Teaching and Examination scheme of SEM UG SEM I and II

2024-25

INSTITUTE OF SCIENCE, NAGPUR

(An Autonomous Institute of Government of Maharashtra)

DEPARTMENT OF PHYSICS

Teaching and Examination scheme
Name of Course (Subject): PHYSICS
Programme Outcomes (PO):

On completion of the B.Sc. PHYSICS students will be able to:

1. Develop Understanding of advanced concepts of physics
2. Solve the problems in physics.
3. Demonstrate the concepts of physics by performing experiments.
4. Develop algorithm using programming techniques for numerically solving physics problems.
5. Design and find solutions to innovative problems based on physics.
6. Pursue advanced studies and research in physical sciences.

Table 5: B.Sc. Semester I

Sr No	Course Category	Name of the course (Title of the Paper)	Course code	Level	Theory Th	Tutorial Tu	Practical P	Total Credit	Duration of Examination (Hrs)	Semester End Evaluation (SEE)	Continuous Internal Evaluation (CIE)	Minimum Passing Marks
1	Subject (One will be Major and other Minor in Semester III)	Subject 1: Mechanics and Properties of Matter	B-PH111T	4.5	2	--	--	2	2	30	20	25
		Subject 1 Lab	B-PH112P		--	--	2	1	4	30	20	25
		Subject 2:			2	--	--	2	2	30	20	25
		Subject 2 Lab			--	--	2	1	4	30	20	25
2	GE	Everyday Physics	B-PH113T		2	--	--	2	2	30	20	25
		Storytelling Physics	B-PH114T		2	--	--	2	2	30	20	25
3	VSEC	Physical Measurement techniques	B-PH115P		--	--	4	2	4 - 6	60	40	50
		Designing Power Supplies	B-PH116P		--	--	4	2	4 - 6	60	40	50
4	AEC	English Compulsory			2	--	--	2	2	30	20	25
5	VEC	Environmental Studies			2	--	--	2	2	30	20	25
6	IKS	Introduction to Metaphysics	B-PH117T		2	--	--	2	2	30	20	25
7	CC	NSS /NCC / Sports / Cultural			--	--	4	2	--	--	100	50
		Total			14	--	16	22	--	390	360	--

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Table 6: B.Sc. Semester II

Sr No	Course Category	Name of the course (Title of the Paper)	Course code	Level	Theory Th	Tutorial Tu	Practical P	Total Credit	Duration of Examination (Hrs)	Semester End Evaluation (SEE)	Continuous Internal Evaluation (CIE)	Minimum Passing Marks
1	Subject (One will be Major and other Minor in Semester III)	Subject 1:- Thermodynamics and Statistical Physics	B-PH121T		2	--	--	2	2	30	20	25
		Subject 1 Lab	B-PH122P		--	--	2	1	4	30	20	25
		Subject 2:			2	--	--	2	2	30	20	25
		Subject 2 Lab			--	--	2	1	4	30	20	25
2	GE	Basic Concepts in Physics	B-PH123T		2	--	--	2	2	30	20	25
		Physics of Solar System	B-PH124T		2	--	--	2	2	30	20	25
3	VSEC	Maintenance of Household appliances	B-PH125P	4.5	--	--	4	2	4 - 6	60	40	50
		Electrical and Electronics Measurement techniques	B-PH126P		--	--	4	2	4 - 6	60	40	50
4	AEC	English Compulsory			2	--	--	2	2	30	20	25
5	VEC	Constitution of India			2	--	--	2	2	30	20	25
6	IKS	Indian Contribution to Astronomy	B-PH127T		2	--	--	2	2	30	20	25
7	CC	NSS /NCC / Sports / Cultural			--	--	4	2	--	--	100	50
	Total				14	--	16	22	--	390	360	--

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DSC: Mechanics and Properties of Matter, B-PH111T Credit: 2

Objective: To provide the necessary information regarding mechanics and properties of matter.

Course Outcomes: After completing this course, students should be able to
1. Distinguish inertial, non-inertial and rotational frames of reference
2. Explain the concept of fictitious and Coriolis forces
3. Solve collision problems and determine motion regular/irregular bodies
4. Determine mechanical properties of solids
5. Solve problems based on surface tension and viscosity of liquids

Syllabus

Unit I: (7.5 Hrs)

Mechanics: Newton's law of motion, motion in a plane, components of velocity and acceleration in different coordinate system, Centripetal acceleration, Coriolis force and its applications. System of particles, Center of mass, Equation of motion, Conservation of linear and angular momentum, Conservation of energy, Elastic and inelastic collisions, Moments of inertia and their products, Moment of inertia of cylinder and sphere, Principal moments and axes.

Unit-II (7.5 Hrs)

Elasticity: Introduction, Hooke's law, Elastic constants (Y, K, η) and relation between them, Poisson's ratio, Elastic limit, Work done in stretching a wire, Twisting couple on a solid cylinder, Work done in twisting solid cylinder (wire), Bending of beam, Bending moment, External and internal bending moment, Cantilever supported at one end and at both end, Torsional pendulum, and Maxwell needle.

Unit III: (7.5 Hrs)

Viscosity: Streamline and turbulent flow, Coefficient of viscosity, Equation of continuity, Euler's equation, Bernoulli's theorem and its applications (Lift of an Airplane, Atomizer) , Poiseuilli's formula, Reynolds number, Terminal velocity, Stokes law by the method of dimension, Variation of viscosity with temperature.

Unit IV: (7.5 Hrs)

Surface tension: Introduction, Relation between radius of curvature, pressure and surface tension. Angle of contact and wetting, Surface energy, Pressure difference across a liquid surface: Excess pressure inside a spherical liquid drop, Excess pressure inside a soap bubble. Surface tension by Jaeger's, Quincke's and Capillary rise methods

References & Text books:

1. Applied Fluid Mechanics, by Mott Robert, Pearson Benjamin Cummir, VI Edition, Pearson Education/Prentice Hall International, New Delhi
2. Properties of Matter, by D. S. Mathur, Shamlal Chritable Trust New Delhi
3. Properties of Matter, by Brijlal
4. Physics for Degree Students B.Sc.-Part-I, by- C. L. Arora, Dr. P. S. Hemne, S Chand & Company.

5. General Properties of matter, by J. C. Upadhyay, Ram Prasad & Sons

6. Mechanics, by D. S. Mathur, S Chand.

7. Mechanics, by B. M. Roy, Das Ganu Publications.

8. A text book of properties of Matter, by N. S. Khare& S. Kumar.

9. Mechanics & Properties of Matter, by J. C. Upadhyaya.

B.SC.I, SEM I
DSC: LAB, B-PH112P Credit: 2

Objective: To provide the practical skill of mechanics, properties of matter and thermodynamics

Course Outcomes: After completing this course, students should be able to
1. Handle and use the basic measurement tools in laboratory
2. Determine mechanical properties of matter by various methods
3. Demonstrate thermal properties of matter and related the concepts
4. Analyse and compare the results obtained by various methods

List of the experiments:

1. Range and least count of Instruments, measurements using various instruments and error analysis (vernier callipers, screw gauge, traveling microscope, spectrometer etc.)

1. Acceleration due to gravity by bar pendulum
2. Young's modulus by cantilever.
3. Young's modulus by bending of beam.
4. Young's modulus by vibrational method.
5. Modulus of rigidity by Torsional pendulum.
6. Modulus of rigidity by Maxwell's needle.
7. Determination of η by statical method.
8. To determine Coefficient of Viscosity of water by Poiseulle's method.
9. Surface tension of a liquid by Quincke's method.
10. Surface tension of a liquid by Capillary rise method.
11. To determine the moment of inertia of a body using torsion pendulum.
12. To determine the moment of inertia of a fly-wheel.

References:
1. B. Sc. Physics practical by C. L. Arora
2. B. Sc. Physics practical by H. Singh, P.S. Hemne
3. B. Sc. Physics practical by Gita Sanon

GE: Everyday Physics: B-PH113T Credit: 2

Objective: To provide day to day life physics information or phenomena

Course Outcomes: After completing this course, students should be able to
1. Handle and use the basic knowledge of optical phenomena
2. Understand the phenomena about the motion of the bodies.
3. Handle the electric gadgets.
4. Understand the phenomena about the solar devices and thermal equipments.

Unit-I (7.5 Hrs)

Reflection, refraction, diffraction, interference, scattering (elementary ideas only) – examples from daily life – apparent depth, blue color of sky, twinkling of stars, Concave and convex mirrors, Lenses – focal length, power of a lens, refractive index, prism, dispersion. Human eye, defects of the eye – myopia, hypermetropia, presbyopia and astigmatism and their correction by lens.

Unit II (7.5 Hrs)

Velocity, acceleration, momentum, Inertia, force - laws of motion. Newton's law of gravitation, acceleration due to gravity, mass and weight, apparent weight, weightlessness Rotational motion, Moment of inertia, torque, centripetal and centrifugal acceleration examples- banking of curves, centrifugal pump, and roller coasters.

Unit III: (7.5 Hrs)

Ohms law, current measurements, voltage measurements, AC and DC voltages, battery eliminators, Dry cell battery, Working of Heater, Electric iron, water heating rod, Fuse, refrigerates, coolers and fans, precautions while handling household electric and electronic equipment,

Unit IV: (7.5 Hrs)

Laws of thermodynamics, heat engine, Pressure cooker working, gas Geezers, basic knowledge of surface tension, capillary action, viscosity, elasticity, Solar cell, solar battery, solar heater

References:
1. Physics of Everyday phenomena, by Griffith, Mc-Graw Hill
2. The physics of Everyday things by James Kakalios, Hachette UK publication.

B.SC.I, SEM I
GE: Storytelling Physics: B-PH114T Credit: 2

Objective: To provide the necessary information regarding development of physics via different happenings.

Course Outcomes:
After completing this course, students should be able to
1. Understand the motion of earth and related laws
2. To understand the nature of smallest part the elements
3. To understand the discovery of high energy electromagnetic radiations
4. Understand the possible origin of universe

Unit I: The History of The Earth's Rotation
Aristotle's concept about the universe, Copernicus theory, Brahe's Model of the Universe, Kepler's laws of planetary motion, Fundamental forces: Gravitational force, Electromagnetic force, Weak nuclear force, Strong nuclear force

Unit II: Story of Atomic Models
Structure of atom, Atomic number, Mass number, Atomic models: John Dalton's atomic model, Plum pudding model, Rutherford's model of the atom, Bohr's model of the atom, Electron Cloud Model/Quantum Mechanics Model of Atom

Unit III: Discovery of X-rays and Radioactivity
An introduction to Electromagnetic spectrum, Wavelength and frequency relationship, Discovery of X-rays, X-ray properties, X-ray uses
Radioactivity process, Discovery of Radioactivity, Alpha decay, Beta decay, Gamma Decay, Law of radioactive decay, Applications of radioactivity

Unit IV: Discovery of Big-Bang and Gamma Ray Bursts
Big Bang hypothesis, Accidental discovery of Big-Bang, Experiments supporting the existence of Big-Bang, Timeline of Big-Bang: Singularity, Inflation epoch, Cooling Epoch, Structure epoch
Gamma Ray Bursts: Concept of Supernova Explosion, Origin of GRBs, Discovery of GRBs, Importance of GRBs

References:
1. Concept of Physics by H. C. Verma
2. The physical universe: An introduction to Astronomy by Frank shu; University Science book publication
3. Kimayagar by Achyut Godbole, Rajhans Publication
4. NCERT books 11th and 12th Physics

VSEC: Physical Measurement Techniques, (B-PH115P)   Credits:2

Objective: To provide the knowledge of day to day measuring instruments

Course Outcomes:

After completing this course, students should be able to

1. to measure parameters by suitable instruments.
2. calibrate the measuring tools.
3. understand the accuracy in the measurements.

Experiments

1. Use of ruler, thermometer, stopwatch, digital balance, measuring cylinder for measurement of different physical quantities

2. To Measure the diameter of a coin using Vernier callipers

3. To measure the inner diameter of a cylinder using Vernier callipers

4. To measure the diameter of a pin using micrometre screw gauge

5. To measure the thickness of a given sheet using micrometre screw gauge

6. To measure the diameter of a capillary tube using travelling microscope

7. To find the Refractive Index of a Glass Slab using a travelling microscope

8. To measure the radius of curvature of a convex lens using spherometer

9. To measure the angle of prism using spectrometer

10. Measurement of joint's range of motion using goniometer

References

1. B. Sc. Physics practical by C. L. Arora
2. B. Sc. Physics practical by H. Singh, P.S. Hemne
3. B. Sc. Physics practical by Gita Sanon

VSEC: Designing Power Supply, (B-PH116P) Credits:2

Objective: To provide the knowledge of power supply and batteries.

Course Outcomes:

After completing this course, students should be able to
1. design power supply of various output current and voltage.
2. Understand the selectivity of battery for various electronic devices.
3. Understand the precautions to avoid the electronics instruments to get damage.

Experiments Based On:
1. To study the voltage versus time graph of dry cell and step down transformer using CRO
2. To study the circuit of half wave rectifier
3. To study the circuit of full wave rectifier
4. To study the circuit of bridge rectifier
5. To study different types of filters

6. To prepare a Zener regulated power supply
7. To prepare an IC regulated power supply using 78xx series
8. To prepare an IC regulated power supply using 79xx series
9. To prepare a dc dual power supply of ± 5 volts
10. To prepare a variable voltage regulated power supply using IC LM 317

References:
1. Basic electronics by V. K. Mehata
2. B. Sc. Practical Physics by C. L. Arora
1. Basic Electronics (Solid State), by B. C. Theraja.
2. Electronic Principles by A. Malvino and D. J. Bates (Mc Graw Hill Education, India)

IKS: Introduction to Metaphysics, B-PH117T, Credit: 2

Objective: To introduce the concepts in metaphysics and classical Indian philosophy

Course Outcomes: After completing this course, students should be able to

1. Elaborate the metaphysical theories held by the different schools of classical Indian philosophy.
2. Compare the metaphysical theories held by the different schools of classical Indian philosophy.
3. Formulate the salient features of Indian metaphysics and epistemology.
4. Communicate the different views of reality and knowledge in Indian philosophy.

Unit I   **7.5hrs**

What is Metaphysics? Metaphysics and physics, Nature and scope of metaphysics, Concepts in Metaphysics: Mind and body, Existence, Universals and particulars, Causation, Substance, Identity, Persistence through time, Modality.

Unit II   **7.5hrs**

Types of metaphysical theory, Platonism, Aristotelianism, Kantianism, Idealism, Materialism, Naturalism, The epistemology of metaphysics,

Unit III   **7.5hrs**

Classical Indian Metaphysics, Orthodox Schools: Sankhya, Yoga, Nyaya, Vaisesika, Purva-Mimansa, Vedanata.

Unit IV   **7.5hrs**

Heterodox Schools: Jainism, Buddhism, Charvaka. Contemporary metaphysics, Analytic metaphysics in the 20th century.

References:

1. Metaphysics: A Very Short Introduction By Stephen Mumford · 2012
2. Metaphysics: The Key Concepts
3. By Nikk Effingham, Helen Beebee, Philip Goff · 2010
4. Roy W Perret. An Introduction to Indian Philosophy. UK: Cambridge University Press, 2016.
5. P. K. Mukhopadhyaya. Indian Realism. Calcutta: Lexington Books,1984.

END of SEM I

BSc Physics SEM-II

DSC: Thermodynamics and Statistical Physics, B-PH121T   Credit: 2

Objective: To provide the knowledge regarding thermodynamics and statistical physics.
Course Outcomes: After completing this course, students should be able to
1. Explain the laws of thermodynamics and establish the limit on efficiency of Cornot's cycle
2. Derive the Maxwell's general relation and explain its applications
3. Analyse the experimental results using concepts in statistical mechanics
4. Develop framework for solving thermodynamic problems using statistical mechanics

 Syllabus
Unit I: **7.5 hrs.**
Thermodynamics I: Thermodynamic variables, Thermal equilibrium and temperature, Zeroth law of thermodynamics, Thermodynamic scales of temperature, Thermodynamic processes (Reversible and Irreversible), Indicator diagram, First law of thermodynamics, Carnot's cycle and it's efficiency, Carnot's theorem

Unit II: **7.5 hrs.**
Thermodynamics II: Entropy, Second and third law of thermodynamics, Maxwell general relationship [$\delta(T, S)/ \delta(x, y) = \delta(P,V)/ \delta(x, y)$] and it's applications, Joules coefficient, Porous plug experiment, Liquefaction of gases- Boyle's temperature and inversion temperature, Liquefaction of Helium, Air conditioning (Concept only).

Unit III: **7.5 hrs.**
 Statistical physics I: Probability and frequency, Joint and Conditional probability, Mean value, variance, probability distribution, thermodynamic probability, Principle of a priori probability, Binomial distribution: mean values, fluctuations

Unit IV: **7.5 hrs.**
 Statistical physics II: Maxwell velocity distribution: Mean values and applications (1D, 2D and 3D) of Maxwell velocity distributions, μ- space, Gamma space, Phase space, accessible and inaccessible states, macro and micro states, Concept of Ensembles and their types.

References and Text books:
1. Heat, Thermodynamics and Statistical Physics, by Pragati Prakashan , Singhal, Agrawal.
2. Heat and Thermodynamics, by Brijlal, Subramanyam.
3. Heat, thermodynamics and statistical physics, by Brijlal, Subramayam and Hemne.
4. Heat and thermodynamics, by C. L. Arora.

DSC: LAB, B-PH122P

Objective: To provide the practical knowledge of thermodynamics

Course Outcomes: After completing this course, students should be able to
List of Experiments

1. To determine the pressure coefficient of air by constant volume air thermometer.

2. To verify the Stefan's law of radiation by using an incandescent lamp.

3. Thermal conductivity of a metal rod using Forbes method.

4. Thermal conductivity of a bad conductor by Lee's disc method.

5. To determine the critical temperature and critical pressure of a gas.

6. To determine the coefficient of thermal conductivity of glass in the form of a tube.

7. To determine specific heat of a given liquid by method of cooling.

8. To determine the mechanical equivalent of heat (J) with the help of Joule's calorimeter.

9. To determine temperature coefficient of resistance of platinum using platinum resistance thermometer

10. Study of heating efficiency of electrical kettle with varying voltages.

References:
4. B. Sc. Physics practical by C. L. Arora
5. B. Sc. Physics practical by H. Singh, P.S. Hemne
6. B. Sc. Physics practical by Gita Sanon

BSc Physics SEM-II
GE: BASIC CONCEPTS IN PHYSICS B-PH123T   Credits: 2

Objective:
1. To introduce the basic concepts of electrostatics
2. To inculcate a scientific awareness about optics and modern physics
3. To understand the atomic structure, radioactive nucleus and thermodynamics

Course Outcomes:
After completing this course, the learner will be able to
1. understand the electrostatics
2. understand optics and modern physics laws
3. understand the atomic structure, radioactive nucleus and thermodynamics

Unit I   **7.5 Hrs**
Electric charges, Electric field, Electric flux, Electric potential, Electric current, drift velocity, mobility, electrical resistivity and conductivity, Kirchhoff's rules, Biot – Savart law, Ampere's law and its applications, Faraday's laws, induced EMF and current, Lenz's Law, Self and mutual induction.

Unit II   **7.5 Hrs**
Reflection, Refraction, total internal reflection and optical fibers, Diffraction, Microscopes and astronomical telescopes and their magnifying powers, interference, Young's double slit experiment, coherent sources, Dual nature of radiation, Photoelectric effect, Matter waves.

Unit III   **7.5 Hrs**
Structure of atom, Alpha-particle scattering experiment; Rutherford's model of atom, Bohr model of hydrogen atom, hydrogen line spectra, Composition of nucleus, nuclear force, Mass-energy relation, mass defect, nuclear fission, nuclear fusion.

Unit IV   **7.5 Hrs**
Heat, Zeroth law of thermodynamics, First law of thermodynamics, Second law of thermodynamics, isothermal, adiabatic, reversible, irreversible, and cyclic processes, perfect gas, degrees of freedom, specific heat capacities of gases, mean free path, Avogadro, number, heat, work and internal energy.

References :
1. Concept of Physics by H. C. Verma
2. Heat and thermodynamics, by C. L. Arora
3. Optics, by Ajay Ghatak.
4. Atomic and Nuclear Physics, by N. Subramanyam, Brijlal.

BSc Physics SEM-II
GE: Physics of Solar System   B-PH124T   Credits: 2

Course objectives:
1. To introduce the learners to an exciting topic of Solar system
2. To inculcate a scientific awareness about the Solar system
3. To understand the origin and the structure of the Sun and the planets
4. To explore the properties of the planets in Solar system

Course outcomes:
After completing this course, the learner will be able to
4. explain the origin of the solar system
5. explain the various components of the Solar system
6. explain the origin and the types of planets
7. compare and contrast the terrestrial planets and the Jovian planets
8. describe, in a scientific way, the mechanism of energy production in the Sun

Unit I: Basics of the Solar system   **7.5 hrs.**
Invention of Solar system, components of solar system: planets and their satellites, minor planets (meteoroids, meteors and mereorites) comets, age determination of solar system

Unit II: Origin of the Solar system   **7.5 hrs.**
The nebular hypothesis, the condensation theory, formation of terrestrial planets and Jovian planets, formation of moons, rings and comets

Unit III: The Sun as a star   **7.5 hrs.**
Position of the Sun on H-R diagram, the atmosphere of the Sun, interior structure of the sun, chromospehere and corona of the Sun

Unit IV: Energy production in the Sun   **7.5 hrs.**
Structure of an atom, nuclear fission and fusion process, thermonuclear reaction, proton-proron chain reaction, CNO cycle, Solar neutrino experiment

References:
1. Seven Wonders of the Sky by Jayant Vishnu Narlikar,Cambridge University Press
2. Astrophysics for Physicists by Arnab Rai Chaudhari, Cambridge University Press
3. "Aakashashi jadale nate" by Jayant Vishnu Narlikar, Rajhans Publication
4. An Introduction to astrophysics by Baidyanath Basu, PHI Learning Pvt. Ltd.
5. The Physical Universe by Frank H. Shu, University of California, Berkeley

BSc Physics SEM-II
VSEC: Maintenance of household appliances, B-PH125P

Objectives: To understand handling and maintenance of household appliance based on electrical and thermo dynamical concepts.

Outcomes: Students will be able:
1. To understand refrigerator working and maintenance
2. To test the components household gadgets
3. To repair the same as above
4. To repair the concept of electrical and electronic gadgets
5. To able to perform the periodic maintenance

Experiments:
1. To repair the refrigerator having problems like poor cooling, not defrosting, faulty thermistor, door does not close well
2. To repair the refrigerator having problems like: condensation or formation of ice inside the unit, food in the refrigerator is frozen, bad odour
3. To inspect and clean filter, coils, blowers and fan of air conditioner
4. To lubricate motor, bearings and adjust or replace fan belt of air conditioner
5. To service the gas stove for regular maintenance
6. To change the broken induction glass top and to replace faulty induction coil in the induction stove
7. To repair mixer/ grinder for problems like: broken coupler, leakage from jar, tripping problem, blunt blades problem, motor is not rotating, jammed jar blades, spark and burning smell inside mixer grinder
8. To fix the problems of washing machine like: machine is leaking, noisy machine, machine moves around, spin problem, machine won't fill with water, Door opening problem, clogged machine/ won't drain, smelly (bad odour) problem, machine ruining clothing, switching on problem
9. To troubleshoot water purifier with problems like : unusual water taste or smell from the water purifier, slow water flow from the water purifier, water purifier's faucet is making unusual noises, water leakage from faucet or filter/ membrane, R/O water tank does not fill up
10. To repair vacuum cleaner for problems like: Loss of suction, clogged filter, jammed cleaning head, stick vacuum cleaner batteries

References:
1. Service manuals of household appliances from google

Electrical and Electronic measurement techniques: B-PH126P

Objectives: To study some electrical and electronics parameters, physical quantities or
           Properties

Outcomes: Students will be able:

To use DMM and CRO for electrical measurements

To test the components consisting of p-n junctions

To perform experiments using simulator

To understand the concept of electrical and electronic physical quantities

1. Study of digital multi-meter (DMM)

2. Study of cathode ray oscilloscope (CRO)

3. Testing of diode and transistor using DMM

4. Calibration of CRO for measurement of frequencies

5. To find the unknown frequency of a source using Lissajous figures

6. To find the Zener breakdown voltage

7. To find the knee voltage of a diode

8. Measurement of inductance using Maxwell bridge (using simulator link from virtual lab of IIT Kharagpur)

9. Measurement of capacitance by Schering bridge method (using simulator link from virtual lab of IIT Kharagpur)

10. Measurement of resistance using Wheatstone bridge (using simulator link from virtual lab of IIT Kharagpur)

References:

1. DMM and CRO manuals

2. BSc Physics practical by C L Arora

3. Virtual lab of IIT Kharagpur

BSc Physics SEM-II
IKS: Indian Contribution to Astronomy,   B-PH127T   Credits: 2

Course objectives:
- To introduce the learner to the exciting branch of astronomy
- To introduce the learner about the rise of astronomy in India
- To introduce the learner to the great ancient astronomers and their work
- To introduce the learner to the scientific concept of telescopes

Course outcomes:

After completing the course, the learner will be able to
1. explain the rise of astronomy India
2. understand the contribution of great scientist in the field of astronomy
3. explain the basic concept of astronomical telescope
4. elaborate the history of few ancient observatories in India

Unit I: Roots of Indian astronomy   7.5 Hrs

Worldwide rise of astronomy, rise of astronomy in India, Vedic astronomy, siddhantic astronomy, Zij astronomy, modern astronomy

Unit II: Contribution of Aryabhatta to Astronomy   7.5 Hrs

Motion of earth and other planets arround earth, motion of the Earth around itself, concept of day and night, solar and sidereal time, heliocentric and geocentric universe, theory be hinding the shing of moon

Unit III: Siddhantic era of indian astronomy   7.5 Hrs

Concept of longitude and latitude, concept of astrolabe, uses of astrolabe made by Mahendra Suri, Contribution of Bramhagupta and Varahamihira, Properties of gravitational force, motion of moon around earth, phases of moon,

Unit IV: Modern astronomy   7.5 Hrs

Discovery of astronomical telescope, types of astronomical telescopes, establishment of Madras observatory, establishment of Kodaikanal observatory, establishment of Nizamiah Observatory, U.P. state observatory in Nainital

References:
1. Astronomy in India- A perspective by Rajesh Kochhar & Jayant Narlikar, Indian National Science Academy
2. Astronomy in India: Past, Present, and Future by Rajesh Kochhar & Jayant Narlikar, Inter-University Centre for Astronomy & Astrophysics, 1993
3. Astronomy in India: A Historical Perspective, edited by Thanu Padmnabham, Springer Nature
4. Modern Astronomy in India by K.D. Abhaynkar, Journal of the Royal Astronomical Society of Canada, Vol. 58, p.218
5. The Story of Astronomy in India BY Chander Mohan

END of SEM II