

# University of Mumbai



No. AAMS\_UGS/ICC/2022-23/ 163

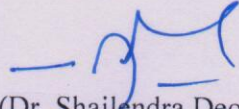
CIRCULAR:-

Attention of the Principals of the Affiliated Colleges and Directors of the Recognized Institutions in Faculty of Science & Technology is invited to this office circular No.UG/69 of 2016-17 dated 21<sup>st</sup> September, 2016 relating to the revised syllabus F.Y.B.Sc.(Physics) (Sem I & II) (CBCS).

They are hereby informed that the recommendations made by the Board of Studies in **Physics** at its meeting held on 10<sup>th</sup> May, 2022 and subsequently passed in the Faculty and then by the Board of Deans at its meeting held on 5<sup>th</sup> July, 2022 vide item No. 6.15(R) have been accepted by the Academic Council at its meeting held on 11<sup>th</sup> July, 2022 vide item No. 6.15 (R) and that in accordance therewith, the revised syllabus of F.Y.B.Sc.(Physics) (Sem.- I & II) (CBCS), has been brought into force with effect from the academic year 2022-23. (The circular is available on the University's website [www.mu.ac.in](http://www.mu.ac.in)).

MUMBAI – 400 032

14<sup>th</sup> November, 2022

  
(Dr. Shailendra Deolankar)  
I/c Registrar

To

The Principals of the Affiliated Colleges and Directors of the Recognized Institutions in Faculty of Science & Technology.

A.C/6.15(R)/11/07/2022

Copy forwarded with Compliments for information to:-

- 1) The Dean, Faculty of Science & Technology,
- 2) The Chairman, Board of Studies Physics,
- 3) The Director, Board of Examinations and Evaluation,
- 4) The Director, Board of Students Development,
- 5) The Director, Department of Information & Communication Technology,
- 6) The Co-ordinator, MKCL.

**Copy to :-**

- 1. The Deputy Registrar, Academic Authorities Meetings and Services (AAMS),**
- 2. The Deputy Registrar, College Affiliations & Development Department (CAD),**
- 3. The Deputy Registrar, (Admissions, Enrolment, Eligibility and Migration Department (AEM),**
- 4. The Deputy Registrar, Research Administration & Promotion Cell (RAPC),**
- 5. The Deputy Registrar, Executive Authorities Section (EA),**
- 6. The Deputy Registrar, PRO, Fort, (Publication Section),**
- 7. The Deputy Registrar, (Special Cell),**
- 8. The Deputy Registrar, Fort/ Vidyanagari Administration Department (FAD) (VAD), Record Section,**
- 9. The Director, Institute of Distance and Open Learning (IDOL Admin), Vidyanagari,**

**They are requested to treat this as action taken report on the concerned resolution adopted by the Academic Council referred to in the above circular and that on separate Action Taken Report will be sent in this connection.**

- 1. P.A to Hon'ble Vice-Chancellor,**
- 2. P.A Pro-Vice-Chancellor,**
- 3. P.A to Registrar,**
- 4. All Deans of all Faculties,**
- 5. P.A to Finance & Account Officers, (F.& A.O),**
- 6. P.A to Director, Board of Examinations and Evaluation,**
- 7. P.A to Director, Innovation, Incubation and Linkages,**
- 8. P.A to Director, Board of Lifelong Learning and Extension (BLLE),**
- 9. The Director, Dept. of Information and Communication Technology (DICT) (CCF & UCC), Vidyanagari,**
- 10. The Director of Board of Student Development,**
- 11. The Director, Department of Students Welfare (DSD),**
- 12. All Deputy Registrar, Examination House,**
- 13. The Deputy Registrars, Finance & Accounts Section,**
- 14. The Assistant Registrar, Administrative sub-Campus Thane,**
- 15. The Assistant Registrar, School of Engg. & Applied Sciences, Kalyan,**
- 16. The Assistant Registrar, Ratnagiri sub-centre, Ratnagiri,**
- 17. The Assistant Registrar, Constituent Colleges Unit,**
- 18. BUCTU,**
- 19. The Receptionist,**
- 20. The Telephone Operator,**
- 21. The Secretary MUASA**

**for information.**

# **UNIVERSITY OF MUMBAI**



**Revised Syllabus for**

**F.Y.B.Sc.  
(Physics)**

**Semester: I&II (CBCS)**

(With effect from the academic year 2022-23)

**UNIVERSITY OF MUMBAI**



**Syllabus for Approval**

Sr. No.	Heading	Particulars
1	Title of the Course	F.Y.B.Sc. (Physics)
2	Eligibility for Admission	—
3	Passing Marks	—
4	Ordinances / Regulations (if any)	
5	No. of Years / Semesters	06 Semesters
6	Level	UG
7	Pattern	Semester
8	Status	Revised
9	To be implemented from Academic Year	From Academic Year: 2022-2023

Date:

Signature:

*AtB ambale*  
Name  
Chairman of BOS of Physics  
**Professor & Head**  
**Department of Physics**  
**University of Mumbai**

*AtMajumdar*  
Dr. Anuradha Majumdar  
Dean, Science and Technology

## Syllabus for B.Sc.Physics (Theory & Practical)

As per Choice Based and Credit System

First Year B.Sc2022-2023

The revised syllabus in Physics as per Choice Based and Credit System for the First Year B.Sc Course will be implemented from the academic year 2022-2023.

### Preamble:

The systematic and planned curricula from these courses shall motivate and encourage learners to understand basic concepts of Physics.

### Objectives:

- To develop analytical abilities towards real world problems
- To familiarize with current and recent scientific and technological developments
- To enrich knowledge through problem-solving, hands-on activities, study visits, projects etc

Course Code	Title	Credits
	Semester I	
USPH101	Classical Physics	02
USPH102	Modern Physics	02
USPHPI	Practical I	02
		Total=06
	Semester II	
USPH201	Optics I	02
USPH202	Electricity and Electronics	02
USPHPII	Practical II	02
		Total=06

### Scheme of Examination:

- Each theory paper of each semester will have 25% Internal Assessment (IA) and 75% External Assessment (EA). All external examinations will be held at the end of each semester and will be conducted by the University as per existing norms
- There will be no internal assessment for practical. A candidate will be allowed to appear for the semester end practical examination only if the candidate submits a certified journal at the time of practical examination of the semester or a certificate from the Head of the Department/Institute to the effect that the candidate has completed the practical course of that

semester of F.Y.B.Sc Physics as per the minimum requirement. The duration of the practical examination will be two hours per experiment. There will be two experiments (one from each group) through which the candidate will be examined in practical. The questions on slips for the same should be framed in such a way that candidate will be able to complete the task and should be evaluated for its skill and understanding of physics.

## SEMESTER-I

Name of the Programme	Duration	Semester	Subject
B.Sc.in Physics	Sixsemesters	I	Physics
CourseCode	Title	Credits	
<b>USPH101</b>	<b>ClassicalPhysics</b>	2	

### Learning Objectives:

1. Understand Newton's laws and applications in daily life.
2. Understand the concepts of friction
3. Understand Work and Energy Equivalence
4. Understand the concepts of Elasticity, Viscosity and Fluid dynamics
5. Understand behavior of real gases in relation to their thermodynamical response.

### Learning Outcomes:

On successful completion of this course students will be able to:

1. Apply Newton's laws for the calculation of the motion of simple systems.
2. Use Work and Energy equivalence and its application through suitable numerical.
3. Use Elasticity, Viscosity and Fluid dynamics in daily life.
4. Understand Real gases and validity of the laws of thermodynamics.
5. Demonstrate quantitative problem solving skills in all the topics covered

### Unit I

15 Lectures

**1. Newton's Laws of Motion:** Newton's first, second and third laws of motion, interpretation and applications, pseudo forces, inertial and non-inertial frames of reference

Worked out examples (with friction present) H

CV: 5.1 to 5.5

**2. Friction:** Advantages & disadvantages of friction in daily life, Friction as the component of Contact force, Kinetic Friction, Static friction, laws of friction, Understanding friction at Atomic level.

HCV: 6.1 to 6.5

**3. Work and Energy:** Kinetic Energy, Work and Work-energy theorem, Potential Energy, Conservative

and Non Conservative Forces, Different forms of Energy: Mass Energy Equivalence Worked out Examples

HCV: 8.1, 8.2, 8.5, 8.6, 8.11

## Unit II

15 Lectures

**1. Elasticity:** An introduction to Elasticity, Stress, Strain, Hooke's Law and Modulus of Elasticity and relation between them

HCV: 14.2, 14.3, 14.4, 14.5

**2. Viscosity:** An introduction to Viscosity, Flow through a Narrow Tube: Poiseuille's Equation, Stokes' Law, Terminal velocity, Measuring Coefficient of Viscosity by Stokes' method, Critical velocity and Reynolds number. Worked out Examples

HCV: 14.15, 14.16, 14.17, 14.18, 14.19, 14.20

**3. Fluid Mechanics:** Streamline and Turbulent flow, Equation of Continuity, Bernoulli's equation, Applications of Bernoulli's equation. Worked out Examples

HCV: 13.8, 13.10, 13.11, 13.12

## Unit III

15 Lectures

**1. Behavior of real gases:** An introduction, Vander Waals equation of state BSH: 2.8

**2. Laws of Thermodynamics:** Thermodynamic Systems, Zeroth law of thermodynamics, Concept of heat, Thermodynamic Equilibrium, Work: A Path dependent function, Internal energy, First law of Thermodynamics, Internal Energy as a state function, Specific heat of gases, Applications of First Law of thermodynamics, The indicator diagram, Work done during Isothermal and Adiabatic processes

BSH: 4.1 to 4.13

**3. Heat engine:** [Definition of Efficiency of heat engine, Carnot's Ideal heat engine, and Numerical examples] (Qualitative)

BSH: 4.21, 4.22, 4.23

*Note: A good number of numerical examples are expected to be covered during the prescribed lectures.*



**MainReferences:**

1. HCV:H.C.Verma,ConceptsofPhysics–  
PartI,(SecondReprintof2020)BharatiBhavanPublishersand Distributers
2. BSH:BrijLal,SubrahmanyamandHemne,HeatThermodynamicsandStatisticalPhysics,S.Chand,R  
evised,Multi-coloured, (Reprint2019)

**AdditionalReferences:**

1. Halliday, Resnick and Walker, Fundamental of Physics (extended) – (6th Ed.), John Wiley  
& Sons.
2. D.SMathur, P.SHemne,Mechanics,2012,S.Chand
3. M.WZemanskyandR.HDittman,Heat andThermodynamics,McGrawHill.
4. ThorntonandMarion,ClassicalDynamics (5thEd.)
5. D.SMathur,ElementofPropertiesofMatter,S.Chand&Co.
6. R.MurugeshanandK.S Shivprasath,PropertiesofMatterandAcoustics,S.Chand.
7. D.KChakrabarti,TheoryandExperiments onThermalPhysics,(2006Ed.),Centralbooks.
8. HansandPuri,Mechanics,(2ndEd.)TataMcGrawHill

## SEMESTER-I

Name of the Programme	Duration	Semester	Subject
B.Sc.inPhysics	Sixsemesters	I	Physics
CourseCode	Title	Credits	
<b>USPH102</b>	<b>ModernPhysics</b>	2	

### Learning Objectives:

1. To grasp and understand the basic concepts of Modern Physics

### Learning Outcomes:

On successful completion of this course students will be able to:

1. Understand nuclear properties, nuclear behavior and various types of nuclear reactions
2. Understand the concept of radioactivity, its applications and different types of equilibrium in radioactive elements
3. Understand various types of nuclear detectors and their applications
4. Demonstrate and understand the quantum mechanical concepts.
5. Demonstrate quantitative problem solving skills in all the topics covered.

### Unit I

15 Lectures

**1. Basic properties of nuclei:** Composition, Charge, Size, density, Spin and Magnetic dipole moment, Rutherford's experiment and estimation of nuclear size, mass defect and binding energy,  $BE/A$  vs  $A$  plot and its interpretation, stability of nuclei ( $N$  vs  $Z$  plot)

Problems

AB: 11.1, 11.2, 11.3, 11.4

SBP: 4.1.2

**2. Radioactivity:** Review of properties of  $\alpha$ ,  $\beta$  and  $\gamma$ -rays.

Law of Radioactive decay, half-life and mean life (derivation required), units of radioactivity, statistical nature of radioactivity, successive radioactive disintegration- A to B to C (stable) type, natural radioactive series, radioactive equilibria, artificial radioactivity, determination of the age of the Earth, Carbon dating, radioisotopes and its applications, radiation hazards.

Problems

SBP: 2.3, 2.4, 2.6, 2.7, 2.8, 2.9, 2.11, 2.12, 2.13

DCT: 2.13 Page No. 86 and 87

AB: 12.1 Page No. 422, 423

Additional Reference: <https://dae.gov.in/node/191>

## Unit II

15 Lectures

**1. Radiation Detectors:** Interaction between particles and matter, plot of variation of ionization current with applied voltage, Gas filled radiation detectors- Ionization chamber (qualitative), Proportional Counter and GM Counter

Problems

SBP: 1.I.1, 1.I.2, 1.I.3(i,ii)

SNG: Figure: 7.3 (exclude mode of operation), 7.4

**2. Nuclear Reactions:** Introduction, types of nuclear reactions, conservation laws (mass, energy and charge), concept of compound and direct reaction, Q value equation and solution of the Q equation, threshold energy

Problems

SBP: 3.1, 3.2, 3.3, 3.4, 3.5

## Unit III

15 Lectures

Review (Photoelectric effect, Blackbody, Black Body spectrum, Wien's displacement law)

**1. Origin of Quantum theory:** Matter waves: De Broglie waves, Concept of wave packet, phase velocity, group velocity and relation between them, wave particle duality, Davisson-Germer experiment, Heisenberg's Uncertainty Principle

AB: 3.1, 3.2, 3.3, 3.4, 3.5, 3.7, 3.8, 3.9

**2. X-Rays:** Production and properties, X-Ray spectra, X-Ray Diffraction, Bragg's Law, Compton Effect, Pair production, Photons and Gravity, Gravitational Red Shift, Blackholes

AB: 2.5, 2.6, 2.7, 2.8, 2.9

*Note: A good number of numerical examples are expected to be covered during the prescribed lectures*

### Main References:

1. AB: Arthur Beiser, Concepts of Modern Physics, 6<sup>th</sup> Edition
2. SBP: S.B. Patel, Nuclear Physics: An Introduction, New Age International Publishers, 2<sup>nd</sup> Edition
3. SNG: S.N. Ghoshal, Nuclear Physics
4. DCT: D.C. Tayal, Nuclear Physics, Himalaya Publishing House, 5<sup>th</sup> Edition

### Additional References:

1. S.L. Kakani and Shubhra Kakani, Nuclear and Particle Physics, Viva Books, 2<sup>nd</sup> Edition
2. Kenneth S. Krane, Modern Physics, 4<sup>th</sup> Edition, Wiley.
4. Ronald Gautreau, Schaum's Outline of Modern Physics, Second Edition, McGraw Hill Besides reference books, Standard websites are expected to be referred

### SEMESTER-I

Name of the Programme	Duration	Semester	Subject
B.Sc.inPhysics	Sixsemesters	<b>I</b>	<b>Physics</b>
CourseCode	Title	Credits	
<b>USPHP1</b>	<b>PracticalI</b>	2	

#### Instructions:

1. All the measurements and readings should be written with proper units in SI system only.
2. After completing all the required number of experiments in the semester and recording them in journal, student will have to get their journal certified and produce the certified journal at the time of practical examination.
3. While evaluating practical, weightage should be given to circuit/ray diagram, observations, tabular representation, experimental skills and procedure, graph, calculation and result.
4. Skill of doing the experiment and understanding physics concepts should be more important than the accuracy of final result.

#### Learning Outcome:

1. On successful completion of this course students will be able to:
2. Understand & practice the skills while performing experiments.
3. Understand the use of apparatus and their use without fear & hesitation.
4. Correlate the physics theory concepts to practical application.
5. Understand the concept of errors and their estimation.

**Note: Exemption of two experiments from section A and/or B and/or C may be given if student carries out any one of the following activity.**

- Collect the information of at least five Physicists with their work or any three events on physics, report that in journal.
- Execute a mini project to the satisfaction of teacher in-charge of practical.
- Participate in a study tour or visit & submit a study tour report.
- For practical examinations, the learner will be examined in two experiments (one from each group).
- Each experiment will be of three lecture hours' duration.

- A Minimum 4 from each group and in all minimum 8 experiments must be reported in journal.
- All the skill experiments are required to be completed compulsorily. Students are required to report all these experiments in the journal. Evaluation in viva voce will be based on regular experiments and skill experiments.

A learner will be allowed to appear for the semester and practical examination only if he submits a certified journal of Physics or a certificate that the learner has completed the practical course of Physics Semester I as per the minimum requirements.

**A.Regular Experiment:**

SrNo	Name of the Experiment
<b>GROUP A</b>	
1	Torsional Oscillation: To determine modulus of rigidity of a material of wire by Torsional oscillations
2	Bifilar Pendulum: Determination of moment of inertia of rectangular and cylindrical bar about an axis passing through its centre of gravity
3	Moment of inertia of Flywheel
4	Constant volume air thermometer
5	Frequency of AC Mains: To determine frequency of AC mains (Sonometer wire)
6	LDR Characteristics: To study the dependence of LDR resistance on intensity of light
<b>GROUP B</b>	
7	Study of Logic gates & To verify DeMorgan's Theorems
8	To study EX-OR Gate and verify its truth table
9	To study half adder and full adder and verify their truth table Ex-OR Gate
10	To study load regulation of a Bridge Rectifier
11	To study Zener Diode as Regulator
12	Study of LASER Beam Divergence

<b>GROUP C: Skill Experiment</b>	
1	Use of Vernier Callipers, Micrometer Screw Gauge and Travelling Microscope
2	Graph plotting (Plot BE/A versus A graph for 30 atoms, Plot Packing Fraction graph for 30 atoms)
3	Spectrometer: Schuster's Method
4	To determine the Resistance & Capacitance using Color code/Number & verify using Multimeter (Analog/Digital)
5	Use of digital multimeter
6	Absolute and relative error calculation

**Note:** Minimum **8** experiments (Four From each group) and **4** Skill experiments should be completed and reported in the journal, in the first semester. **Certified Journal is a must**, to be eligible to appear for the semester end practical examination.

## SEMESTER-II

Name of the Programme	Duration	Semester	Subject
B.Sc.inPhysics	Sixsemesters	II	Physics
CourseCode	Title	Credits	
<b>USPH201</b>	<b>OpticsI</b>	2	

### Learning Objectives:

To acquire knowledge of fundamental optics

### Learning Outcomes:

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

1. Understand the concept of lens, lens defects and their minimization.
2. Significance of combination of lenses implied to eye piece of optical instrument.
3. Understand interference of light with few well known daily life examples.
4. Understand Lasers and Optical fibers, their applications in day to day life.

### UI Geometrical Optics

(15 lectures)

**1. Lenses and Lens Maker's Equation:** Introduction to lenses, Terminology and sign conventions, Introduction to Thin lenses and Lens equation for single convex lens, Lens maker's equation: Position of the Principal Foci and Newton's Lens equation.

SBA: 4.1, 4.2, 4.3, 4.7, 4.8, 4.9, 4.10, 4.10.1, 4.11

**2. Magnification by lens and power of lens:** Lateral, Longitudinal and Angular magnification, Deviation by a thin lens

and its power, Necessity to combine the lenses & equivalent focal length & power of two thin lenses, Concept of cardinal points and their significance

SBA: 4.12, 4.12.1, 4.12.2, 4.12.3, 4.15, 4.16, 4.17, 4.17.1, 4.17.2, 4.17.3, 4.17.4, 5.2

**3. Introduction to Aberration in lenses:** [Spherical aberration & reduction, chromatic aberration & reduction] (Qualitative)

SBA: 9.2, 9.5, 9.5.1, 9.10

Suitable numerical with appropriate difficulty level.

## **U2 Introduction to Optical Instruments and Interference in Thin Films (15 lectures)**

1. **Optical Instruments and Eyepieces:** Human Eye as an optical instrument, Camera and Lenses of Camera, Simple Microscope & Compound Microscope, Concept of eyepiece & its significance: Huygens Eyepiece and Ramsden Eyepiece (Principle, Construction, Expression for Equivalent Focal Length, Merits and Demerits), Comparison of Huygens Eyepiece and Ramsden Eyepiece

[Gauss Eyepiece, Refracting Astronomical Telescope (Construction and Working), Reflecting Telescope] (Qualitative)

SBA: 10.2, 10.3, 10.3.1, 10.5, 10.8, 10.10, 10.11, 10.12, 10.13, 10.14, 10.15, 10.15.1, 10.16

2. **Interference in Thin Films:** Interference due to reflected and transmitted light in plane thin films, Conditions for Maxima and Minima, Interference pattern in wedge-shaped film & Newton's rings

SBA: 15.1, 15.2, 15.2.1, 15.2.2, 15.5, 15.6

Suitable numerical with appropriate difficulty level.

## **U3 Lasers and Fiber Optics (15 lectures)**

1. **An Introduction to LASERS:** Absorption and Emission, Spontaneous and Stimulated Emission, Components of laser, Ruby laser (Qualitative), He-Ne Laser, Laser Beam Characteristics, Applications of Laser

SBA: 22.1, 22.4.1, 22.4.2, 22.8, 22.8.1, 22.8.2, 22.8.3, 22.14.1, 22.14.3, 22.16, 22.19

2. **An Introduction to Optical Fiber:** Total Internal Reflection, Propagation of light through an Optical fiber, Numerical Aperture, Classification of Optical fibers, Single Mode Step Index Fiber, Multimode Step Index Fiber, Graded Index Fiber

[Optical Fiber applications: Optical fiber based communications system & Optical Fiber based Temperature sensor] (Qualitative)

SBA: 24.2, 24.3, 24.4, 24.6, 24.10, 24.11.1, 24.11.2, 24.11.3, 24.21, 24.23.1

### **Main Reference:**

SBA: Dr. N. Subrahmanyam, Brijlal, and Dr. M.N. Avadhanulu, A Textbook of Optics, 25<sup>th</sup> Revised Edition 2012 (Reprint 2016), S. Chand and Company Pvt. Ltd.

### **Additional References:**

1. Jenkins and White, Fundamentals of Optics (4<sup>th</sup> Ed.), McGraw Hill International
2. Ajoy Ghatak, Optics, 6<sup>th</sup> Edition, McGraw Hill Education (India) Private Limited



## SEMESTER II

Name of the Programme	Duration	Semester	Subject
B.Sc.inPhysics	Sixsemesters	II	Physics
CourseCode	Title	Credits	
<b>USPH202</b>	<b>Electricity andElectronics</b>	2	

### Learning Outcomes:

On successful completion of this course students will be able to:

1. Understand the basic concepts of Alternating current theory, AC bridges and Circuit Theorems
2. Understand the basics of Analog and Digital Electronics and apply them in real life situations
3. Demonstrate quantitative problem solving skills in all the topics covered

### Unit I: Electricity

**15 lectures**

1. **Alternating current theory:** (Review: Concept of L, R, and C)

AC circuit containing pure R, pure L and pure C, representation of sinusoids by complex numbers, Series L-R, C-R and LCR circuits, Resonance in LCR circuit (both series and parallel), Power in AC circuit. Q-Factor.

**TT:** 11.29, 11.30, 11.32, 12.5, 12.6, 13.1, 13.7, 13.9, 13.10, 13.11, 13.12, 13.13, 13.14, 13.17, 13.19, 14.2

2. **AC bridges:** General AC Bridge, Maxwell's Inductance Bridge, Maxwell's L/C Bridge, De Sauty Bridge, Wien Bridge.

(Bridge diagram, balancing condition derivation, applications)

**TT:** 16.1, 16.2, 16.3, 16.9, 16.11

### Unit II: Analog Electronics

1. **Circuit Theorems:** (Review: Ohm's law, Kirchhoff's laws) Ideal Current and Voltage Sources, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem. Problems related to circuit analysis using the above theorems.

**TT:** 2.15, 2.16, 2.18, 2.25, 2.30

**15 lectures**

2. **DC Power Supply:** Block diagram of a DC power supply – concept of a transformer, (Review: Half wave rectifier, Full wave rectifier) Bridge rectifier, PIV, Efficiency and Ripple factor of full wave rectifier, Capacitor Filter, Need for voltage regulation - Zener diode as voltage stabilizer, Clipper and Clampers (Basic diode based circuits only).

**BN:** 1.15, 2.6, 2.7, 2.8, 2.9, 2.10, 15.2, 15.3

**AD:** 4.2, 22.1

### **Unit III: Digital Electronics**

**15 lectures**

1. **Number Systems** – Binary number system: Binary to decimal and Decimal to binary conversion, Hexadecimal number system: Hexadecimal to decimal Conversion, Decimal

to hexadecimal conversion, Hexadecimal to binary conversion, Binary to hexadecimal conversion.

**LMS: 5.1 to 5.5**

2. **Derived Gates** (Review: Basic Logic gates), NAND and NOR as Universal Building blocks, Ex-OR gate: logic expression, logic symbol, truth table, Implementation using basic gates and its applications – Parity generator and checker, Half adder and Full adder.

**LMS: 2.1, 2.2**

**Tokheim: 3.6, 3.8, 10.2, 10.3**

### **References:**

1. TT: B.L. Theraja and A.K. Theraja, A

Textbook of Electrical Technology Vol. I, S. Chand Publication

2. BN: R.L. Boylestad and L. Nashelsky, Electronic devices and Circuit Theory - 10<sup>th</sup> Edition, Pearson

3. LMS: Leach, Malvino, Saha, Digital Principles and Applications – 6<sup>th</sup> Edition. Tata McGraw Hill

5. Tokheim: Digital Electronics, Principles and Applications, 6<sup>th</sup> Edition, McGraw Hill Edition.

6. AD: Albert Malvino, David Bates, Electronic Principles, 8<sup>th</sup> Edition, Tata McGraw Hill

## SEMESTER-II

Name of the Programme	Duration	Semester	Subject
B.Sc.inPhysics	Sixsemesters	<b>II</b>	<b>Physics</b>
CourseCode	Title	Credits	
<b>USPHP2</b>	<b>PracticalII</b>	2	

### **Instructions:**

1. All the measurements and readings should be written with proper units in SI system only.
2. After completing all the required number of experiments in this semester and recording them in journal, student will have to get their journal certified and produce the certified journal at the time of practical examination.
3. While evaluating practical, weightage should be given to circuit/ray diagram, observations, tabular representation, experimental skills and procedure, graph, calculation and result.
4. Skill of doing the experiment and understanding physics concepts should be more important than the accuracy of final result.

### **Learning Outcome:**

On successful completion of this course students will be able to:

1. Understand & practice the skills while performing experiments.
2. Understand the use of apparatus and their use without fear & hesitation.
3. Correlate the physics theory concepts to practical application.
4. Understand the concept of errors and their estimation.

**Note: Exemption of two experiments from section A and/or B and/or C may be given if student carries out any one of the following activity.**

- Collect the information of at least five Physicists with their work or any three events on physics, report that in journal.
- Execute a mini project to the satisfaction of teacher in-charge of practical.
- Participate in a study tour or visit & submit a study tour report.
- For practical examinations, the learner will be examined in two experiments (one from each group).

- Each experiment will be of three lecture hours' duration.
- A Minimum 4 from each group and in all minimum 8 experiments must be reported in journal.
- All the skill experiments are required to be completed compulsorily. Students are required to report all these experiments in the journal. Evaluation in viva voce will be based on regular experiments and skill experiments.

A learner will be allowed to appear for the semester and practical examination only if he submits a certified journal of Physics or a certificate that the learner has completed the practical course of Physics Semester II as per the minimum requirements.

#### **A. Regular Experiment:**

<b>SrNo</b>	<b>Name of the Experiments</b>
<b>GROUP A</b>	
1	Young's Modulus of a wire material by method of vibrations
2	Spectrometer: To determine angle of Prism
3	Spectrometer: To determine refractive index of prism material
4	Combination of Lenses: To determine equivalent focal length of a lens system by magnification method
5	Newton's Rings: To determine radius of curvature of a given convex lens using Newton's rings.
6	Determination of diameter of thin wire using Wedge Shaped Film
<b>GROUP B</b>	
7	To study NAND/NOR gates as Universal Building Blocks
8	LRCircuit: To determine the value of given inductance and phase angle
9	CR Circuit: To determine value of given capacitor and Phase angle
10	Transistor configurations: CB/CE/CC (study of input-output characteristics)

11	LCRseriesResonance:TodetermineresonancefrequencyofLCRseriescircuit
12	TostudyThermistorcharacteristics:Resistancevs.Temperature
<b>GROUPC: DEMONSTRATIONEXPERIMENT</b>	
1	Radiusofballbearings(singlepanbalance)
2	UseofOscilloscope:Waveformsatoutputofhalfwave,bridgerectifierswithandwithoutCapacitorfilter,Ripple
3	UseofPC forgraphplotting
4	I-VCharacteristicsofLED
5	Testingofcomponents(Resistors,Diode,Transistor,capacitor)
6	StudyofI-Vcharacteristicsofsolarcell

**Note:** Minimum **8** experiments (Four From each group) and **4** Demo experiments should be completed and reported in the journal, in the first semester. **Certified Journal is a must**, to be eligible to appear for the semester end practical examination.