Structure for B. Sc. Syllabus

Inforce from June 2021

B. Sc. (PHYSICS)

Semester VI

Sr. No.	Course Code	Course Title	Credits
1	PH – 606	Physics Paper VI	02
2	PH – 607	Physics Paper VII	02
3	PH – 608	Physics Paper VIII	02
4	PH – 609	Physics Paper IX	02
5	PH – 610	Physics Paper X	02
6	PH – 611	Physics Paper XI	02
7	PH – 612	Practicals	06
8	Elective Course	Elective Paper 1 or 2or 3	02

Faculty code: Science **Subject code: PH**

Name of the Program: B. Sc. (Physics) **Subject: PHYSICS**

External Examination	Time Duration
Theory Examination	2 Hrs.
Practical Examination	2 Hrs.

Name of Exam	Semester	Paper No.	Course Group	Credit	Internal Marks	External Marks	Total Marks
B. Sc.	VI	PH – 606	Theory	02	20	50	70
		PH – 607	Theory	02	20	50	70
		PH – 608	Theory	02	20	50	70
		PH – 609	Theory	02	20	50	70
		PH – 610	Theory	02	20	50	70
		PH – 611	Theory	02	20	50	70
		PH – 612	Practical	06	60	120	180
		Elctive Course	Theory	02	20	50	70

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T. Y. B. Sc. Sem VI

Physics Paper VI (PH – 606)

Classical Mechanics and Solid State Physics

Unit 1	**Moving Coordinate Systems (Introduction to Classical Mechanics by R G Takwale and P S Puranik, McGraw Hills Edu. Pvt. Ltd., 2017)**
	(9.1) Coordinate System with relative translational motion, (9.2) Rotating Coordinate System, (9.3) The Coriolis Force, (9.4) Motion on the Earth, (9.5) Effect ofCoriolis Force on a Freely falling Particles (9.6)
Unit 2	**Motion of a Rigid Body (Introduction to Classical Mechanics by R G Takwale and P S Puranik, McGraw Hills Edu. Pvt. Ltd., 2017)**
	(10.1) Euler's Theorem, (10.2) Angular Momentum and Kinetic Theory, (10.3) The Inertia Tensor, (10.4) Euler's Equation of Motion, (10.5) Torque Free Motion, (10.6) Euler's Angle, (10.7) Motion of a Symmetric Top
Unit 3	**Fermi Surfaces and Metals (Solid State Physics Charles Kittel , John Wiley & Sons, 8th ed., 2005)**
	Ch: 9 Reduced Zone Scheme, Periodic Zone Scheme, Construction of Fermi Surfaces, Electron Orbits, Hall Orbits and Open orbits, Calculation of Energy Bands, Experimental Methods in Fermi Surface Studies, Summary Problems (inclusive of sub topics)
Unit 4	**Superconductivity (Solid State Physics Charles Kittel , John Wiley & Sons, 8th ed., 2005)**
	Ch:10 Experimental Survey, Theoretical Survey, High Temperature Superconductors, Summary, Problems (including subtopics)

Suggested books:

1. An Introduction to Mechanics by Daniel Kleppner and Robert Kolenkow, McGraw Hill Edu. 2017
2. Classical Mechanics by G. Aruldhas, PHI, 2015
3. Solid State Physics by S O Pillai, New Age International Publishers, 2018.

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Physics Paper VII (PH – 607)

Electrodynamics and Optics

Unit 1	**Electrodynamics (Introduction to Electrodynamics by David J. Griffiths, Pearson India Education, 4th ed.)**
	1 Electromotive Force: Ohm's Law (1.1), Electromotive Force(1.2), Motional emf (1.3) **2 Electromagnetic Induction**Faraday's Law (2.1), The Induced Electric Field (2.2), Inductance (2.3), Energy in Magnetic Field (2.4)
Unit 2	**Electrodynamics (Introduction to Electrodynamics by David J. Griffiths, Pearson India Education, 4th ed.)**
	Maxwell's Equations: Electrodynamics before Maxwell (3.1), How Maxwell fix Ampere's Law (3.2), Maxwell's Equation (3.3), Magnetic Charge (3.4), Maxwell's Equations in Matter (3.5), Boundary Conditions (3.6) **Conservation laws:** The continuity equation (1.1), Poynting's theorem (1.2)
Unit 3	**Reflection and Refraction of Electromagnetics Waves (Optics by Ajoy Ghatak, McGraw Hill Edu. (India) Pvt. Ltd., 6th ed., 2017)**
	Introduction (24.1), Reflection and Refractions at an Interface of Two Media (24.2), Normal Incidence on a Medium (24.3), Oblique Incidence: E Parallel to the Plane of Incidence (24.4), Polarization by Reflection: Brewster's Law (24.5), Total Internal Reflection and the Evanescent Wave (24.6), Oblique Incidence: E Perpendicular to the Plane of Incidence (24.7), Expressions for Reflectivity and Transmittivity (24.8)
Unit 4	**Optical Fiber Basics using Ray Optics (Optics by Ajoy Ghatak, McGraw Hill Edu. (India) Pvt. Ltd., 6th ed., 2017)**
	Why Glass Fibers? (28.5), The Coherent Bundle (28.6), The Numerical Aperture (28.7), Attenuation in Optical Fibers (28.8), Multimode Fibers (28.9)

Suggested books:

1. Electricity and Magnetism by D C Tayal, Himalaya Publishing House, 2014.
2. Fundamentals of Optics by F A Jenkins and H E White, McGraw Hill, 2017.
3. Optics by Eugene Hecht and A. R. Ganeshan, Pearson Education., 2019.

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Physics Paper VIII (PH – 608)

Atomic and Molecular Physics and Nuclear Physics

Unit 1	**Many Electron Atoms (Concepts of Modern Physics by Arthur Beiser, McGraw Hill Publishing Co. Ltd. New Delhi, 6 ed.)**
	(7.4) Periodic Table, (7.5) Atomic Structures, (7.6) Explaining the Periodic Table, (7.7) Spin-Orbit Coupling, (7.8) Total Angular Momentum, (7.9) X-Ray Spectra
Unit 2	**Molecular Physics (Concepts of Modern Physics by Arthur Beiser, McGraw Hill Publishing Co. Ltd. New Delhi, 6 ed.)**
	(8.1) The Molecular Bond, (8.2) Electron Sharing, (8.3) The H2+ Molecular Ion, (8.4) The Hydrogen Molecule, (8.5) Complex Molecules, (8.6) Rotational Energy Levels, (8.7) Vibrational Energy Levels, (8.8) Electronic Spectra of Molecules
Unit 3	**Particle Accelerators and Radiation Detectors (Introduction to Nuclear and Particle Physicsby V.K.Mittal, R.C. Verma, S.C. Gupta, PHI, 3rd ed., 2014)**
	Introduction (6.1) Cockcroft and Walton Accelerator (6.2), Tandem Accelerator (6.4), Linear Accelerator (LINAC) or Drift Tube Accelerator (6.5), Introduction (7.1), Gas-Filled Detectors (7.2), Ionizations Chamber (7.3), Proportional Counters (7.4), Geiger-Muller (GM) Counters (7.5), Scintillations Detectors (7.6), Semiconductors Radiations Detectors (7.7), Cloud Chamber (7.8), Cerenkov Counters (7.12) (inclusive of all topics)
Unit 4	**Particle Physics(Introduction to Nuclear and Particle Physics by V.K.Mittal, R.C. Verma, S.C. Gupta, PHI, 3rd ed., 2014)**
	Introduction (8.1), Productions of Elementary Particles (8.2), Types of Interaction (8.3), Classification of Elementary Particles (8.4), Mass Spectra and Decays of Elementary Particles (8.5), Quantum Numbers (8.6), Conservation laws (8.7) (inclusive of all topics)

Suggestedbooks:

1. Quantum Physics by Robert Eisberg & Robert Resnick, Wiley, 2006
2. Nuclear Physics by D C Tayal, Himalaya Publications, 2017
3. Nuclear and Particle Physics by Satadal Bhattacharyya, University Press (India) Private Ltd, 2019

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Physics Paper IX (PH – 609)

Statistical Mechanics and Relativity

Unit 1	**Classical and Quantum Statistics (Thermal Physics by Garg, Bansal and Ghosh, 2nd ed., McGraw Hill Education (India) Pvt Ltd. Chennai, 2012)**
	Classical and quantum statistics (12.9), Distribution functions (12.9.1), Partition function and thermodynamics properties of a system (13.2), The partition function for an ideal monatomic gas(13.3), Single partition function (13.3.1), N-particle partition function and thermodynamic variables (13.3.2), Some deductions from MB statistics (13.4), Distribution law for molecular speeds (13.4.1), specific heat capacity of gases (13.4.2), partition function of a diatomic molecule (13.4.3), specific heat capacity of hydrogen (13.4.5)
Unit 2	**Specific Heat Capacity of Solids (Thermal Physics by Garg, Bansal and Ghosh, 2nd ed., McGraw Hill Education (India) Pvt Ltd. Chennai, 2012)**
	Specific heat capacity of solids (13.5), Einstein's theory (13.5.1), Debye theory (13.5.2), Thermodynamic functions of systems with finite number of energy levels (13.6), negative temperatures (13.6.1), transition between states: Einstein's formulation of spontaneous and stimulated emission of radiation (13.6.2), Laser action (13.6.3)
Unit 3	**Relativistic Dynamics (Introduction to Special Relativity by Robert Resnick; Wiley India Pvt. Ltd.)**
	The Need to Redefine Momentum (3.2), Relativistic Momentum (3.3), Alternative Views of Mass in Relativity (3.4), The Relativistic Force Law and the Dynamics of a Single Particle (3.5), The Equivalence of Mass and Energy (3.6)
Unit 4	**Relativity and Electromagnetism (Introduction to Special Relativity by Robert Resnick; Wiley India Pvt. Ltd.)**
	Introductions (4.1) The Interdependence of Electric and Magnetic Fields (4.2), The Transformation for **E** and **B**(4.3), The Field of a Uniformly Moving Point Charge (4.4), Forces and Fields near a Current Carrying Wire (4.5), Forces between Moving Charges (4.6), The Invariance of Maxwell's Equations (4.7), The Possible Limitations of Special Relativity (4.8)

Suggested books:

1. Fundamentals of Thermal and Statistical Physics by Fredrick Reef, Sarat Book Distributors, 2010
2. The Special Theory of Relativity by S Banerji and Asit Banerjee, PHI Learning Pvt. Ltd. New Delhi, 2012

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Physics Paper X (PH – 610)

Electronics

Unit 1	**Operational Amplifiers and Linear Op-Amp circuits(Electronic Principles by A Malvino and D. Bates, McGraw Hill Edu. (India) Pvt. Ltd, New Delhi, 7thed.)**
	Introduction : Introduction to OP Amps (18.1), The 741 Op Amp (18.2), The Inverting Amplifiers (18.3), The Non Inverting Amplifiers (18.4), Two Op-Amp Applications (18.5) Inverting-Amplifier circuits (20.1), Noninverting-Amplifier circuits (20.2), Inverter/Noninverter circuits (20.3), Differential amplifiers (20.4), Instrumentation amplifiers (20.5), Summing amplifier circuits (20.6)
Unit 2	**Feedback & Oscillators (Electronic Principles by A Malvino and D. Bates, McGraw Hill Edu. (India) Pvt. Ltd, New Delhi, 7thed.)**
	Feedback: Four Types Of Negative Feedback(19.1), VCVS Voltage Gain (19.2) **Oscillators:** Theory of Sinusoidal Oscillators (23.1), The Wein Bridge Oscillator(23.2), Other RC Oscillators (23.3), The Colpitt Oscillator (23.4), Other LC Oscillators (23.5), The 555 timer (23.7), Astable operation of 555 timer (23.8), 555 circuits (23.9)
Unit 3	**Arithmetic Circuits (Digital Principles And Applications by A. Malvino and D. Leach, McGraw Hill Edu. (India) Pvt. Ltd, 7th ed.)**
	Clock waveforms (7.1), TTL clock (7.2), Schmitt trigger (7.3), 555 timer – Astable (7.4), 555 timer – monostable (7.5), Monostables with input logic (7.6), Pulse-forming circuits (7.7)
Unit-4	**Flip-Flop (Digital Principles And Applications by A. Malvino and D. Leach, McGraw Hill Edu. (India) Pvt. Ltd, 7th ed.)**
	RS Flip-Flop(8.1), Gated Flip-Flops(8.2),Edged-Triggered RS Flip-Flops(8.3), Edged-Triggered D Flip-Flops(8.4) Edged-Triggered, Jk Flip-Flops(8.5), Flip-Flops Timing(8.6),Edge Triggering through input lock out(8.7), JK Master-Slave Flip-Flops(8.8).

Suggestedbooks:

1. Functional Electronics by K.V. Ramanan – McGraw Hill Edu. Pvt. Ltd, New Delhi Publication
2. Electronics Devices and Circuits by Allen Mottershed – PHI Publication.
3. Modern Digital Electronics by R P Jain, McGraw Hill Education, New Delhi, 2009.

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Physics Paper XI (PH – 611)

Mathematical Method of Physics and C-Programming

Unit 1	**Differential equations(Mathematical Method for Physicists by Arfken and Weber, Academic Press 6thed.)**
	Partial Differential Equations (9.1),First order Differential Equations(9.2),Separation of variables (9.3), Singular Points(9.4) Series solutions-Frobenius method (9.5)
Unit 2	**Matrices (Mathematical Method for Physicists by Arfken and Weber, Academic Press 6thed.)**
	3.2 **Matrices** Basic Definitions, Rank, Equality, Addition, Subtraction, Multiplication by Scalar, Matrix Multiplication- inner product, Direct Product, Diagonal Matrices, Matrix Inversion, 3.3 **Orthogonal Matrices** Direction Cosines, Applications to vectors, Orthogonality conditions: Two Dimensional Case, Transpose Matrix 3.5 **Diagonalization of Matrices:** Moment of Inertia Matrix, Eigen Vector, Eigen Values, Hermitian Matrices, Anti-Hermitian Matrices, Functions of Matrices Diagonal Matrices
Unit 3	**C Programing (Computer Programing in C by V Rajaraman by PHI Learning Private Ltd, Delhi (24thPrinting))**
	Defining and Manipulating Arrays: Array Variable (10.1), Syntax Rules for Arrays (10.2), Use of Multiple Subscripts in Array (10.3), Reading and Writing Multidimensional Arrays (10.4), Examples of for Loops with Arrays (10.5) **Logical Expressions and More Control Statements:** Introduction (11.1), Logical Operators and Expressions (11.2), Precedence Rules for Logical Operators (11.3), Some Example of Use of Logical Expressions (11.4), The Switch Statement (11.5), The Break Statement (11.6), The Continue Statement (11.7)
Unit 4	**C Programing (Computer Programing in C by V Rajaraman by PHI Learning Private Ltd, Delhi (24thPrinting))**
	Functions: Introduction (13.1), Defining and Using Functions (13.2), SyntaxRules for Function Declaration (13.3), Array in Functions (13.4), Global Local and Static Variables (13.5)

Suggested books:

1. Mathematical Physics by H K Das and Dr. Rama Verma, S.Chand Co., 7th ed., 2019
2. Mathematical Physics by P K Chattopadhaya, New Age International publishers, 2006
3. Let us C by Y. Kanetkar, BPB Publications, 17th ed., 2017

Suggested books:

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Proposed Practicals for T. Y. B. Sc. Sem VI

PH-612

LIST OF EXPERIMENTS

	GROUP A
1	To determine Young's modulusby Koeing's method.
2	To study Resonance Pendulum
3	To study coupled oscillator
4	To determine the oscillation of mass in the case of combination of two spring.
5	To determine Young's modulus by the method of vibration
6	To determine the moment of inertia of a flywheel
	GROUP B
1	To determine refractive index of liquid using hollow prism
2	To determine the wavelength of light using Fresnel's biprism
3	To determine the resolving power of diffraction grating
4	To determine cardinal points of a lens system using Searle's goniometer
5	To determine the wavelength of light using Lloyd's mirror
6	To determine wavelength of light using Edser butler plate
	GROUP C
1	To determine the constants of thermocouple
2	To determine e/m by Thomson's method
3	To determine the constants of BG using solenoid
4	To study LDR
5	To study Colpitt's oscillator
6	To study Hartley's oscillator
	GROUP D
1	To determine high resistance using method of leakage
2	To determine mutual inductance by Carey-Foster's method
3	To determine self-inductance of a given coil by Rayleigh's method
4	To determine self-inductance of a given coil using Maxwell's Induction bridge
5	To determine the ratio of capacities using Desauty's method
6	To determine mutual inductance using ballistic galvanometer

Suggested books:

1. D C Tayal,University Practical Physics,Edited by Ila Agarwal ,Himalaya Publishing House
2. B. L. Worsnop and H. T. Flint, Advanced Practical Physics, Asia Publishing House, New Delhi.
3. P. Khandelwal, A Laboratory Manual of Physics for Undergraduate Classes, Vani Publication House, New Delhi.
4. Geeta Sanon, BSc Practical Physics, 1st Edn. (2007), S. Chand & Co.

For Sem VI

Note:

1. The duration of each experiment is of 2 hours.
2. In the external exam, a student shall perform four experiments, one from each group. Each experiment will be of 2 hours duration.
3. There shall not be more than 20 students per batch in the external exam.
4. The external exam of each batch of 20 students should be completed in two days by arranging three sessions of 2 hours each in a day. Last two sessions per batch shall be allotted for evaluation of project work.
5. The experiments in Sem-VI divided in four groups (A,B,C and D) carrying 4 credits (8hrs/week) as per list attached above.
6. In addition to experiments, students have to perform project work (4 hr/week, 2 credits) under the guidance of a faculty as per the guidelines mentioned below:

Guidelines for Project Work:

It is expected that,

1. As project work the student does work equivalent to twelve hours laboratory experiments through sixth semester under the guidance of faculty.
2. A project shall be carried out either individually or in a group of not more than four students. The Head of the Department shall assign one teacher per project. The equivalent workload should be credited to the teacher who has been assigned the project guideship and must be added in the time schedule of practical.
3. The project work is a practical course and it is intended to develop a set of skills pertaining to the laboratory work apart from the cognition of students. Therefore, the guides should not permit projects that involve no contribution on part of student.
4. The project must have a clear and strong link with the principles of basic physics and/or their applications.
5. The theme chosen should be such that it promotes better understanding of physics concepts and brings out the creativity in the students.
6. The evaluation of the project work must give due credit to the amount of the project work actually done by a student, skills shown by the student, understanding of the physics concepts involved and the presentation of the final report at the time of viva voce.
7. Any ready-made material used in the report (such as downloaded pages from the web) must be clearly referred to and acknowledged.
8. Time schedule for project work shall be decided by the guide in such a way that the final report submission is completed along with submission of journal of laboratory work.
9. Any non-adherence to this norm should attract a penalty by way of deduction in the marks awarded to a student.

Minimum 4 hours per student/group should be spent by the faculty member for the guidance of project work to the students which shall be considered as work load of practical.

Evaluation of the projectwork:

The following points shall be considered during evaluation of project work:

1. Working model (Experimental or Concept based simulation)
2. Understanding of the project
3. Data collection
4. Data Analysis
5. Innovation/difficulty
6. Report.

Scheme of external examination: (Total 120 marks)

1. The University (external) examination for Practical shall be conducted at the end of each Semester and the evaluation of Project work at the end of the sixth semester along with practical examination.
2. The candidates shall appear for external examination of Practical course carrying
   (i) 120 marks at the end of fifth semester (Six practicalof two hours each)
   (ii) 80 marks (Four sessions of two hours each) + 40 marks project work.
3. The evaluation of project work should be conducted based on presentation and report. Extra care must be taken in the evaluation of projects done in a pair or group. Delegation of the work done by individuals must be sought from the students in such cases.
4. The candidate shall prepare and submit a certified Journal for practical examination based on the practical course with at least 80% of total experiments from each group.
5. At the time of practical examination, the candidate must also submit the certified Project Report prepared as per the guidelines given in the Syllabus.
6. A candidate will be allowed to appear for the practical examination in each semester only if the candidate submits a certified journal of that semester or a certificate from the Head of the Department to the effect that the candidate has completed the practical course of that semester as per the minimum requirements and a project completion report duly certified by the project in-charge and Head of the Department.
7. The scheme for internal marks (total 60 marks) shall also be followed to include project work evaluation.
8. During the external practical examination the number of students per batch should be twenty (20).

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Syllabus for T. Y. B. Sc. Sem VI

Elective Course – I

Modern Digital and Analog Communication System-II

Note: The prerequisite for this course is that a student should have taken the Elective paper:Modern Digital and Analog Communication System-I in Semester V.

Unit 1	**Principles of Digital Data Transmission (Modern Digital And Analog Communication System B P Lathi & Zhi Ding, Oxford University press (2011)**
	Digital Communication Systems(7.1), Line Coding (7.2), Pulse Shaping (7.3)(Including Subtopics)
Unit 2	**Principles of Digital Data Transmission (Modern Digital And Analog Communication SystemB P Lathi & Zhi Ding, Oxford University press (2011)**
	Scrambling (7.4), Digital Receivers and Regenerative Repeaters (7.5), Eye Diagrams: An Important Tool (7.6), PAM: M-ARY Baseband Signalling for Higher Data Rate (7.7), Digital Carrier Systems (7.8), M-ARY Digital Carrier Modulation (7.9)
Unit 3	**Performance Analysis of Digital Communication Systems (Modern Digital And Analog Communication SystemB P Lathi & Zhi Ding, Oxford University press (2011)**
	Optimum Linear Detector for Binary Polar Signaling (10.1), General Binary Signaling (10.2), Coherent Receivers For Digital Carrier Modulations (10.3), Signal Space Analysis of Optimum Detection (10.4), Vector Decomposition of White Noise Random Processes (10.5)(Including Subtopics)
Unit 4	**Performance Analysis of Digital Communication Systems (Modern Digital And Analog Communication System B P Lathi & Zhi Ding, Oxford University press (2011)**
	Optimum Receiver for While Gaussian Noise Channels (10.6), General Expression for error Probability of Optimum receivers (10.7), Equivalent Signal Sets (10.8), Nonwhite (Colored) Channel Noise, Other Useful Performance Criteria (10.10), Noncoherent Detection (10.11)(Including Subtopics)

Suggested books:

1. Introduction to Analog & Digital Communications by Simon Haykin & Michael Moher, Wiley, 2014

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Proposed Syllabus for T. Y. B. Sc. Sem VI

Elective Paper II

Astrophysics-II

Note: The prerequisite for this course is that a student should have taken the Elective paper: Astrophysics-I in Semester V.

Unit 1	**Structure and Evolution of Stars (An Introduction to Astrophysics by Baidyanath Basu, Tanuka Chattopadhyay and Sudhindra Nath Biswas PHI Learning Private Ltd 2nd ed.)**
	Introduction (14.1), The equation of state for stellar interior (14.3), Mechanical and thermal equilibrium in stars (14.4), Energy generation in stars (14.6), Steller Evolution (14.7) White Dwarfs (14.8)
Unit 2	**Pulsars, Neutron Stars and Black Holes (An Introduction to Astrophysics by Baidyanath Basu, Tanuka Chattopadhyay and Sudhindra Nath Biswas PHI Learning Private Ltd 2nd ed.)**
	Discovery of Pulsars (15.1), Rotating Neutron Stars model of Pulsars (15.2), Period distribution and loss of Rotational Energy (15.3), Binary Pulsars (15.7), Black Holes (15.8)
Unit 3	**Quasars (An Introduction to Astrophysics by Baidyanath Basu, Tanuka Chattopadhyay and Sudhindra Nath Biswas PHI Learning Private Ltd 2nd ed.)**
	The Discovery (20.1), Radio Properties (20.2), Optical Properties (20.3), The Redshift of Quasars (20.4), Active Galactic Nuclei (20.5)
Unit 4	**Cosmology (An Introduction to Astrophysics by Baidyanath Basu, Tanuka Chattopadhyay and Sudhindra Nath Biswas PHI Learning Private Ltd 2nd ed.)**
	Introduction (21.1), Redshift and the Exapansion of the Universe (21.2), Matter Density in the Universe and the Deceleration Parameter (21.3), The Cosmological Principle: The perfect Cosmological Principle (21.4), Fundamental Equations of Cosmology (21.5), The Cosmic Microwave Background Radiation (21.8)

Suggested books:

1. Astrophysics: Stars and Galaxies by K D Abhyankar, University Press, 2001
2. Introduction to Cosmology by Jayant Narlikar, Cambridge University Press, 2002.

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Proposed Syllabus for T. Y. B. Sc. Sem VI

Elective Paper III

Measurements and Instrumentation-II

Note: The prerequisite for this course is that a student should have taken the Elective paper:Measurements and Instrumentation-I in Semester V.

Unit 1	**Primary Sensing Elements and Trasducers 1 (Electrical and Electronic Measurements and Instrumentation By A.K. Sawhney, Dhanpat Rai & Co 19th ed.)**
	Resistance Thermometer(25.19), Thermistors(25.20), Integrated circuits temperature transducers(25.22), Variable inductance transducers(25.23), Linear variable differential transformer(LVDT)(25.24), Rotary variable differential transformer(RVDT)(25.25), Synchros(25.26), Resolvers(25.27)
Unit 2	**Primary Sensing Elements and Trasducers 2 (Electrical and Electronic Measurements and Instrumentation By A.K. Sawhney, Dhanpat Rai & Co 19th ed.)**
	Capacitive transducers (25.28), Piezo-electric transducers (25.29), Hall effect Transducers (25.30), Magneto-Resistors(25.31), Magneto-elastic and magneto-strictive trasducers(25.32), Optoelectronic transducers(25.33)
Unit 3	**Display Devices(Electrical and Electronic Measurements and Instrumentation By A.K. Sawhney, Dhanpat Rai & Co 19th ed.)**
	Introduction (28.1), Electrical indicating instruments(28.2), Digital Instruments(28.3), Electronic counters(28.4), Digital display methods(28.5), Digital display units(28.6), Segmental displays(28.7), DOT matrices(28.8), Rear projection display(28.9), Light emitting diode(28.11), Liquid crystal diodes(28.12), Nixie tubes(28.13), Segmental gas discharge displays(28.14), Decade counting assemblies(DCAs)(28.15), Display systems(28.16)
Unit 4	**Modern Sensors and Chemical sensors(Electrical and Electronic Measurements and Instrumentation By A.K. Sawhney, Dhanpat Rai & Co 19th ed.)**
	Types of modern sensors(32.2), Neno-sensors(32.3), Biosensors(32.4), Introduction(34.1), Probe analysers (34.2), Differential refractometers (34.3), Spectrophotometers(34.4), Detectors(34.5), Filters(34.6),Chromatography(34.7), Electrochemical sensors(34.8),

Suggested books:

1. Electrical and electronic measurements and instrumentation By R.K.Rajput, S.Chand Publication
2. Electronic instrumentation by H.S.Kalsi, Mc Graw Hill (third Edition), 2017
3. Electrical and electronic measurements and instrumentation by Syed Imam and Vibhav Kumar Published by Wiley, 2020