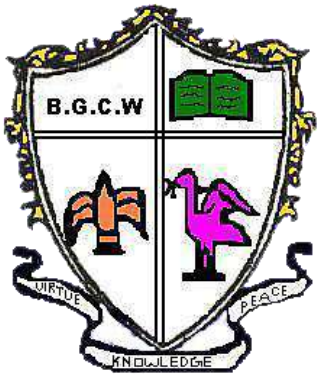
BHARATHIDASAN GOVT. COLLEGE FOR WOMEN

(Autonomous)



UNDERGRADUATE PROGRAM

B.Sc (PHYSICS)

COURSE STRUCTURE

CBCS PATTERN SYLLABUS

(For the students admitted from the academic year 2019-2020)

2019 - 2020

BHARATHIDASAN GOVT COLLEGE FOR WOMEN (AUTONOMOUS)

COURSE STRUCTURE AND SCHEME OF EXAMINATION (EFFECTIVE FROM 2019-2020)

NAME OF THE COURSE: **B.Sc. PHYSICS**

COURSE CODE: **02**

SEMESTER-I

Sl. No	Part	Short Code	SUBJECT COMPONENT	TITLE OF THE PAPERS	Hours / week	No of Credits	Marks		
							Int	Ext	Total
1	III	CC-1	Core Course – I	Mechanics and Properties of Matter	3+1	4	25	75	100
2	IV	AECC-1	Ability Enhancement Compulsory course-I	Introduction to Public Administration	4	2	25	75	100
3	III	CCP-1	Core Course Practical – I	Physics Practical - I	4	2	25	75	100
4	III	DSE-1	Allied course – I	Mathematics – I	6	6	25	75	100
5	I	MIL-1	MIL communications Skill-I	Tamil -I / Language-I	6	3	25	75	100
6	II	ENG-1	English communications Skill-I	English-I	6	3	25	75	100
				Total	30	**20**			600

SEMESTER- II

Sl. No	Part	Short Code	SUBJECT COMPONENT	TITLE OF THE PAPERS	Hours / week	No of Credits	Marks		
							Int	Ext	Total
1	III	CC-2	Core Course – II	Thermal Physics and Statistical Mechanics	3+1	4	25	75	100
2	IV	AECC-2	Ability Enhancement Compulsory course-II	Environmental Studies	4	2	25	75	100
3	III	CCP-2	Core Course Practical – II	Physics Practical - II	4	2	25	75	100
4	III	DSE-2	Allied Course –II	Mathematics – II	6	6	25	75	100
5	I	MIL-2	MIL communications Skill-II	Tamil -II / Language-II	6	3	25	75	100
6	II	ENG-2	English communications Skill-II	English-II	6	3	25	75	100
				Total	30	**20**			600

SEMESTER- III

Sl. No	Part	Short Code	SUBJECT COMPONENT	TITLE OF THE PAPERS	Hours / week	No of Credits	Marks		
							Int	Ext	Total
1	III	CC-3	Core Course – III	Optics	3+1	4	25	75	100
2	III	CC-4	Core Course – IV	Electricity and Magnetism	3+1	4	25	75	100
3	III	CCP-3	Core Course Practical – III	Physics Practical - III	4	2	25	75	100
4	III	DSE- 3	Allied Course – III	Chemistry - I	4	4	15	60	75
5	III	DSEP-1	Allied Course Practical – I	Chemistry Practical-I	2	2	5	20	25
6	I	MIL-3	MIL communications Skill-III	Tamil -III / Language-III	6	3	25	75	100
7	II	ENG-3	English communications Skill-II	English-III	6	3	25	75	100
				Total	30	**22**			600

SEMESTER- IV

Sl. No	Part	Short Code	SUBJECT COMPONENT	TITLE OF THE PAPERS	Hours / week	No of Credits	Marks		
							Int	Ext	Total
1	III	CC-5	Core Course – V	Oscillations and waves	3+1	4	25	75	100
2	III	CC-6	Core Course – VI	Analog Electronics	3+1	4	25	75	100
3	III	CCP-4	Core Course Practical – IV	Physics Practical - IV	4	2	25	75	100
4	III	DSE-4	Allied Course –IV	Chemistry - II	4	4	15	60	75
5	III	DSEP-2	Allied Course Practical – II	Chemistry Practical-II	2	2	5	20	25
6	I	MIL-4	MIL communications Skill-IV	Tamil -IV / Language-IV	6	3	25	75	100
7	II	ENG-4	English communications Skill-IV	English-IV	6	3	25	75	100
				Total	30	**22**			600

SEMESTER- V

Sl. No	Part	Short Code	SUBJECT COMPONENT	TITLE OF THE PAPERS	Hours / week	No of Credits	Marks		
							Int	Ext	Total
1	III	CC - 7	Core Course – VII	Electromagnetism	3+1	4	25	75	100
2	III	CC - 8	Core Course – VIII	Quantum Mechanics	3+1	4	25	75	100
3	III	CC - 9	Core Course – IX	Solid State Physics	3+1	4	25	75	100
4	III	DSE-5	Discipline specific Elective – P1	Atomic Physics and Relativity	3+1	4	25	75	100
5	III	GE - 1	Generic Elective - 1	Astrophysics	3+1	4	25	75	100
6	III	SEC-1	Skill Enhancement Course -1	Advanced Physics Practical – I	5	2	25	75	100
7	III	SEC-2	Skill Enhancement Course -2	Electronics Practical –I	5	2	25	75	100
				Total	30	**24**			700

SEMESTER- VI

Sl. No	Part	Short Code	SUBJECT COMPONENT	TITLE OF THE PAPERS	Hours / week	No of Credits	Marks		
							Int	Ext	Total
1	III	CC - 10	Core Course – X	Nuclear and Particle Physics	3+1	4	25	75	100
2	III	CC - 11	Core Course – XI	Molecular Spectroscopy and Laser Physics	3+1	4	25	75	100
3	III	CC - 12	Core Course – XII	Digital Electronics	3+1	4	25	75	100
4	III	DSE-6	Discipline specific Elective – P2	Communication Electronics	3+1	4	25	75	100
5	III	GE - 2	Generic Elective - 2	Computational Physics	3+1	4	25	75	100
6	III	SEC-3	Skill Enhancement Course -3	Advanced Physics Practical – II	5	2	25	75	100
7	III	SEC- 4	Skill Enhancement Course - 4	Electronics Practical –II	5	2	25	75	100
				Total	30	**24**			700

Net Credits (20+20+22+22+24+24):	**132**

BHARATHIDASAN GOVERNMENT COLLEGE FOR WOMEN (AUTONOMOUS)
PUDUCHERRY
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B.Sc (PHYSICS) - Three Year Degree Programme - Semester Pattern

Revised syllabi (as per CBCS)

(Effective from the Academic Year 2019-20)

1.PROGRAM OUTCOME

Knowledge Outcomes

After completing B.Sc. (Physics) Programme students will be able to: 1. Apply the basic principles of Physics to the events occurring around us and also in the world. 2. Try to find out or analyze scientific reasoning for various things.

Skill Outcomes

After completing B.Sc. (Physics) Programme students will be able to: 1. Use of computers and various software and programming skills 2. apply the knowledge to develop the sustainable and eco-friendly technology for pollution free environment 3. collaborate effectively on team-oriented projects in the field of Physics 4. Communicate scientific information in a clear and concise manner both orally and in writing or through audio video presentations.

Generic outcomes

Students will 1. develop ability to work in group 2. develop capacity of critical reasoning, judgment and communication skills. 3. Develop abilities for logical thinking

PROGRAM SPECIFIC OUTCOME

The course as a whole opens up several career doors for the students interested in various areas of science and technology in private, public and government sectors. Students may get job opportunities in higher education, research organizations, physics consultancy, radiology and many others. Some of the institutions where physics students can start their carrier are: BARC (Bhabha Atomic Research Centre), NPTC (National Thermal Power Corporation), IISc (Indian Institute of Science), ISRO (Indian Space Research Organisation), ONGC (Oil and Natural Gas Corporation), BHEL (Bharath Heavy Electricals Limited), NITs (National Institute of Technology), etc.

2.COURSE OUTCOME

SEMESTER-I

CC1: Paper-I: MECHANICS AND PROPERTIES OF MATTER

- To impart a basic understanding about the laws and rules of Mechanics and also properties of the materials.
- After the completion of the paper the students understand and appreciate the underlying laws of the mechanics in all the areas of physics and to link the properties of materials with the physics principles, also acquiring relevant skills to apply physics laws in their succeeding semesters.

AECC 1: Introduction to Public Administration

- The course will provide an overview of the field of public administration by focusing on its development and importance in modern government operations at the union territory, state and national levels.

- After the completion of the paper students can discuss the tools that modern public administrators use to pursue public goals, along with the pros and cons of those tools. Explain how the various administrative mechanisms that can be used for the better planning and execution.

CCP1: Paper-II: Physics Practical - I PHYSICS PRACTICAL - I

- To improve the observational, computational and data analysis skills through experiments.

- After the completion of the paper the students are exposed to experiments related to topics they come across in the core papers and may design experiments to verify their simple ideas.

SEMESTER-II

CC2: Paper- III: Thermal Physics & Statistical Mechanics

- To enhances skills in developing suitable mathematical models and statistical methods while dealing with dynamics of thermal energy .

- The students understand the mathematical modeling of heat related phenomena and applying statistical models in predicting macroscopic behavior from microscopic behavior of system of particles at the end of the course.

AECC 2: Environmental Science

- To educate and create awareness about the environment and environment protection to the students and to prepare them to provide a better environment.

- The students will develop a sense of community responsibility by becoming aware of environmental issues in the larger social context. Develop qualities to protect natural resources and take part in building public opinion to make ways and means to safe guard the surrounding.

CCP2: Paper- IV: Physics Practical - II

- To provide comprehensive knowledge and a sound understanding of physics concepts through experiments and develop practical, analytical and mathematical skills.

- The students acquire a range of general skills, including the ability to arrive at conclusions from observation, to identify key issues, to solve problems, to complete a task by a deadline at the end of the course.

SEMESTER-III

CC3: Paper-V: Optics

- To impart a basic understanding about the interaction of light energy with matter and to comprehend various natural phenomena from the wave nature of light.

- The students will learn about principles and uses of the various optical systems and analytically understands different properties of light in a coherent way.

CC4: Paper-VI: Electricity and Magnetism

- To establish a first grounding in electricity and magnetism concepts in preparation for more advanced courses.
- After the successful completion of the course the students understand the interaction of electrical and magnetic field with matter through mathematical methods.

CCP3: Paper-VII: Physics Practical - III

- To provide an experimental foundation for the theoretical concepts introduced in the lectures.

- At the completion of the course the students familiarize with experimental apparatus, the scientific method, methods of data analysis. Also trained to complete a task by a deadline and to use computers with confidence.

SEMESTER-IV

CC5: Paper-VIII: Oscillations and Waves

- To provide models for many real-life problems, develop analytical skills in understanding natural oscillatory systems and to motivate the students towards post graduate studies.

- At the end of the course the students can comprehend the fundamental principles, concepts relating to oscillations of a systems, dynamics of wave motions. The Fourier analysis topic improve their mathematical skill.

CC6: Paper-IX: Analog Electronics

- To teach the fundamentals on the working of electronic circuits and systems based on diodes, transistor and FETS and to understand electronic circuits analytically.
- At the completion of the paper they design simple electronic circuits. Analysis amplifier and oscillator circuits based on BJTs and FETs using

small signals. Demonstrate basic skills on using electronic devices.

CCP4: Paper-X: Physics Practical - IV

- To provide knowledge and a rigorous understanding of physics come across on lecture hours through experimental setups.
- After the completion of the paper the students acquire a range of general skills, including the aptitude to evaluate observational data, handling electrical and electronic devises, to identify errors in measurement and to use computers with confidence.

SEMESTER-V

CC7: Paper-XI: Electromagnetism

- To present the intricate relation between electric current and magnetic phenomena, laws of electromagnetism, their experimental justification and their application to physical phenomena.
- The students understand basic relation between electrons flow and magnetism, technique of generating magnetic fields, generating current through dynamic magnetic fields. Network theorem prepares them for advance electronic courses.

CC8: Paper-XII: Quantum Mechanics

- The primary aim of this course is to develop familiarity with the physical concepts and facility with the mathematical methods of quantum mechanics.

- The students can understand the fundamental ideas of quantum physics and they also show skills in framing and solving Schrodinger equation for simple quantum systems at the completion of the paper.

CC9: Paper-XIII: Solid State Physics

- To introduce an extended knowledge of the principles and techniques of solid state physics and to create a physical understanding of matter from an atomic view point.
- At the completion of the paper one can explain what types of matter exist and the methods available to determine their structure and properties, types of bonding and conductivity, concepts of energy band, phenomenon of superconductivity. Apply the knowledge gained to solve problems in solid state physics using relevant mathematical tools.

DSE5: Paper-XIV: Atomic Physics and Relativity

- To impart a basic understanding about the different atomic models, quantum numbers and their relation to behavior of atoms. In addition, aims to introduce a basic on theory of relativity.
- At the end of the course the students understand the fundamental models of the atom, spectrum, influence of the electric and magnetic fields over the

atom and develops a analytical knowledge on special theory of relativity.

GE1: Paper-XV: Astrophysics

- The course aims to give undergraduate students in physics an elementary introduction and overview of modern ideas in solar, stellar astrophysics and cosmology.

- At the completion of the paper the students can explain the different type of telescopes and their uses, basics of solar system, process of energy generation and its relation to stellar evolution.Discuss the birth, growth and future of Universe.

SEC1: Paper-XVI: Advanced Physics Practical-I

- To provide knowledge and a rigorous understanding of physics concepts come across on lecture hours through experimental setups and to develop experimental, analytical and mathematical skills.

- On successful completion of this course students should have a comprehensive knowledge and a sound understanding of physics. They should have acquired a range of general skills, including the ability to evaluate information, to solve problems, to complete a task by a deadline.

SEC2: Paper-XVII: Electronics Practical-I

- This is a course to expose basic electronic circuit concepts, circuit modeling and methods of circuit analysis and the experiments are tailored to give enhanced skills in design, build and implementation of basic analog and digital circuits.

- Handles basic laboratory equipment to measure electrical quantities using laboratory test equipment such as multimeters, power supplies,signal generators, and oscilloscopes. Develops sound skill to build, and troubleshoot analog and digital electronic circuits.

SEMESTER-VI

CC10: Paper-XVIII: Nuclear and Particle Physics

- To introduce the fundamental principles and concepts governing nuclear and particle physics and have a knowledge of their application to real-life problems.

- Understand the basic properties of nuclei and the atomic nucleus. Describe radioactivity and related phenomena. Explain the various interactions of nuclear radiation with matter. Discuss the fission and fusion reactions and their applications. Explain nuclear interactions and elementary particles involved inthe interactions.

CC11: Paper-XIX: Molecular Spectroscopy & Laser Physics

- To understand concepts of the absorption, emission and scattering of

electromagnetic radiation by molecules both quantitatively and qualitatively.

- At the accomplishment of the paper the students can understand the atomic and molecular spectra, the pure rotations and vibrational spectra of molecules (homo and hetero). Explains the basics of laser operation and different types of lasers.

CC12: Paper-XX: Digital Electronics

- To impart a basic understanding about the concept, technique of digital electronic components and system.
- Have a thorough understanding of the fundamental concepts and techniques used in digital electronics. Develops ability to analyze and design various combinational and sequential circuits. Able to identify basic requirements for a design application and propose a cost-effective solution.

DSE6: Paper-XXI: Communication Electronics

- To introduce the fundamentals of basic communication technique and systems along with the signal transmission methods and basic of antenna design.

- At the completion of the paper the students understand analytically analog modulation techniques. Comprehend the basics of picture transmission and reception. Explains the signal transmission modes between antennas. Understands the mathematical modeling of popular antenna designs.

GE2: Paper-XXII: Computational Physics

- The aim of the course is introduce the power of computers through computational approach for solving physics problems, which is distinct from, and complimentary to, traditional experimental and theoretical approaches.

- At the completion of the paper students demonstrate knowledge in essential methods and techniques for numerical computation in physics. Write programs in FORTRAN to solve problems in physics. Develops skill in visual presentation of observation and results through Gnuplot - a graphic applications.

SEC3: Paper-XXIII: Advanced Physics Practical-II

- This laboratory-based course provides a 'hands on' experience in a number of experimental techniques, and develops competence in the instrumentation typically used in Physics.

- After completing this course, students will be well prepared for the advanced laboratory in post graduate programs. Develops an ability to accurately record, analyze, interpret and critically evaluate experimental findings.

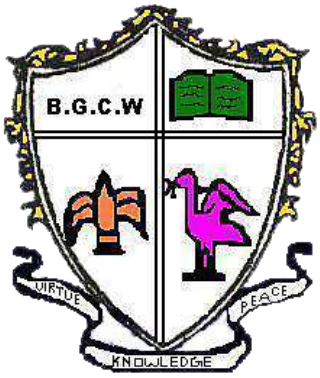
SEC4: Paper-XXIV: Electronics Practical-II

- This is a course to expose basic electronic circuit concepts, circuit modeling and methods of circuit analysis and the experiments are tailored to give enhanced skills in design, build and implementation of basic analog and digital circuits.

- Handles basic laboratory equipment to measure electrical quantities using laboratory test equipment such as multimeters, power supplies, signal generators, and oscilloscopes. Develops sound skill to build, and troubleshoot analog and digital electronic circuits.

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN

(Autonomous)



UNDERGRADUATE PROGRAM

B.Sc (PHYSICS)

CBCS PATTERN SYLLABUS

(For the students admitted from the academic year 2019-2020)

2019 - 2020

BHARATHIDASAN GOVT COLLEGE FOR WOMEN (AUTONOMOUS)

DEPARTMENT OF PHYSICS

CHOICE BASED CREDIT SYSTEM FOR B.Sc. PHYSICS

(For the students admitted from the academic year 2019 - 2020)

DISTRIBUTION OF PAPERS AMONG VARIOUS COURSE COMPONENTS

NAME OF THE COURSE: **B.Sc. PHYSICS**
COURSE CODE: **02**

Sl. No.	Short Code	Subject Component	No of Papers
1	CC	Core Course	12
2	CCP	Core Course Practical	4
3	DSE	Discipline Specific Elective	6
4	SEC	Skill Enhancement Course	4
5	AECC	Ability Enhancement Compulsory Course	2
6	MIL	MIL - Language Course	4
7	ENG	English Communication Skill Course	4
8	DSEP	Discipline Specific Elective Practical	2
9	GE	Generic Elective	2
		Total	**40**

SYLLABI

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)
(For the students admitted from the academic year 2019 - 2020)
SYLLABUS FOR B.Sc. PHYSICS

YEAR : I	MECHANICS AND PROPERTIES OF MATTER	SEMESTER: I
PAPER : CC-01		CREDIT : 4

UNIT – I: Laws of motion **(10 Lectures)**

Laws of motion - conservative forces and potential energy - law of conservation of momentum and energy for a single particle-angular momentum and torque - law of conservation of angular momentum for single particle - rotating frame of reference - centrifugal and Coriolis forces as fictitious forces - Foucault pendulum.

UNIT – II: Gravitation, Collison **(14 Lectures)**

Newton's law of gravitation - motion under central force - Kepler's laws-proof for II and III law - gravitational field and intensity of: uniform solid and hollow sphere - gravitational self-energy of system of masses - rocket - rocket equation - satellite orbits - geosynchronous orbits -weightlessness. System of particles - equation of motion - centre of mass - conservation of momentum and angular momentum of a system of particles. Direct impact of two smooth spheres, determination of final velocities and loss of kinetic energy.

UNIT – III: Rigid Body Dynamics **(12 Lectures)**

Rigid body - degrees of freedom - angular momentum of a rigid body - theorems of moment of inertia – moment of Inertia of: circular disc, cylinder and hollow sphere – moment of Inertia of a diatomic molecule –moment of inertia tensor-Euler's equation for rotating rigid body - precessional motion (qualitative) -Gyroscope.

UNIT – IV: Elasticity **(10 Lectures)**

Modulus of elasticity and their inter-relation - work done in strains -torsion of a cylinder, determination of rigidity modulus (torsion pendulum) – bending of a beam - bending moment - cantilever – depression of beams - non-uniform bending, determination of young's modules - I shape girders.

UNIT – V: Viscosity and Surface Tension **(14 Lectures)**

Streamlines - equation of continuity - Euler's equation - Bernoulli's theorem from Euler's equation - Venturimeter - viscous fluids -streamline and turbulent flow - coefficient of viscosity - Poiseuille's formula - terminal velocity and Stoke's formula.

Surface tension and surface energy - molecular interpretation - pressure on a curved liquid surface - excess pressure inside drops and bubbles - surface tension by drop weight method -variation of surface tension with temperature.

BOOKS FOR STUDY:

1. Mechanics, P K Srivastava, 2nd Ed., New Age International Publishers, 2007.
2. Mechanics, D.S. Mathur, 1st Ed., 2000, S. Chand & Co.
3. Properties of Matter, D. S. Mathur, 1st Ed., 38th Reprint, S. Chand & Co, 2010.

BOOKS FOR REFERENCE:

1. Fundamentals of Physics, Resnick, Halliday and Walker, 10th Ed., John Wiley & Sons., 2013.
2. Feynman lectures on Physics, Volume - I, Narosa Publishing House, 1986.
3. University Physics, FW Sears, M.W. Zemansky & H.D Young, 13th Ed., Pearson India, 2013.

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)
(For the students admitted from the academic year 2019 - 2020)
SYLLABUS FOR B.Sc. PHYSICS

YEAR : I	INTRODUCTION TO PUBLIC ADMINISTRATION	SEMESTER: I
PAPER : AECC-1		CREDIT : 2

Unit-I: Introduction: (12 Lectures)
Meaning, nature and scope of public Administration and its relationship with other disciplines - Evolution of public administration as a discipline - Woodrow Wilson, Henry Fayol, Max Weber and others – Evolution of Public Administration in India - Arthashastra – Colonial Administration upto 1947.

UNIT-II: Public Administration in India (12 Lectures)
Enactment of Indian Constitution - Union government – The Cabinet - Central Secretariat – All India Services - Training of Civil Servants – UPSC - Niti Ayog - Statutory Bodies: The Central Vigilance commission, CBI, National Human Rights Commission, National Women's Commission, CAG.

UNIT-III: State Administration (12 Lectures)
Differential Administrative systems in Union Territories compared to States Organization of Secretariat - Position of chief secretary - Functions and Structure of Departments, Directorates - Ministry of Home Affairs.

UNIT-IV: Union Territory Administration (10 Lectures)
Supervision of union territory Administration – Position of Lt. Governor in UT – Government of Union Territories Act 1963 – Changing trend in UT Administration in Puducherry and Andaman and Nicobar Island.

UNIT-IV: Emerging Issues in Indian Public Administration (14 Lectures)
Changing Role of District Collector – Civil Servants - Politicians relationship – Citizens character - Public Grievance Redressal mechanisms - The RTI Act 2005 - Social Auditing and Decentralization - Public Private Partnership.

BOOKS FOR STUDY:

1. Public Administration, A.R. Tyagi, 1st Ed., Atma Ram sons, New Delhi, 1983.
2. Public Administration in India, Avasthi and Maheshwari, 1st Ed., Lakshmi Narain Agarwal, 2013.
3. Public Administration in India-21st Century Challenges for Good Governance, R.B. Jain, 1st Ed., Deep and Deep, New Delhi, 2002.
4. Public administration in India, Ramesh K Arora, 1st Ed., Wishwa Prakashan, New Delhi, 2006.

BOOKS FOR REFRENCE:

1. Ramesh K Arora, Public Administration-Recent Perspective, 1st Ed., Rawat Pub, 2011.
2. Rumki Basu, Public Administration-Concept and Theories, 1st Ed., Sterling, New Delhi, 2013
3. Policy and Administration, Appleby P.H, 1st Ed., University of Alabama Press, Alabama, 1949.
4. Gerald. E. Caden, Public Administration, 1st Ed., Pablidas Publishers, California, 1982.

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)
(For the students admitted from the academic year 2019 - 2020)
SYLLABUS FOR B.Sc. PHYSICS

YEAR : I	**PHYSICS PRACTICAL - I**	**SEMESTER: I**
PAPER : CCP-01		**CREDIT : 2**

*Choose any **Eight** experiments from the following list*

LIST OF EXPERIMENTS

1. Compound pendulum- determination of g, radius of gyration and moment of inertia.
2. Young's modulus - non-uniform bending – Scale and telescope method.
3. Rigidity modulus - Torsional oscillations without masses.
4. Surface tension of a liquid & interfacial surface tension by the drop weight method.
5. Stoke's method - determination of viscosity.
6. Specific heat capacity of a liquid and emissivity of a surface - method of cooling.
7. Spectrometer – velocity of light in a liquid - hollow prism.
8. Spectrometer calibration of grating - Normal incidence method.
9. Potentiometer - calibration of low range voltmeter (0 - 1.5 V).
10. P.O. box - resistivity and verification of laws of resistance.
11. Variation of period of oscillations of a spring with mass and spring constant.
12. Emf of thermocouple using digital multimeter.
13. Computer simulation of law of gravitation - PHET Sim.
14. Computer simulation -fluid flow - PHET Sim.
15. Computer simulation of Fourier analyses a given wave-PHET sim.
16. Computer simulation of Normal modes of vibration – PHET sim.

BOOKS FOR STUDY:

1. Practical Physics and Electronics, C.C. Ouseph et al, 1st Ed., S. Visawanathan Pvt. Ltd., 2005.
2. Practical Physics, M.N. Srnivasan et al, 1st Ed., Sultan Chand and Sons, 2005.
3. A Textbook of Practical Physics, H.P. Shrivastava, 1st Ed., ABD Publishers, 2006.

BOOKS FOR REFERENCE:

1. Practical Physics, G. L. Squires, 3rd Ed., Cambridge University Press, 1985.
2. Experiments in Modern Physics, Adrian C. Melissinos, 2nd Ed., Academic Press, 2003.

WEBSITES FOR SIMULATIONS:

1. PHET Simulations -https:/ /phet.colorado.edu/en/simulations/category/physics/
2. Physics Animations - http://www.vascak.cz/physicsanimations.php?l=en/

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)
(For the students admitted from the academic year 2019 - 2020)
SYLLABUS FOR B.Sc. PHYSICS

YEAR : I	THERMAL PHYSICS AND STATISTICAL MECHANICS	SEMESTER: II
PAPER : CC-02		CREDIT : 4

UNIT -I: Kinetic Theory **(14 Lectures)**

Review of the kinetic model of an ideal gas – interpretation of temperature - law of equipartition of energy (no derivation) and its applications to specific heat of gases: mono-atomic and diatomic gases - derivation of Maxwell's law of distribution of velocities and its experimental verification - most probable speed, rms speed, average speed - mean free path (zeroth order) - transport phenomena: viscosity, conduction and diffusion.

UNIT -II: Thermodynamic Laws **(12 Lectures)**

Zeroth Law of thermodynamics and temperature - first law and internal energy - various thermodynamical processes - applications of first law: general relation between C_P & C_V, work done during isothermal and adiabatic process - reversible & irreversible processes - second law & entropy - Carnot's cycle, theorem, refrigerator - entropy changes in reversible & irreversible processes - entropy-temperature diagrams - third law of thermodynamics - unattainability of absolute zero.

UNIT -III: Thermodynamic Relations **(12 Lectures)**

Maxwell's thermodynamic relations - applications of Maxwell's relations: Clausius-Clapeyron equation, expression for ($C_P - C_V$), TdS equations. Thermodynamic potentials - enthalpy, Gibbs, Helmholtz and internal energy functions - relation to thermodynamic variables.

UNIT -IV: Radiation **(10 Lectures)**

Blackbody radiation - spectral distribution - concept of energy density - derivation of Planck's law - deduction of Wien's distribution law, Rayleigh-Jeans Law, Stefan Boltzmann Law and Wien's displacement law from Planck's law.

UNIT -V: Statistical Mechanics **(12 Lectures)**

Phase space - macro-state and micro-state - entropy and thermodynamic probability - Maxwell-Boltzmann law – application: pressure and entropy of ideal gas - Quantum statistics - Fermi-Dirac distribution law - electron gas - Bose-Einstein distribution law - photon gas - comparison of three statistics.

BOOKS FOR STUDY:

1. Heat, Thermodynamics and Statistical Physics, Brij Lal et al., 3rd Ed., S. Chand & Co, 2008.
2. Thermal Physics, A.B.Gupta and H.Roy,3rd Ed., Books & Allied Ltd., New Delhi, 2010.
3. Thermal Physics, A. Kumar and S.P. Taneja, 1st Ed., R. Chand &Co., 2014.
4. Heat and thermodynamics, D.S. Mathur, 5th- Ed., 2014, Sultan Chand & Sons.

BOOKS FOR REFRENCE:

1. Thermodynamics, Kinetic theory & Statistical thermodynamics, F. W. Sears et al., 3rd Ed., Addison Wesley, 1975.
2. Heat and Thermodynamics, M. W. Zemasky and R. Dittman, 7th Ed., McGraw Hill, 1996.
3. Thermal Physics, S. Garg, R. Bansal and C. Ghosh, 1st Ed., Tata McGraw-Hill, 1993.
4. Statistical Mechanics, Gupta and Kumar, 24th Ed., Pragati Prakashan, 2011.

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)
(For the students admitted from the academic year 2019 - 2020)
SYLLABUS FOR B.Sc. PHYSICS

YEAR : I	ENVIRONMENTAL STUDIES	SEMESTER: II
PAPER : AECC-2		CREDIT : 2

Unit I: Introduction to environmental studies and Ecosystem (12 Lectures)

Multidisciplinary nature of environmental studies - Scope and importance - Concept of sustainability and sustainable development. Ecosystem - Structure and function of ecosystem - food chains, food webs and ecological succession - forest ecosystem - grassland ecosystem - desert ecosystem - aquatic ecosystems.

Unit II: Natural Resources (14 Lectures)

Land resources - land degradation - soil erosion and desertification - causes and impacts due to mining, dam building on environment - use and over-exploitation of surface and ground water - floods, droughts - conflicts over water - energy resources - Renewable and non-renewable energy sources -use of alternate energy sources, growing energy needs.

Unit III: Biodiversity and Conservation (14 Lectures)

Genetic, species and ecosystem diversity - biodiversity patterns and global biodiversity hot spots - India as a mega-biodiversity nation - endangered and endemic species of India - habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions - conservation of biodiversity - nature reserves, tribal populations and rights.

Unit IV: Environmental Pollution (10 Lectures)

Environmental pollution types - causes, effects and control of pollution - air, water, soil and noise pollution - nuclear hazards and human health risks - solid waste management - control measures of urban and industrial waste.

Unit V: Environmental Policies (10 Lectures)

Climate change- global warming- ozone layer depletion- acid rain and impacts on human communities and agriculture. Environment Protection Act- Wildlife Protection Act - Forest Conservation Act - Montreal and Kyoto protocols and Convention on Biological Diversity.

BOOKS FOR STUDY:

1. Environmental studies, Erach Bharucha, 1st Ed., Universities Press, 2005.
2. Environmental and Ecology, Anil K. De and Arnab K. De, 1st Ed., New Age International, 2009.
3. Environmental science and Engineering, Anubha Kaushik, 5th Ed., New Age International, 2016.
4. Essentials of Ecology and Environmental Science, Rana, 5th Ed., PHI, 2013.

BOOKS FOR REFERENCE:

1. Fundamentals of Ecology, Eugene P. Odum and W.B.Saunders, 1st Ed., London, 1971.
2. Environmental Science, Tyler Miller, 14th Ed., Cengage, 2014.
3. Environmental Science, Botkin and Keller, 8th ed., Wiley India, 2012.
4. Environmental Studies: From Crisis to Cure, Rajagopalan, 3rd Ed., Oxford University Press, 2015.

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SYLLABUS FOR B.Sc. PHYSICS

YEAR : II	**PHYSICS PRACTICAL - II**	**SEMESTER: II**
PAPER : CCP-02		**CREDIT : 2**

*Choose any **Eight** experiments from the following list*

LIST OF EXPERIMENTS

1. Young's modulus - Uniform bending – Pin and microscope method.
2. Rigidity modulus - Torsional pendulum with masses.
3. Poiseuille's flow method – comparison of viscosity.
4. Specific Heat capacity of a liquid - Joule's calorimeter.
5. Thermal conductivity of a bad conductor - Lee's disc method.
6. Sonometer - determination of frequency and verification of laws of transverse vibrations.
7. Spectrometer- wavelengths of mercury spectrum - Minimum deviation method (I order)
8. Spectrometer: Grating - wavelength of sodium lines - normal incidence (I & II Order)
9. Potentiometer - calibration of low range ammeter (0-1.5 amps).
10. P.O. box - temperature coefficient of the material of a coil of wire.
11. Study of characteristics of a thermistor using digital multimeter.
12. Field along the axis of the circular coil carrying current - determination of B_H.
13. Computer simulation of circuit loops and verification of Kirchoff's law - Physics Animations.
14. Computer simulation of AC and DC circuits - PHET Sim.
15. Computer simulation - isothermal, adiabatic, isobaric and isochoric process. - PHET Sim.
16. Computer simulation of Blackbody radiation-PHET Sim

BOOKS FOR STUDY:

1. Practical Physics and Electronics, C.C. Ouseph et al, 1st Ed., S. Visawanathan Pvt. Ltd., 2005.
2. Practical Physics, M.N. Srnivasan et al, 1st Ed., Sultan Chand and Sons, 2005.
3. A Textbook of Practical Physics, H.P. Shrivastava, 1st Ed., ABD Publishers, 2006.

BOOKS FOR REFERENCE:

1. Practical Physics, G. L. Squires, 3rd Ed., Cambridge University Press, 1985.
2. Experiments in Modern Physics, Adrian C. Melissinos, 2nd Ed., Academic Press, 2003.

WEBSITES FOR SIMULATIONS:

1. PHET Simulations -https:/ /phet.colorado.edu/en/simulations/category/physics/
2. Physics Animations - http://www.vascak.cz/physicsanimations.php?l=en/

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SYLLABUS FOR B.Sc. PHYSICS

YEAR : II	OPTICS	SEMESTER: III
PAPER : CC-03		CREDIT : 4

UNIT – I: Matrix Optics (12 Lectures)

Fermat's principle - reflection and refraction - Matrix method - translation matrix - refraction matrix - system matrix for thick and thin lens – focal length of thin and thick lens - focal length of thin lens combination - magnification. Cardinal points - focal points, principal points and nodal points. Chromatic aberrations - achromatic combination of separated lenses- monochromatic aberrations and their reduction.

UNIT – II: Interference (14 Lectures)

Coherent sources - conditions for interference - principle of superposition - visibility of fringes - Fresnel's bi-prism - determination of wavelength of monochromatic light - Stoke's phase change on reflection – interference in thin films - air-wedge - Newton's rings, determination of wavelength and refractive index – Abbe's refractometer - Michelson's interferometer - principle, construction and working - formation of circular and straight fringes - determination of wavelength and thickness of transparent sheet.

UNIT – III: Diffraction (14 Lectures)

Diffraction - Fresnel diffraction - rectilinear propagation of light - zone plate - Fresnel diffraction at: circular aperture, circular obstacle, straight edge - Cornu spiral - Fraunhofer diffraction at a single slit - at N parallel slits - plane transmitting grating - wavelength determination using grating. Resolving power - Rayleigh criterion - resolving power of prism, grating, microscope and telescope.

UNIT – IV: Polarization (10 Lectures)

Transverse nature of light wave - plane polarized light - double refraction - Huygen's explanation of double refraction in uniaxial crystal - construction of wave fronts - quarter wave plate and half wave plate - production and analysis of polarized light – Biot's Law of optical rotation - specific rotation - Laurent's half shade polarimeter.

UNIT – V: Dispersion (10 Lectures)

Dispersion - dispersive power of a prism - normal and anomalous dispersion - Cauchy's equation - Hartmann's formula - Sellmeir's formula - Lorentz electromagnetic theory of dispersion.

BOOKS FOR STUDY:

1. A Textbook of Optics, Subrahmanyam, Brij Lal etal, 23rd Ed., S. Chand & Co., 2006.
2. Introduction to Modern Optics, Ajoy Ghatak, 1st Ed., Tata McGraw Hill, 1971.
3. Fundamentals of Optics, H. R. Gulati and D. R. Khanna, R. Chand -1991.
4. Refresher Course in Physics-Volume II, C. L. Arora, 19th Ed., S. Chand & Co., 2013.

BOOK FOR REFRENCE:

1. Fundamentals of Optics, F.A. Jenkins and H.E. White, 4th Ed., McGraw-Hill, 2001.
2. Introduction to Classical and Modern Optics, Jurger R. Meyer et al., 4th Ed., Pearson, 1994.
3. Optics, Smith and Thomson, 2nd Ed., John Wiley and Sons, 1988.

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)
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SYLLABUS FOR B.Sc. PHYSICS

YEAR : II	**ELECTRICITY AND MAGNETISM (Note: Vector language is to be used all through)**	**SEMESTER: III**
PAPER : CC-04		**CREDIT : 4**

UNIT – I: Electric Intensity (12 Lectures)

Coulomb's law - intensity of electric field - field due to monopole, dipole - flux of an electric field - Gauss's law –proof - Differential form of Gauss's law - applications to deduce electric fields of spherical charge distribution and uniformly charged spherical conductor – electric field near the surface of charged conductor- coulomb's theorem - force per unit area on the surface of a charged conductor.

UNIT – II: Electric Potential and Electric Images (14 Lectures)

Electric potential - relation between electric field and potential - potential and field due to dipole and quadrupole – potential energy of: system of charges and charged spherical conductor - Energy associated with electric field - Poisson's equation, Laplace's equation, boundary conditions, and uniqueness theorems. Electric images - Induced charges - field and potential near an earthed infinite conducting sheet and spherical conductor.

UNIT – III: Dielectrics (12 Lectures)

Dielectrics, polar and non-polar dielectric – polarization of a dielectric – polarization vector - permittivity - susceptibility - Gauss law in dielectrics – Electric field caused by polarized matter - relation connecting **E, D** and **P** - dielectric constant and dielectric strength – effect of dielectric on the capacity of a capacitor.

UNIT – IV: Dielectric Polarization (12 Lectures)

Mechanism of polarization- polarizability tensor - types of polarizabilities - frequency dependence of polarizability- molecular field - Clausius-Mosotti equation, its limitation - Debye's relation – ferroelectric materials (general ideas).

UNIT –V: Magnetism (10 Lectures)

Magnetic properties of materials, Intensity of Magnetization, Relation connecting **B**, **H**, and **M** vectors. Magnetic permeability and susceptibility - properties and characteristics of dia, para and ferro magnetic materials - Curie point - **M-H** curve and hysteresis (qualitative).

BOOKS FOR STUDY:

1. Electricity and Magnetism, K.K. Tewari, 13th Ed., S. Chand & Co., 2006.
2. Electricity and Magnetism, R. Murugesan, 10th Ed., S. Chand & Co., 2017.
3. Electricity and Magnetism, D.C. Tayal, 4th Ed., Himalaya Publishing House, 2014.

BOOKS FOR REFERENCE:

1. Electrodynamics, Gupta, Kumar and Singh, 1st Ed., Pragati Prakshan, 2005.
2. Electricity and Magnetism, A.S. Mahajan and A.A. Rangawala, 1st Ed., TMH, 2007.
3. Electricity and Magnetism, Edward M. Purcell, 3rd Ed., Cambridge University Press, 2013.
4. University Physics, Ronald Lane Reese, 1st Ed., Thomson Brooks Cole, 2010.

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)
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SYLLABUS FOR B.Sc. PHYSICS

YEAR : II	**PHYSICS PRACTICAL - III**	**SEMESTER: III**
CORE : CCP-03		**CREDIT : 2**

*Choose any **Ten** experiments from the following list*

LIST OF EXPERIMENTS

1. Young's modulus - cantilever - pin & microscope method.
2. Melde's apparatus - determination of frequency.
3. Specific latent heat of fusion of ice.
4. Newton's rings – determination of focal length of plano-convex lens.
5. Spectrometer: Dispersive power of the material of a prism.
6. Carry-Foster's bridge - Resistivity of the material of the coil of wire.
7. B.G - Comparison of emf of two cells.
8. Figure of merit of a periodic moving coil galvanometer.
9. **M** and $\mathbf{B_H}$ - using deflection and vibration magnetometer.
10. Kater's pendulum - determination of acceleration due to gravity at a place.
11. Study of interference fringes bi-prism arrangements.
12. Study of polarization of light by simple reflection.
13. Computer simulation of effect of electric field on charged particles -Physics lab simulator.
14. Computer simulation of field produced by electromagnets -PHET Sim.
15. Computer simulation of image formation in mirrors and lenses– PHET sim.
16. Computer simulation of interference of waves – PHET sim.

BOOKS FOR STUDY:

1. Practical Physics and Electronics, C.C. Ouseph et al, 1st Ed., S.Visawanathan Pvt. Ltd., 2005.
2. Practical Physics, M.N.Srnivasan etal, 1st Ed., Sultan Chand and Sons, 2005.
3. A Textbook of Practical Physics, H.P. Shrivastava, 1st Ed., ABD Publishers, 2006.

BOOKS FOR REFERENCE:

1. Practical Physics, G. L. Squires, 3rd Ed., Cambridge University Press, 1985.
2. Experiments in Modern Physics, Adrian C. Melissinos, 2nd Ed., Academic Press, 2003.

WEBSITES FOR SIMULATIONS:

1. PHET Simulations -https:/ /phet.colorado.edu/en/simulations/category/physics/
2. Physics Animations - http://www.vascak.cz/physicsanimations.php?l=en/

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SYLLABUS FOR B.Sc. PHYSICS

YEAR : II	OSCILLATIONS AND WAVES	SEMESTER: IV
PAPER : CC-05		CREDIT : 4

UNIT – I: Simple Harmonic Oscillations (12 Lectures)

Small oscillation about stable equilibrium, simple harmonic motion - differential equation of SHM and its solution - time period of loaded spring - compound pendulum - center of suspension and oscillation - two masses connected by spring, reduced mass - oscillations of: liquid in a U tube and floating body. Kinetic, potential and total energies of SHM.

UNIT – II: Damped Oscillations and Fourier Analysis (14 Lectures)

Damped oscillations - over damping, critical damping and oscillatory damping - power dissipation, relaxation time and Q factor- forced oscillations and resonance - power absorbed by the oscillator - two dimensional oscillators - pendulums coupled by a spring, normal modes.

Fourier's Theorem – Fourier series - evaluation of Fourier coefficients - application to saw tooth wave and square wave.

UNIT – III: Superposition Of Waves (12 Lectures)

Superposition of two collinear harmonic oscillations - linearity and superposition principle - oscillations having equal frequencies (interference) - oscillations having different frequencies (beats) - superposition of two perpendicular harmonic oscillations - Lissajous figures with equal and unequal frequency - analytical method - uses of Lissajous figures.

UNIT – IV: Propagation Of Waves in a Medium (12 Lectures)

Differential equation of transverse waves on a string - travelling and standing waves - characteristic impedance to transverse waves by a string - normal modes in a string - phase velocity, group velocity, relation between the two - speed of longitudinal waves in a fluid - normal modes vibrations of air columns.

UNIT – V: Music and Acoustics (10 Lectures)

Intensity and loudness of sound - decibels - Intensity levels - musical notes - musical scale. Acoustics of buildings - reverberation and time of reverberation - absorption coefficient - Sabine's formula - measurement of reverberation time - acoustic aspects of halls and auditoria.

BOOKS FOR STUDY:

1. Waves and Oscillations, N. K. Bajaj, 1st Ed., Tata McGraw Hill, 2006.
2. Oscillations and Waves, J.C. Upadhyaya, 1st Ed., Himalaya Pub. House, Bombay, 2017.
3. A Text Book of Sound, M. Ghosh, 2nd Ed., S. Chand & Co., 1987.
4. Oscillations and Waves – Satya Prakash, 4th Ed., Pragati Prakashan Pub, Meerut, 2007.

BOOKS FOR REFERENCE:

1. The Physics of Vibrations and Waves, H J Pain, 6th Ed., Wiley, 2005.
2. Vibrations and waves, A P French, 9th Ed., W.W. Nortan & company, 1971.
3. The Mathematics of waves and vibrations, R K Ghosh, 1st Ed., Macmillan, 1975.
4. Text book of Vibrations and Waves, S. P. Puri, 2nd Ed., Macmillan India Ltd, 2004.

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SYLLABUS FOR B.Sc. PHYSICS

YEAR : II	ANALOG ELECTRONICS	SEMESTER: IV
PAPER : CC-06		CREDIT : 4

UNIT-I: Junction Diodes **(10 Lectures)**

PN Junction diodes - V-I Characteristics – Diode parameters -diode clippers and clampers- Half wave, Full-wave and Bridge rectifiers - expressions for efficiency and ripple factor - Avalanche and Zener breakdown - Zener diode characteristics- Zener diode as voltage regulator- characteristics and uses of LED, Photodiode and Varactor diodes.

UNIT-II: Bipolar Junction Transistor (BJT) **(14 Lectures)**

Working of NPN and PNP transistors- CB, CE and CC modes – CB and CE characteristics study and their parameters - AC and DC Load line concept - operating point– Base biasing and voltage divider biasing methods of BJTs - Stability factor and stabilization - Thermal run away - Two-Port analysis - h-parameters of a transistor and their notation – hybrid equivalent circuits for CE and CB transistors modes.

UNIT -III: BJT Amplifiers **(12 Lectures)**

Classification of Amplifiers –Single stage CE Amplifier with voltage divider bias- h-parameter analysis and gain – Frequency response, band width– Multistage amplifiers - types - working of two-stage RC Coupled and Transformer coupled amplifiers - power amplifiers and their classification – working of class B Push-pull amplifiers.

UNIT -IV: BJT Oscillators and FET **(14 Lectures)**

Feedback in amplifiers- positive and negative feedback - Barkhausen criterion - classification of oscillators –working and analysis of tuned collector, Hartley and phase shift Oscillators – Multi-vibrators -types- working of transistor bi-stable multi-vibrator.

JFETs –types - Operation of n-channel JFET - characteristics study -JFET parameters - uses of JFETs - Comparison between JFET and BJT - MOSFET – types – construction, working and characteristics.

UNIT -V: Operational Amplifiers **(10 Lectures)**

Differential amplifiers - principles of operational amplifiers - offset parameters, differential gain, CMRR - inverting and non-inverting amplifiers - Op-amp as summing amplifier and difference amplifier – Op-amp as differentiator, integrator and comparator.

BOOKS FOR STUDY:

1. A Text Book of Applied Electronics, R.S. Sedha, 3rd Ed., S. Chand & Co, 1990.
2. Basic electronics, B. L. Theraja, 5th Ed., S. Chand & Co, 2005.
3. Principal of electronics, V.K.Mehta, 11th Ed., S. Chand & Co, 2005.
4. Electronics Circuits-I and II, Salivahanan and Suresh Kumar, 1st Ed., McGraw Hill Education, 2015.

BOOKS FOR REFERENCE:

1. Integrated electronics- Millman and Halkias, 2nd Ed., McGraw Hill Education, 2015.
2. Microelectronic Circuits: Analysis and Design, Muhammad H. Rashid, 3rd Ed., Cengage, 2015.
3. Electronics devices and circuit theory, R. L. Boylestad and Nashelsky, 10th Ed., Person India, 2009.

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SYLLABUS FOR B.Sc. PHYSICS

YEAR : II	PHYSICS PRACTICAL - IV	SEMESTER: IV
PAPER : CCP-04		CREDIT : 2

*Choose any **Ten** experiments from the following list*

LIST OF EXPERIMENTS

1. Youngs modulus -Koneig's method.
2. Rigidity modulus - Static torsion-scale and telescope method.
3. Spectrometer - i-d curve.
4. Spectrometer: Dispersive power of a grating.
5. B.G. - Comparison of capacities.
6. Potentiometer: Verification of laws of resistance and resistivity of the material of a wire.
7. Comparison of magnetic moments of magnets in tan A and tan B positions.
8. V-I Characteristics of junction and Zener diodes.
9. Construction of half wave rectifier and full wave rectifier-comparison of ripples factors.
10. Transistor characteristics – CE mode.
11. JFET characteristics.
12. OP-AMP (7411C) – study of inverting and non-inverting amplifiers.
13. Computer simulation – Atomic models and Hydrogen spectrum.
14. Computer simulation - Michelson Morley experiment.
15. Computer simulation – Diode circuit analysis -Electronic Circuit Simulator.
16. Computer simulation – Rectifiers- Electronic Circuit Simulator.

BOOKS FOR STUDY:

1. Practical Physics and Electronics, C.C. Ouseph et al, 1st Ed., S. Visawanathan Pvt. Ltd., 2005.
2. Practical Physics, M. N. Srnivasan et al, 1st Ed., Sultan Chand and Sons, 2005.
3. A Textbook of Practical Physics, H.P. Shrivastava, 1st Ed., ABD Publishers, 2006.

BOOKS FOR REFERENCE:

1. Practical Physics, G. L. Squires, 3rd Ed., Cambridge University Press, 1985.
2. Experiments in Modern Physics, Adrian C. Melissinos, 2nd Ed., Academic Press, 2003.
3. Basic electronics – A Text-lab manual, Zbar et al, 7th Ed., Tata McGraw Hill, 2009.

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2. Physics Animations - http://www.vascak.cz/physicsanimations.php?l=en/
3. Electronic Circuit Simulator - http://www.falstad.com/circuit/

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SYLLABUS FOR B.Sc. PHYSICS

YEAR : III	ELECTROMAGNETISM	SEMESTER: V
PAPER : CC-07		CREDIT : 4

UNIT – I: Current Carrying Conductors in a Magnetic Field (10 Lectures)
Lorentz force on a moving charge - force on current carrying conductor-definition, unit and dimensions of **B** - torque on a rectangular current loop in magnetic field - magnetic flux - magnetic moment of a current loop - construction and working of the moving coil ballistic galvanometer – condition for ballistic or dead beat.

UNIT – II: Magnetic Field produced by Current Carrying Conductors (12 Lectures)
Biot-Savart's law, its applications to: straight conductor, circular coil, solenoid carrying current - force between parallel wires and definition of Ampere - Ampere's circuital law - application to find field due to infinitely long straight conductor, solenoid, and toroidal solenoid - divergence and curl of magnetic field - magnetic vector potential and scalar potential

UNIT – III: Electromagnetic Induction (12 Lectures)
Faraday's law of electromagnetic induction - Lenz's law - Faraday's law in integral and differential forms - Self and mutual inductances - **L** of solenoid - **M** of concentric solenoids - Energy stored in magnetic field - Measurement of **L** by Rayleigh's method - Measurement of mutual inductance by Kirchhoff's method.

UNIT – IV: Alternating Current circuits and Maxwell's Equations (14 Lectures)
Alternating currents - series and parallel LCR circuits – series and parallel resonance - Q-factor - power dissipation and power factor - skin effect - Principle and working of AC generator -AC bridges - Balancing conditions - Andersons' bridge to find **L** – Wein's bridge to find **C**.
Equation of continuity - Displacement current- Maxwell's equations in integral and differential forms- Poynting vector and energy flow- electromagnetic wave propagation through vacuum - transverse nature of EM waves.

UNIT – V: Network Theorems and Transient Currents (12 Lectures)
Electric current - current and current density - equation of continuity - Thevenin's Theorem - Norton's theorem - Superposition theorem - maximum power theorem. Rise and fall of currents in LR circuits - growth and decay of charge in CR circuits - time constant and its significance – growth and decay of charge in parallel LCR circuits

BOOKS FOR STUDY:

1. Electricity and Magentism, K.K. Tewari, 13th Ed., S. Chand & Co., 2006.
2. Electricity and Magentism, Murugeshan, S. Chand & Co., 2005.
3. Electrodynamics, S. L. Guptha, S.P. Singh, V. Kumar, 18th Ed., Pragati Prakasan, 2006.
4. Electricity and Magnetism, A S Mahajan and A A Rangawala, 1st Ed., TMH, 2007.

BOOKS FOR REFERENCE:

1. Electricity and Magnetism, Edward M. Purcell, 3rd Ed., Cambridge University Press, 2013.
2. Electricity and Magnetism, J.H. Fewkes et al.,. Vol-I, 2nd Ed., University Tutorial Press, 1965.
3. D.J. Griffiths, Introduction to Electrodynamics, 3rd Ed., Benjamin Cummings, 1998.
4. Electromagnetic field theory fundamentals, B. S. Guru et al., 2nd Ed., Cambridge University, 2004.

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SYLLABUS FOR B.Sc. PHYSICS

YEAR : III	QUANTUM MECHANICS	SEMESTER: V
PAPER : CC-08		CREDIT : 4

UNIT - I: Old Quantum Theory (10 Lectures)
Distribution of energy in the spectrum of black body – Planks quantum concept- photo electric effect and Einstein's idea of light quanta – atomic models and atomic spectra - Bohr's quantization rule - Compton effect - theory and experiment - Drawbacks of old quantum theory.

UNIT - II: Matter Waves (12 Lectures)
Dual character of light - De Broglie's hypothesis - Matter waves - De Broglie wave length - wave velocity, group velocity of de Broglie waves - wave packets - Davisson and Germer's experiment – two slit interference of electrons- De Broglie concept and Bohr's quantum condition - energy of particle in a potential well - Principle and working of electron microscope.

UNIT - III: Introduction to Quantum Mechanics (14 Lectures)
Heisenberg's uncertainty principle –elementary proof –gamma ray microscope thought experiment – non-existence of electrons inside the nucleus - Schrödinger's one-dimensional time - dependent wave equation - Schrödinger's one-dimensional time-independent wave equation - physical significance of wave function - orthogonal and normalized wave functions - Eigen function, eigen value and eigen value equation.

UNIT - IV: Operators in Quantum Mechanics (12 Lectures)
Bohr's correspondence principle - postulates of quantum mechanics – operators – operators for momentum, angular momentum, kinetic energy, total energy, - Hamiltonian and Hermitian operators - expectation values commuting and non-commuting operators - commutator for position and momentum operators – Schrödinger's equation and solution for: free particle, particle in a one-dimensional box.

UNIT - V: Application of Schrodinger Equation (12 Lectures)
one-dimensional simple harmonic oscillator -eigen values and energy levels - Reflection at a step potential - transmission across a potential barrier - Tunnel effect. Hydrogen atom – separation of variables – azimuthal, polar and radial wave equations- solution of radial equation in the ground state.

BOOKS FOR STUDY:

1. Elements of quantum mechanics, Kamal Singh and S.P. Singh, 1st Ed., S. Chand & Co., 2005,
2. Quantum Mechanics, S.P. Singh and M.K. Bagde, 1st ed., S. Chand & Co., 2004.
3. Modern Physics, R. Murugesan, 2nd Ed., S. Chand & Co., 2010.
4. Quantum Mechanics, Gupta, Kumar & Sharma, 31st Ed., Jai Prakash Nath Pub, 2012.

BOOKS FOR REFERENCE:

1. Concepts of Modern Physics, Arthur Beiser, 2009, 4th Ed., Tata McGraw – Hill.
2. Quantum Mechanics, Satyaprakash and C.K. Singh, Kedarnath Ram Nath & Co., 1991.
3. Quantum Mechanics, Ghatak and Loganathan, 1st Ed., Springer Netherlands, 2004.
4. Quantum Mechanics, Leonard I. Schiff, 3rd Ed., Tata McGraw Hill, 2010.
5. A Text book of Quantum Mechanics, Mathews & Venkatesan, 2nd Ed., McGraw Hill Ind., 2010.

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SYLLABUS FOR B.Sc. PHYSICS

YEAR : III	SOLID STATE PHYSICS	SEMESTER: V
PAPER : CC-09		CREDIT : 4

UNIT-I: Crystals and Lattice (12 Lectures)

Crystal and amorphous structure - crystal lattice – unit cell - primitive cell - lattice parameters- Bravais lattice in two and three dimensions - co-ordination number - Packing fraction - symmetry elements and symmetry operations - point group and space groups - crystal planes - Miller indices – reciprocal lattice. X-ray diffraction - Bragg's law - Laue's formulation - Laue experimental method - Rotating crystal method.

UNIT-II: Bonding and Lattice Vibrations: (14 Lectures)

Types of chemical bonding - Ionic, Covalent, Metallic, Vander-wall's and Hydrogen bond and their properties - expression for lattice energy of ionic crystal - Madelung constant. Lattice vibrations - vibrations of one dimensional diatomic Lattice - optical and acoustic modes - Phonons and their characteristics. Specific heat capacity - Einstein's and Debye's theory of specific heat capacity.

UNIT-III: **Conduction in solids (12 Lectures)**

Conduction in solids - Drude-Lorentz theory - Conductivity, Resistivity and Mobility - Wiedemann-Franz law – Lorentz number – Sommerfeld's free electron theory - Fermi energy - Density of energy states in one dimension. Hall effect in metals - Hall coefficient - Hall angle - determination of Hall coefficient - applications of Hall effect.

UNIT-IV: Bands in solids (10 Lectures)

Bands in solids - Bloch theorem - division of conductors, insulators and semiconductors on the basis of energy band diagram - mobility, drift velocity and conductivity of intrinsic semiconductor - carrier concentration and Fermi level for intrinsic and extrinsic (n-type) semiconductors.

UNIT-V: Magnetism and Superconductivity (12 Lectures)

Diamagnetism- classical theory - para-magnetism - Langevin theory - Curie's law – ferromagnetism – domains and their origin - outline of anti-ferro and ferrimagnetism. Superconductivity - zero resistivity and perfect diamagnetism - critical temperature and field - Meissner effect - type-I and type-II super conductors - Josephson effect - BCS theory of superconductivity (qualitative ideas).

BOOKS FOR STUDY:

1. Solid state physics, S.O. Pillai, 6th Ed., New Age International Publishers, 2006.
2. Solid State Physics, Puri & Babber, 1st Ed., S. Chand & Co., 2004.
3. Fundamentals of Solid state physics, Saxena et al, 28th Ed., Pragathi Prakashan, Meerut, 2016.

BOOKS FOR REFERENCE:

1. Introduction to Solid state physics, C. Kittel, 8th Ed., Wiley India, 2012.
2. Solid State Physics, W. Ashcroft & N. David Mermin, Holt, 1st Ed., Cengage, 2003.
3. Elementary Solid State Physics, M. Ali Omar, 1st Ed., Addison-Wesley Pub. Co., 1993

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SYLLABUS FOR B.Sc. PHYSICS

YEAR : III	ATOMIC PHYSICS AND RELATIVITY	SEMESTER: V
PAPER : DSE-5		CREDIT : 4

UNIT - I: Atomic Models **(10 Lectures)**

Sommerfeld's atom model - elliptical orbit and relativistic correction – critical potential - excitation potential - Frank-Hertz experiment - Electron spin - Stern and Gerlach experiment - vector atom model – quantum numbers – Pauli's exclusion principle - arrangement of elements in periodic table.

UNIT - II: Electronic Spectra **(14 Lectures)**

Electronic spectra of atoms - Coupling schemes, L-S, J-J couplings, Spectral terms, s, p, d, f – notation - selection rules - fine structure of hydrogen lines; different series in alkali spectra and their features - screening constants for monovalent atoms - series limits- doublet structure of alkali spectrum.

X-ray spectra: The continuum and characteristic spectrum and their origin - Duane and Hunt limit; Moseley's law, fine structure of x-ray levels, X-ray absorption spectra, absorption edges.

UNIT - III: Atoms in Electric and Magnetic Fields **(14 Lectures)**

Magnetic moment of electron due to orbital motion and spin motion – Bohr magneton - gyro magnetic ratios for orbital and spin motions - Lande's 'g' factor - Normal Zeeman effect and anomalous Zeeman effect- Normal and anomalous Zeeman effects with reference to sodium D-lines - theory and experiment - Pachen-Back effect - simple Theory and experiment- Stark effect (experimental study only).

UNIT - IV: Relativity-I **(12 Lectures)**

Frame of reference - Newtonian relativity - Galilean transformations - Michelson-Morley experiment - Einstein's basic postulates - Lorentz transformations - length contraction - Time dilation - Twin paradox - Einstein's velocity addition rule - relativistic Doppler effect.

UNIT - V: Relativity-II **(10 Lectures)**

Variation of mass with velocity - mass energy equivalence - relativistic formulae for momentum and energy - invariant mass - Minkowski's four-dimensional space - space-time diagrams - relativistic view of aberration of star light - general theory of relativity (basic ideas) and its important predictions.

BOOKS FOR STUDY:

1. Modern physics, R. Murugeshan, Kiruthiga Sivaprasath, 17th Ed., S Chand and Co., 2014.
2. A Primer of Special Relativity, P. L. Sardesai, 1st Ed., New Age International, 2004.
3. Atomic Physics, S.N. Ghosal, 7th Ed., S. Chand and Company, 2004.

BOOKS FOR REFERENCE:

1. Concepts of Modern Physics, Arthur Beiser, 2009, 4th Ed., Tata McGraw – Hill.
2. Introduction to Modern Physics, R. B. Singh, 1st Ed., New Age International, 2002.
3. Atomic Physics, J.B. Rajam, S. Chand & Co., 1976.

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)
(For the students admitted from the academic year 2019 - 2020)
SYLLABUS FOR B.Sc. PHYSICS

YEAR : III	ASTROPHYSICS	SEMESTER: V
PAPER : GE-1		CREDIT : 4

UNIT-I: Surveying the Cosmos **(10 Lectures)**

Reflection telescope - refraction telescope – types of reflecting telescopes – radio telescope - radio interferometry – principle of gamma ray and X- ray telescopes – Hubble space telescope (block diagram), space coordinates - right ascension and declination.

UNIT-II: Solar System **(12 Lectures)**

Rotation and revolution of the Earth - Precession of the Earth - seasons on earth - Phases and the features of Moon – solar and lunar eclipses - general properties of terrestrial & Jovian planets - dwarf planets - origin of solar system - Kupier's Proto-planet theory - Exo Planets.

UNIT-III: Sun and Stars **(12 Lectures)**

Different regions of sun and their characteristics - Sun Spots - Solar Flares and Prominences - Solar Wind and its effect on Earth - Aurora. Constellations - Binary stars - star clusters - absolute and apparent magnitudes of stars - Hertzsprung-Russel diagram - outline of Saha's ionization theory.

UNIT-IV: Stellar Evolution **(12 Lectures)**

Nebulas as stellar nurseries – proto-star – Main-sequence stars – energy production in stars – Red Giants – White dwarfs - Chandrasekar's mass limit (qualitative ideas) - heavy element synthesis – Supernova – Neutron stars - Black holes.

UNIT -V: Galaxy and Cosmology **(14 Lectures)**

Hubble classification of galaxies- galaxy clusters and super clusters- Milky way galaxy-Radio galaxies - characteristics; Quasars-radio and optical properties of Quasars.

Expanding universe - Hubble's law - Big-Bang theory -standard model - inflation, evidences in favor of Big-bang theory – Pulsating theory- dark matter - future of the universe.

BOOKS FOR STUDY:

1. An Introduction to Astrophysics, Baidyanath and Basu, 1st Ed., Prentice Hall of India, 2010.
2. Astrophysics -Stars and Galaxies, K. D. Abhyankar, 1st Ed, Universities Press, 2001.
3. Introduction to Cosmology, J. V. Narlikar, 3rd Ed, Cambridge University Press, UK, 2002.

BOOKS FOR REFERENCE:

1. Unfolding our Universe, Ion Nicolson, 1st Ed, Cambridge University Press, UK, 1999.
2. Universe, Roger A Freedman et al., 6th Ed, W. H. Freeman and Company, New York, 2001.
3. Dynamic Astronomy, Robert T. Dixen, 5th Ed., Prentice Hall International, 1989.
4. Explorations-An Introduction to Astronomy, Thomas T. Arny, 3rd Ed, McGraw-Hill, 2004.

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)
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SYLLABUS FOR B.Sc. PHYSICS

YEAR : III	ADVANCED PHYSICS PRACTICAL- I	SEMESTER:V
CORE : SEC-01		CREDIT : 2

*Choose any **Ten** experiments from the following list*

LIST OF EXPERIMENTS

1. Spectrometer - i_1 - i_2 curve and determination of refractive index (I-method).
2. Air wedge - Determination of the thickness of the wire.
3. Spectrometer - Determination of Cauchy's constants.
4. Potentiometer - Resistance of the potentiometer and calibration of low range voltmeter
5. Potentiometer -Calibration of a high range voltmeter.
6. Study of the Series LCR circuit at varying frequencies to measure resonance
7. Study of the rise and decay of current in a RC circuit
8. B.G - Current and voltage sensitivities.
9. B.G - Absolute capacity of a condenser.
10. Field along the axis of the coil Searl's vibration magnetometer.
11. Measurement of wavelength of a laser beam and particle size determination.
12. Determination of Planck's constant
13. Determination of refractive index - Abbe's refractometer.
14. To determine the Rydberg's constant - spectrometer & hydrogen gas discharge tube.
15. Determination of Band-gap of a semiconductor.
16. To determine the Fermi energy of copper using meter bridge.
17. Dielectric constant - Dielectric material of a capacitor - method of charging and discharging.
18. Determination of wavelength of sodium light using Bi-prism.
19. Computer simulation – quantum tunneling and wave packets-PHET sim.
20. Simulation of 3-D models of a various kind of crystal – Crystal walk Animation
21. Computer simulation Davisson-Germer Electron Diffraction experiment -PHET sim.
22. Computer simulation – Important astronomical phenomena – Astronomy simulator.

BOOKS FOR STUDY:

1. Practical Physics and Electronics, C. C. Ouseph et al, 1st Ed., S.Visawanathan Pvt. Ltd., 2005.
2. Practical Physics, M. N. Srnivasan et al, 1st Ed., Sultan Chand and Sons, 2005.
3. A Textbook of Practical Physics, H.P. Shrivastava, 1st Ed., ABD Publishers, 2006.

BOOKS FOR REFERENCE:

1. Practical Physics, G. L. Squires, 3rd Ed., Cambridge University Press, 1985.
2. Experiments in Modern Physics, Adrian C. Melissinos, 2nd Ed., Academic Press, 2003.

WEBSITES FOR SIMULATIONS:

1. PHET Simulations: https://phet.colorado.edu/en/simulations/category/physics/
2. Physics Animations: http://www.vascak.cz/physicsanimations.php?l=en/
3. crystallographic simulator: https://crystalwalk.herokuapp.com/
4. Astronomy simulation: http://astro.unl.edu/naap/

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)
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SYLLABUS FOR B.Sc. PHYSICS

YEAR : III	ELECTRONICS PRACTICAL -I	SEMESTER: V
PAPER : SEC-02		CREDIT : 2

*Choose any **Ten** experiments from the following list*

LIST OF EXPERIMENTS

1. Clipping and Clamping circuits using diodes.
2. Hartley oscillator – frequency measurement and determination of self-inductance.
3. Tuned collector oscillator - Frequency measurement by CRO and Frequency counter.
4. Bi-stable Multi-vibrator(transistors) - Measurement of Frequency by Frequency counter.
5. Single stage RC coupled - Frequency response curve.
6. Basic OP-AMP circuits - Half-wave rectifier, Clipper, Clamper, Comparator,
7. OP-AMP Integration and differentiation.
8. Wien bridge oscillator - Measurement of Frequency by Frequency counter.
9. Basic Logic and Universal gates using diodes and transistors components.
10. Basic and Universal logic gates using ICs
11. Implementation of logic expression and their simplification
12. Arithmetic circuits using discrete gates.
13. XOR and XNOR logic gates using NAND and NOR gates
14. Multiplexers-using ICs
15. RS, D, JK and Master Slave flip-flops
16. Shift Registers using ICs
17. Intel 8085 – 8-bit Addition and subtraction,
18. Intel 8085 – addition of two 8-bit numbers having 16-bit sum.
19. Computer simulation – Amplifiers analysis - Electronic Circuit Simulator.
20. Computer simulation of Registers – Logism simulator.
21. Computer simulation of intel 8085 – bubble sorting.
22. Computer simulation using Logism – Multiplexer and de-multiplexers.

BOOKS FOR STUDY:

1. Practical Physics and Electronics, C.C. Ouseph etal, 1st Ed., S. Visawanathan Pvt. Ltd., 2005.
2. Practical Physics, M. N. Srnivasan etal, 1st Ed., Sultan Chand and Sons, 2005.
3. A Textbook of Practical Physics, H.P. Shrivastava, 1st Ed., ABD Publishers, 2006.

BOOKS FOR REFERENCE:

1. Practical Physics, G. L. Squires, 3rd Ed., Cambridge University Press, 1985.
2. Experiments in Modern Physics, Adrian C. Melissinos, 2nd Ed., Academic Press, 2003.
3. Basic electronics – A Text-lab manual, Zbar etal, 7th Ed., Tata McGraw Hill, 2009.
4. Digital Electronic Practice Using ICs-R.P. Jain and M.M.S. Anand, 1st Ed., TMH, 1988.

WEBSITES FOR SIMULATIONS:

1. Electronic circuit simulator - http://www.falstad.com/circuit/
2. Logism software – digital electronic simulator - http://www.cburch.com/logisim/
3. Microprocessor simulator -Jubin's 8085 simulator.

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)
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SYLLABUS FOR B.Sc. PHYSICS

YEAR : III	NUCLEAR AND PARTICLE PHYSICS	SEMESTER: VI
PAPER : CC - 10		CREDIT : 4

UNIT - I: Nuclear Properties **(12 Lectures)**

Constituents of nucleus – classification of nuclei - nuclear properties: size, radius, volume, mass, density - Mass defect - Binding energy - stability of the nucleus – binding energy curve – N-Z plot -Packing fraction - Nuclear charge, spin and magnetic moment.

UNIT-II: Nuclear forces **(10 Lectures)**

Types of nuclear forces - properties of nuclear forces - Meson theory of nuclear forces – semi-empirical mass formula - nuclear models -Features of liquid drop model and shell model of the nucleus - merits and demerits evidence for nuclear shell structure- Magic numbers – collective model (basic ideas).

UNIT - III: Radioactivity **(14 Lectures)**

Radioactivity – laws of radioactive disintegration and successive disintegration – secular and transient equilibrium – radioactive dating – Geiger-Nuttall law – alpha ray spectra – Gamow theory of alpha decay (qualitative ideas) – beta spectra – origin – neutrino theory of beta decay- gamma ray emission -internal conversion.

UNIT - IV: Nuclear reactions **(14 Lectures)**

Nuclear reactions with examples – Q value of the reactions - threshold energy - conservation laws - concept of compound and direct reaction - resonance reaction - reaction cross section - Rutherford scattering. Particle accelerators: Betatron, proton synchrotron. Radiation detectors: GM counters, scintillation counters.

Nuclear fission - chain reaction - critical size - nuclear reactors – power and breeder reactors. Nuclear fusion - controlled thermo-nuclear reactions - stellar energy.

UNIT - V: Particle physics **(10 Lectures)**

Types of particles and its families – particle and antiparticles - quantum numbers of particles: Baryon number, Lepton number, Isospin, strangeness, parity - symmetries and conservation laws - quarks and their types - concept of quark model - color quantum number and gluons- four fundamental interactions between particles.

BOOKS FOR STUDY:

1. Nuclear Physics, S.N. Ghosal, 1st Ed., S. Chand & Co., 2009.
2. Modern Physics, R. Murugesan et al., 14th Ed., S. Chand & Co., 2007.
3. Nuclear Physics, D.C. Dayal, 1st Ed., Himalaya Publishing House, 2011.
4. Nuclear Physics, S. B. Patel, 2nd Ed., New Age International, 2011.

BOOKS FOR REFERENCE:

1. Introductory Nuclear Physics, Kenneth S. Krane, 3rd Ed., Wiley India Pvt. Ltd., 2008.
2. Concepts of Nuclear Physics, Bernard L. Cohen, 1st Ed., Tata Mcgraw Hill, 2008.
3. Introduction to Elementary Particles, D. Griffith, 1st Ed., John Wiley & Sons, 2008.

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)
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SYLLABUS FOR B.Sc. PHYSICS

YEAR : III	MOLECULAR SPECTROSCOPY AND LASER PHYSICS	SEMESTER: VI
PAPER : CC - 11		CREDIT : 4

UNIT - I: Rotational Spectroscopy **(10 Lectures)**

Molecular spectrum - types of molecular energies - types of molecular spectra - Rotational spectrum – theory of rigid diatomic rotator - spectrum of CO - non-rigid rotator - types of molecules and their moments of inertia –spectrum of carbon oxysulphide - microwave spectrophotometer (block diagram).

UNIT - II: IR Spectroscopy **(14 Lectures)**

Modes of vibrations of a molecule - Regions of IR absorption spectroscopy - conditions for absorption of IR radiation -theory of diatomic harmonic oscillator –anharmonic oscillator (basic idea) - Description and working of a double beam IR spectrophotometer - Fourier transform IR spectroscopy (basic ideas) – modes of vibration of polyatomic molecules- molecular structure of H_2O and CO_2 using IR spectroscopy.

UNIT - III: Raman Spectroscopy **(12 Lectures)**

Raman effect - stokes and anti-stokes lines - Classical & Quantum theory of Raman effect – Laser as Raman source - Design and working of Laser Raman spectrophotometer - Types of Raman spectrum - Rule of mutual exclusion - Raman spectrum to study molecular structure of CO_2, H_2O and N_2O - comparison between IR and Raman spectra.

UNIT - IV: Fundamentals of Laser **(12 Lectures)**

The width of spectral lines – types of line broadening - coherent length and coherent time (basics only) - spatial coherence - temporal coherence - Spontaneous & stimulated emission - Einstein's A and B coefficients - conditions for light amplification and large stimulated emissions - concept of population inversion - pumping - pumping methods - active medium.

UNIT - V: Construction of Laser **(12 Lectures)**

Laser resonators – laser modes - Pumping schemes - three level and four level pumping schemes - Types of Lasers - design and operation of: Nd:YAG laser, He-Ne Laser, Tunable dye laser, semiconductor diode laser – basics of Excimer lasers - Holography (basic Concepts).

BOOKS FOR STUDY:

1. Fundamentals of Molecular spectroscopy, C.N. Banwell, 4th Ed., TMH, 2009.
2. Spectroscopy, Gurdeep & Chatwal, 5th Ed., Himalaya Publishing House, 2016.
3. An introduction to Lasers, M.N. Avadhanulu, 1st Ed., S. Chand & Co., 2001.

BOOKS FOR REFERENCE:

1. Spectroscopy, B.K. Sharma, 20th Ed., GOEL Publishing House, 2007.
2. Organic Spectroscopy, William Kemp, 3rd Ed., Palgrave Macmillan, 1991.
3. Laser Fundamentals, W.T. Silfvast, 2nd Ed., Cambridge University Press, 2004.
4. Lasers and Non-linear optics, B.B. Laud, 3rd Ed., New Age International, 2011.

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)
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SYLLABUS FOR B.Sc. PHYSICS

YEAR : III	DIGITAL ELECTRONICS	SEMESTER: VI
PAPER : CC - 12		CREDIT : 4

UNIT -I: Number system and Boolean simplification (10 Lectures)

Number systems and their inter conversion - binary arithmetic - basic gates and universal gate operations - Boolean algebraic theorems and properties - Karnaugh map: two, three and four variable maps - POS and SOP simplification - NAND and NOR implementation - don't care conditions.

UNIT-II: Logic Families and Combinational Logic (12 Lectures)

Types of logic families, characteristics and parameters - TTL gates - TTL open collector gates - CMOS gates - TTL-CMOS interface - Combinational logic design: parity checker, half adder, full adder, binary adder, demultiplexer, multiplexer, decoders, Encoders.

UNIT-III: Flip-Flops, Register and Counters (12 Lectures)

RS flip-flops - clocked RS flip-flop - edge-triggering - JK flip-flop - D-type flip-flops - JK master slave flip-flop - serial-in-serial out, serial-in-parallel out shift registers - asynchronous counters - decade counter (Mod 10 counter) – clock wave form -NE 555 timer in astable mode as clock.

UNIT-IV: D/A and A/D Converters (12 Lectures)

Principle of variable network and binary ladder type - four-bit D/A converter - A/D converter: counter method and successive approximation method - resolution and accuracy of D/A and A/D converter - frequency counters - digital voltmeters.

UNIT -V: Microprocessor 8085 (14 Lectures)

Components of a micro - processor system - architecture of 8085 - addressing modes - pin configuration - internal bus - instruction formats – addressing modes – classification of instruction in 8085 - data transfer instructions – arithmetic and logical instructions - loop instructions - interrupts in 8085. Assembly language programming of Intel 8085 – programs involving 8-bit addition and subtraction.

BOOKS FOR STUDY

1. Digital Principles and Applications, Malvino & Leach, 7th Ed., Tata McGraw Hill, 2011.
2. Modern Digital Electronics, R.P. Jain, 3rd Ed., Tata McGraw-Hill, New Delhi, 2006.
3. Microprocessor Architecture, Programming, and Applications with the 8085, R. S. Gaonkar, 5th Ed., Prentice Hall, 2002.

BOOKS FOR REFERENCE:

1. Digital fundamentals, Floyd L. Thomas, 8th Ed., Pearson Education Pvt. Ltd, 2005.
2. Digital logic and computer design, M. Morris Mano, 4th Ed., Prentice Hall of India, 2008.
3. Fundamentals of Microprocessors and Microcomputers, Badri Ram, 1st Ed., Dhanpat Rai Publ., 2005.

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)
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SYLLABUS FOR B.Sc. PHYSICS

YEAR : III	COMMUNICATION ELECTRONICS	SEMESTER: VI
PAPER : DSE-06		CREDIT : 4

UNIT- I: Amplitude Modulation (12 Lectures)

Need for modulation – types - Amplitude modulation – theory - modulation index - sidebands - power output in AM - Base modulation - theory of balanced modulator - SSB generation by phase shift method - AM transmitter (block diagram). Detection: simple Diode and transistor detectors - super-heterodyne receivers.

UNIT- II: Frequency and Pulse modulation (12 Lectures)

Frequency modulation - theory - qualitative discussion of Bessel harmonics – side bands - modulation percentage - reactance modulator - FM detectors: dual slope detectors, the discriminator. Digital (pulse) modulation – PPM, PAM, PCM (basic ideas only).

UNIT-III: Television transmission and reception (12 Lectures)

Image transmission principles – scanning- synchronization and blanking pulse - composite signal - TV camera: Image orthicon - B/W TV transmitter & receiver (block diagram) - Television systems - transmission of colour information - colour picture tube - colour TV transmitter & receiver (block diagram) - shadow mask tube – LCD TV (basic ideas) - cable TV.

UNIT-IV: Wave Propagation in Space (12 Lectures)

Modes of electromagnetic wave propagation in space - Ground waves propagation - line of sight distance - reflection of radio waves by earth's surface - Space wave propagation - effect of earth's curvature - duct propagation – skywaves - theory of Ionospheric refractive index and bending of sky waves - expression for skip-distance & maximum usable frequency.

UNIT- V: Antenna (12 Lectures)

Basic antenna action - antenna parameters-- Expressions for radiated E & B fields, power radiated, power pattern, radiation resistance, directive gain and directivity of short doublet and half-wave antenna. General principle & power pattern of two element (half-wave) array - qualitative ideas of: end-fire array, broad-side array – design and working of: Yagi antenna, parabolic reflectors.

BOOKS FOR STUDY:

1. Hand book of electronics, Gupta &Kumar, Revised 23rd Ed., Pragati Prakashan, 2012.
2. Electronic & Radio Engineering, M. L. Gupta, 1st Ed., Dhanpat Rai & Sons, 2011.
3. Electronic Communications, Roody & Coolen, 4th Ed., Pearson, 1995.

BOOKS FOR REFERENCE:

1. Electronic Communications Systems, Roy Blake, 2nd Ed., Cengage Learning, 2001.
2. G. Kennedy, Electronic Communications Systems, 4th Ed., Tata McGraw Hill, India, 2008.
3. Advanced Electronic Communications Systems, Wayne Tomasi, 6th Ed., Pearson, 2013.
4. Television Electronics: Theory & Servicing, Kiver & Kaufman, 8th Ed., Springer, 1983.

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)
(For the students admitted from the academic year 2019 - 2020)
SYLLABUS FOR B.Sc. PHYSICS

YEAR : III	COMPUTATIONAL PHYSICS	SEMESTER: VI
PAPER : GE-02		CREDIT : 4

UNIT - I: Introduction to Computers (10 Lectures)

Classification of computers - components of computers: central processing unit, input and output devices- types of computer memory - storage devices - magnetic disc - optical technology - flash memory - system software- operating system - popular operating systems: Windows, Mac, Unix and Linux (basic ideas only).

UNIT - II: Network fundamentals and Programming Languages (10 Lectures)

Types of network - LAN, MAN and WAN - internet and intranet - internet tools - World Wide Web - search engine –virus - virus detection and control systems- application software – LibreOffice (general idea).

Programming Languages - overview of programming languages - development of programming languages - applications- advantages and disadvantages of HLL.

UNIT - III: Learning FORTRAN (14 Lectures)

Fortran Character Set - Constants, variables, operators – mode of expressions – arithmetic to FORTRAN expression – hierarchy of operators - statements – conditional and unconditional - input & output statements – executable statements - format and goto statements – computed goto – arithmetic IF – logical IF, built-in functions - Do statement – simple Do loop - function - subroutine – arrays (introduction).

UNIT -IV: FORTRAN Programming: (14 Lectures)

Algorithm – simple examples - concept of Flow Chart - symbols, guidelines, types. Programs using Fortran: Area of a triangle heron's formula, to check leap year, factorial of a number using stirling's formula, solution of quadratic equation, conversion of temperature from one unit to another, conversion of decimal numbers to binary, binary to decimal, sum of infinite series (exp(x), sin(x), cos(x)), addition and multiplication of matrix.

UNIT -V: Data Visualization: (12 Lectures)

Introduction to graphical analysis and its limitations - introduction to Gnuplot - importance of visualization of computational and computational data - basic Gnuplot commands - simple plots - plotting data from a file - saving and exporting - multiple data sets per file - physics with Gnuplot (equations, building functions, user defined variables and functions).

BOOKS FOR STUDY:

1. Introduction to Information Technology, ITL Education Solutions, 1st Ed., Pearson, 2006.
2. Computer Programming in Fortran 77. V. Rajaraman, 4th Ed., PHI Learning, 2006.
3. Gnuplot in Action, Philip K Janert, 2nd Ed., Manning Publications, 2012.

BOOKS FOR REFERENCE:

1. Schaum's Outline of Theory and Problems of Programming with Fortran, S Lipsdutz and A Poe, 1st Ed., Mc-Graw Hill Book Co. 1987.
2. Computational Physics, R. C. Verma, et al. 1st Ed., New Age International Publishers, 1999.
3. Gnuplot Cookbook, Lee Phillips, 1st Ed., Packt Publishing, UK, 2012.

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)
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SYLLABUS FOR B.Sc. PHYSICS

YEAR : III	ADVANCED PHYSICS PRACTICAL - II	SEMESTER: VI
PAPER : SEC-03		CREDIT : 2

*Choose any **Ten** experiments from the following list*

LIST OF EXPERIMENTS

1. Spectrometer - i_1 - i_2 curve for given angle of deviation (II method).
2. Spectrometer - resolving power of diffraction grating.
3. Spectrometer - small angled prism.
4. Potentiometer - Resistance of the potentiometer & measurement of emf of a thermocouple.
5. Potentiometer - Temperature coefficient of resistance of the material of a coil of wire.
6. B.G - Quantity or charge sensitivity
7. B.G - Comparison of mutual inductance of two pairs of coils.
8. Study of the Parallel LCR circuit at varying frequencies to measure resonance
9. Study of the rise and decay of current in a LR circuit
10. Field along the axis of a circular coil - Determination of moment of a magnet
11. Temperature co-efficient of a Thermistor.
12. Measurement of charge on an electron by Milliken's method.
13. Characteristics of a solar cell.
14. Measurement of e/k, using a transistor and hence determining the Boltzmann constant - k.
15. Hall probe in magnetic field measurement.
16. Ultrasonic velocity and compressibility of the liquids -Interferometer method.
17. To verify Stefan's law from the power dissipated across the bulb as a function of resistance.
18. Study of optical rotation by solutions.
19. Computer simulation of photo electric effect-PHET Sim.
20. Computer simulation of quantum bound states- PHET Sim.
21. Computer simulation of quantum wave interference - PHET Sim.
22. Computer simulation of Nuclear chain reactions and nuclear energy - PHET Sim.

BOOKS FOR STUDY:

1. Practical Physics and Electronics, C.C. Ouseph et al, 1st Ed., S. Visawanathan Pvt. Ltd., 2005.
2. Practical Physics, M.N. Srnivasan et al, 1st Ed., Sultan Chand and Sons, 2005.
3. A Textbook of Practical Physics, H.P. Shrivastava, 1st Ed., ABD Publishers, 2006.

BOOKS FOR REFERENCE:

1. Practical Physics, G. L. Squires, 3rd Ed., Cambridge University Press, 1985.
2. Experiments in Modern Physics, 2nd Ed., Adrian C. Melissinos, Academic Press, 2003.

WEBSITES FOR SIMULATIONS:

1. PHET Simulations - https://phet.colorado.edu/en/simulations/category/physics/
2. Physics Animations - http://www.vascak.cz/physicsanimations.php?l=en/

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)
(For the students admitted from the academic year 2019 - 2020)
SYLLABUS FOR B.Sc. PHYSICS

YEAR : III	ELECTRONICS PRACTICAL - II	SEMESTER: VI
PAPER : SEC-04		CREDIT : 2

*Choose any **Ten** experiments from the following list*

LIST OF EXPERIMENTS

1. Power pack with bridge rectifier, Zener regulator and shunt capacitor filter.
2. Colpitt's oscillator - Frequency measurement by CRO and Frequency counter.
3. RC oscillator - Frequency measurement by CRO and Frequency counter.
4. Astable multi-vibrator - Using Transistor and 555 Timer- Frequency measurements
5. Two stage RC coupled amplifier and study of its frequency response and feedback.
6. Emitter follower.
7. OP-AMP adder and subtractor.
8. Schmitt trigger – Conversion of sine wave to square wave.
9. Transistor Amplitude modulator and measurement of percentage of modulation.
10. Universal logic gates using RTL and DTL using discrete components.
11. NAND and NOR as universal gates using ICs
12. IC Half adder and Full adder.
13. Parity generator / checker.
14. Demultiplexers.
15. Asynchronous counters using ICs.
16. Diode AM detection.
17. Intel 8085 – 8-bit multiplication and division.
18. Intel 8085 – subtraction of two 8-bit number with borrow.
19. Computer simulation – oscillator working - Electronic Circuit Simulator.
20. Computer simulation using Logism – counters.
21. Computer simulation using Logism – Encoder/decoders.
22. Computer simulation of intel 8085 – generating Fibonacci series.

BOOKS FOR STUDY:

1. Practical Physics and Electronics, C.C. Ouseph et al, 1st Ed., S. Visawanathan Printers, 2005.
2. Electronics Lab Manual Volume I, K. A. Navas, 5th Ed., PHI, 2015.
3. Digital Electronic Practice Using ICs, R.P. Jain and M.M.S. Anand, 1st Ed., TMH, 1988.

BOOKS FOR REFERENCE:

1. Practical Physics, G. L. Squires, Cambridge University Press, 3rd Ed., 1985.
2. Experiments in Modern Physics, Adrian C. Melissinos, Academic Press, 2nd Ed., 2003.
3. Basic electronics – A Text-lab manual, Zbar et al, Tata McGraw Hill, 7th Ed., 2009.
4. Digital Electronics (Lab Manual), Bignell and Donovan, 5th Ed., Cengage Learning,2006.

WEBSITES FOR SIMULATIONS:

1. Electronic Circuit Simulator. http://www.falstad.com/circuit/
2. Logism software – digital electronic simulator - http://www.cburch.com/logisim/
3. Microprocessor simulator -Jubin's 8085 simulator.

BHARATHIDASAN GOVT. COLLEGE FOR WOMEN (Autonomous)
(For the students admitted from the academic year 2019 - 2020)
ALLIED PHYSICS SYLLABUS FOR II B.Sc. CHEMISTRY

YEAR : II	ALLIED PHYSICS – I	SEMESTER: III
PAPER: AC-01		CREDIT : 4

UNIT – I: Simple Harmonic Motion (10 Lectures)

Simple harmonic motion-differential equation and its solution- period of SHM-simple pendulum- vertical oscillations of mass attached to spring- Compound pendulum - center of oscillation and center of suspension -determination of acceleration due to gravity using compound pendulum.

UNIT – II: Elasticity (12 Lectures)

Hooke's law - stress and strain - Elastic modulii - Poison's ratio -relation between elastic constants - expression for bending moment of a beam - Cantilever - expression for depression -determination of Young's modulus of a rectangular bar - non-uniform bending - pin and microscope method with theory – torsion - expression for couple per unit twist - determination of rigidity modulus - torsion pendulum.

UNIT – III: Viscosity and Surface Tension (12 Lectures)

Viscosity - coefficient of viscosity - equation of continuity -Streamline flow and turbulent flow - Poiseuille's formula (analytical method), comparison of viscosity experiment – Stoke's law, determination of viscosity. Surface tension and surface energy - interfacial surface tension - experimental determination of surface tension by drop weight method-with theory - variation of surface tension with temperature.

UNIT - IV: Heat and Thermodynamics (12 Lectures)

Specific heat of liquids - Newton's law of cooling - determination of specific heat of liquid - specific heat capacity of gases - C_P & C_V - Mayer's relation - ratio of specific heat capacities - Thermal conductivity- Thermal conductivity of a bad conductor - Lee's disc method - First law of thermodynamics and second law of thermodynamics- Isothermal and adiabatic process- Indicator diagram-Carnot's engine- efficiency.

UNIT – V: Optics (14 Lectures)

Interference: conditions for interference- theory of interference - Newton's rings, determination of refractive index - Interferometers - Michelson's Interferometer - determination of wavelength. Diffraction: Fresnel's diffraction and Fraunhofer diffraction - Fraunhofer diffraction at single slit -double slit - plane diffraction grating theory-determination of wavelength. Polarisation: optical activity-specific rotatory power-Polarimeter-Laurentz's half shade Polarimeter.

BOOKS FOR STUDY:

1. Allied Physics, R. Murugeasn, 1st Ed., S. Chand & Co., 2005.
2. A Textbook of Allied Physics (VoI-I and Vol-II), Dr.Sabesan etal, 1st Ed., 1998.
3. Ancillary Physics, Kamalakannan and others, 1st Ed., S. Viswanathan Publishers, 2000.

BOOKS FOR REFERENCE:

1. Fundamentals of Physics, Halliday, Resnik, Walker, 5th Ed. Asian Books Pvt. Ltd., 2002.
2. Refresher Course in Physics -Vol-I and Vol-II, C.L Arora, 19th Ed., S Chand and Co., 2007.

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YEAR : II	**ALLIED PHYSICS PRACTICAL - I**	**SEMESTER: III**
PAPER : ACP-01		**CREDIT : 2**

*Choose any **Eight** experiments from the following list*

LIST OF EXPERIMENTS:

1. Young's modulus-Non-Uniform bending – Scale and Telescope.
2. Rigidity modulus-Torsional oscillations without masses.
3. Comparison of coefficient of viscosity.
4. Surface tension of a liquid and interfacial surface tension by drop weight method.
5. Stoke's method - determination of viscosity.
6. Spectrometer –velocity of light in a liquid- Hollow prism.
7. Newton's Rings – determination of focal length of Plano-convex lens.
8. Melde's apparatus-Determination of frequency.
9. Joule's calorimeter – determination of specific heat of liquid.
10. Field along the axis of the circular coil carrying current- Determination of $\mathbf{B_H}$.
11. Potentiometer - calibration of low range voltmeter (0-1.5 volts).
12. Meter Bridge – specific resistance of given coil of wire.
13. Computer simulation of oscillating mass - measurement of time period and energy- PHET Sim.
14. Computer simulation of law of gravitation.

BOOKS FOR STUDY:

1. Practical Physics and Electronics, C.C. Ouseph etal, 1st Ed., Viswanathan Printers, 2005.
2. Practical Physics, M.N.Srnivasan etal, 2nd Ed., Sultan Chand and Sons, 2005.
3. A Textbook of Practical Physics, H.P. Shrivastava, 1st Ed., ABD Publishers, 2006.

BOOKS FOR REFERENCE:

1. Practical Physics, P. R. Sasikumar, 1st Ed., PHI Learning Pvt. Ltd, 2011.
2. B.Sc. Practical Physics, Harnam Singh and P.S.Hemne, 2nd Ed., S. Chand & Co, 2002.

WEBSITES FOR SIMULATIONS:

1. PHET Simulations -https:/ /phet.colorado.edu/en/simulations/category/physics/
2. Physics Animations - http://www.vascak.cz/physicsanimations.php?l=en/

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PAPER: AC-02		CREDIT : 4

UNIT –I: Electricity (14 Lectures)

Gauss's law with proof – Electric intensity and potential due to a uniformly charged hollow conductor at a point outside, on the surface and inside a spherical conductor — capacity of a parallel plate condenser with and without a dielectric slab – dielectric polarization – polar and nonpolar molecules; Electrolysis – electrical conductivity of electrolyte - Kohlrausch Bridge – working of Daniel and Leclanché cell – Secondary cell - lead-acid accumulator- Li ion battery (basic idea).

UNIT –II: Electromagnetism & Magnetism (12 Lectures)

Biot & Savart's law — field along the axis of a circular coil carrying current – Magnetic properties of materials – relation between – the three magnetic vectors – susceptibility and permeability - para, dia and ferromagnetism (qualitative ideas) – magnetic hysteresis. Superconductivity – persistent current and Meissner Effect-uses of superconductors.

UNIT-III: Modern physics (12 Lectures)

Breakdown of classical mechanics – old quantum theory - de Broglie ideas - Davison-Germer - experiment-Heisenberg uncertainty principle – Schrodinger time dependent equation.
Radioactive isotopes (production and uses) – particle accelerator – linear accelerator – particle detectors – Scintillation counter – nuclear models – Liquid drop model-Fission and Fusion reaction- nuclear reactors.

UNIT-IV: Electronics (12 Lectures)

Junction diode - V-I characteristics –half-wave rectifier - Transistors – modes of transistors – CE characteristics – transistor as a RC coupled amplifier, frequency response (without derivation) – basic principles of an oscillator - Hartley oscillator – working (without derivation) – elementary ideas about modulation and demodulation – working of electronic PH meter (block diagram).

UNIT - V: Laser Physics (10 Lectures)

Spontaneous and Stimulated emission – population inversion – pumping - active medium -laser cavity-characteristics of lasers – He-Ne laser - tunable dye laser - application of lasers.

BOOKS FOR STUDY:

1. Allied Physics -Paper I & II, R. Murugesan, 1st Ed., S Chand & Co, 2005.
2. A Textbook of Allied Physics, Dr. Sabesan et al., Vol-I and Vol-II, 1998.
3. Ancillary Physics, Ponnusamy, et al., 1st Ed., Anuradh publishers, 1998.
4. Ancillary Physics, Kamalakannan, et al., 1st Ed., S.Viswanathan Publishers, 2000.

BOOKS FOR REFERENCE:

1. Fundamentals of Physics, Resnick, Halliday et al, 10th Ed., John Wiley & Sons, 2013.
2. Refresher Course in Physics (Vol-I &II), C.L Arora, 19th Ed., S Chand and Co., 2011.

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YEAR : II	ALLIED PHYSICS PRACTICAL - II	SEMESTER: IV
PAPER : ACP-02		CREDIT : 2

*Choose any **Eight** experiments from the following list*

LIST OF EXPERIMENTS:

1. Compound determination of acceleration due to gravity.
2. Rigidity modulus - Static torsion-scale and telescope method.
3. Post office box- laws of resistance and specific resistance.
4. Spectrometer -Grating-N determination by normal incidence method.
5. Sonometer-verification of law of transverse vibration in strings
6. Potentiometer - calibration of ammeter (0-1.5 amps).
7. Figure of merit of a periodic moving coil galvanometer.
8. Newtons law of cooling - specific heat capacity of liquid.
9. Measurement of magnetic moment – Defection (Tan A) and vibration magnetometer
10. Measurement thermos-emf by digital millimeter.
11. Diffractions of Diode Laser – determination of wavelength.
12. Junction diode V-I diode characteristics.
13. Computer simulation of AC and DC circuits - PHET Sim.
14. Computer simulation of Nuclear chain reactions and nuclear energy - PHET Sim.

BOOKS FOR STUDY:

1. Practical Physics and Electronics, C.C. Ouseph et al, 2nd Ed., Visawanathan Printers, 2005.
2. Practical Physics, M.N. Srnivasan et al, 2nd Ed., Sultan Chand and Sons, 2005.
3. A Textbook of Practical Physics, H.P. Shrivastava, 2nd Ed., ABD Publishers, 2006.

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1. PHET Simulations -https:/ /phet.colorado.edu/en/simulations/category/physics/
2. Physics Animations - http://www.vascak.cz/physicsanimations.php?l=en/