, Capacitor, Inductor, Transformer, Relays, Switches (working principle, circuit symbols, types, specifications and applications).

2.Circuit Analysis: (06)

Concept of Voltage and Current Sources, Internal resistance, Kirchhoff's Current Law, Kirchhoff's Voltage Law, Mesh Analysis, Node Analysis, Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Millman's Theorem. (Numericals expected)

Unit –II:

3. Diodes: (08)

Introduction of P-type and N-type semiconductor, Formation of semiconductor PN junction, Barrier potential, Diode Equation and I-V characteristics, Zener diode, Zener and Avalanche breakdown, Zener diode specifications. Photo diode, Light Emitting Diode (LED): Introduction, construction and working.

4. DC Power Supply: (08)

Need of Power Supply, Block diagram of DC regulated power supply, Rectifiers: Bridge rectifier:- Circuit diagrams, working and waveforms, ripple factor, π - filter. Regulation: Concept of Line and load regulation, Zener diode as voltage regulator, Three pin IC regulators: Block diagram, Specifications and applications. Fixed and Variable voltage IC regulator (IC 78xx,79xx and LM317). Concept of SMPS

References:

1. R. S. Sedha, Textbook of Applied Electronics, S. Chand Publication
2. Soni and Gupta, Network Analysis
3. S. A. Nasar, Electric Circuits, Schaum's outline series, Tata McGraw Hill (2004)
4. Electrical Circuits, M. Nahvi and J. Edminister, Schaum's Outline Series, Tata McGraw-Hill.(2005)
5. Robert L. Boylestad, Essentials of Circuit Analysis, Pearson Education (2004)
6. W. H. Hayt, J. E. Kemmerly, S. M. Durbin, Engineering Circuit Analysis, Tata McGraw Hill(2005)
7. Alexander and M. Sadiku, Fundamentals of Electric Circuits, McGraw Hill (2008)
8. S. M. Sze, Semiconductor Devices: Physics and Technology, 2nd Edn, Wiley India edition (2002).
9. Ben G Streetman and S. Banerjee, Solid State Electronic Devices, Pearson Education (2006

Learning Outcomes:

After the completion of the course the student will be able to:

1: Identify and explain electrical components and determine the value of resistor, inductor and capacitor using color code method.

2: Understand the basic properties of electrical elements, and solve DC circuit analysis problems, DC network theorems.

3: Acquire the knowledge about the characteristics and working principles of PN junction diode, Zener diode, photo diode, LED and different diode applications.

MN-VI SEM-4 (MN-BPP23-402) (Practical Paper) (Credit-02)

Learning Objectives:

1. To understand Building and testing of various electronic component.
2. To understand Use of C.R.O. to determine A.C. and D. C. voltages.
3. To understand theory behind the different electrical circuits or their laws.
4. To understand the construction and working of BJT, rectifiers and logic gates.

Sr.No.	List of Practical's
1.	To determine A.C. and D.C. sensitivity of the C.R.O. and to measure unknown frequency.
2.	Measurement of phase shift of RC network using CRO.
3.	Band gap energy of semiconductor using p-n junction diode.
4.	Verification of D'Morgans Theorems.
5.	To verify Kirchhoff's laws.
6.	Measurement of Amplitude, Frequency & Phase difference using Oscilloscope.
7.	Verification of Thevenin`s Theorem.
8.	Study of the I-V Characteristics of P-N junction Diodes.
9.	Zener Diode as voltage regulator.
10.	Study of Half wave and Full wave rectifier
11.	Study of Logic Gates.

Learning Outcomes:

1. Students will able to explain Single phase and 3-phase supply electrical supply system.
2. Students will able to explain different Logic Gates.
3. Students will able to explain working principle of CRO
4. Students will able to explain working of P-N junction Diodes.

References:

1. Advanced Practical Physics for Students: B. L. Worsnop and H. T. Flint, 1971 Asia Publ. House.
2. Practical Physics: S. L. Gupta and V. Kumar, Pragati Prakashan, 27th Edition, 2010.
3. An Advanced course in Practical Physics: D. Chattopadhyay and P. C. Rakshit, 7th edition, 2005.
4. New Central Book Agency Pvt. Ltd.