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VEER NARMAD SOUTH GUJARAT UNIVERSITY
University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
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–: પરિપત્ર :–

વિજ્ઞાન વિદ્યાશાખા હેઠળની ભૌતિકશાસ્ત્ર વિષયનો અભ્યાસક્રમ ચલાવતી સંલગ્ન સ્નાતક કૉલેજોનાં આચાર્યશ્રીઓ જણાવવાનું કે, શૈક્ષણિક વર્ષ: ૨૦૨૧–૨૨ થી અમલમાં આવનાર T.Y.B.Sc. (Physics) Sem-5 & Sem-6 ના અભ્યાસક્રમ અંગે ભૌતિકશાસ્ત્ર વિષયની અભ્યાસસમિતિની તા.૧૦/૦૫/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંક: ૨ અન્વયે નીચે મુજબ કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ ની સભાનાં ઠરાવ ક્રમાંક: ૭ અન્વયે મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલે તેની તા.૨૫–૨૬/૦૬/૨૦૨૧ ની સભાના ઠરાવ ક્રમાંક: ૨૮ અન્વયે સ્વીકારી મંજૂર કરેલ છે. તેની જાણ સંબંધકર્તા શિક્ષકો અને વિદ્યાર્થીઓને કરવી, તદ્ઉપરાંત તેનો અમલ કરવો.

ભૌતિકશાસ્ત્ર વિષયની અભ્યાસસમિતિની તા.૧૦/૦૫/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંક: ૨

:: આથી ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ ૨૦૨૧–૨૨, જૂન–૨૦૨૧ થી અમલમાં આવનાર T.Y.B.Sc. (Physics) Sem-5 & Sem-6 નો પેટાસમિતિએ તૈયાર કરેલ અભ્યાસક્રમ સર્વાનુમતે મંજૂર કરી વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંક: ૭

:: આથી ઠરાવવામાં આવે છે કે, ભૌતિકશાસ્ત્ર વિષયની અભ્યાસસમતિની તા.૧૦/૦૫/૨૦૨૧ ની સભાનાં ઠરાવ ક્રમાંક: ૨ અન્વયે મંજૂર કરેલશૈક્ષણિક વર્ષ ૨૦૨૧–૨૨, જૂન–૨૦૨૧ થીઅમલ માં આવનાર T.Y.B.Sc. (Physics) Sem-5 & Sem-6 નો પેટાસમિતિએ તૈયાર કરેલ અભ્યાસક્રમ મંજૂર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

એકેડેમિક કાઉન્સિલની તા.૨૫–૨૬/૦૬/૨૦૨૧ ની સભાનાં ઠરાવ ક્રમાંક: ૨૮

:: આથી ઠરાવવામાં આવે છે કે,ભૌતિકશાસ્ત્ર વિષયની અભ્યાસસમિતિએ તેની તા.૧૦/૫/૨૦૨૧ ની સભાનાં ઠરાવ ક્રમાંક: ૨ અન્વયે અનેવિજ્ઞાન વિદ્યાશાખાએ તેની તા. ૧૭/૦૬/૨૦૨૧ ની સભાના ઠરાવ ક્રમાંક: ૭ અન્વયે ભલામણ કરેલ શૈક્ષણિક વર્ષ ૨૦૨૧–૨૨, જૂન–૨૦૨૧ થી અમલમાં આવનાર T.Y.B.Sc. (Physics) Sem-5 & Sem-6 નો અભ્યાસક્રમ મંજૂર કરવામાં આવે છે.

બિડાણ: ઉપર મુજબ

ક્રમાંક : એકે./પરિપત્ર/૯૨૮૫/૨૧
તા.૦૧–૦૭–૨૦૨૧

ઈ.ચા. કુલસચિવ

પ્રતિ,
૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની ,ભૌતિકશાસ્ત્ર વિષય ચલાવતી સંલગ્ન કૉલેજોના આચાર્યશ્રીઓ.
૨) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા
૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.
......તરફ જાણ તેમજ અમલ સારૂ.

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Syllabus for T. Y. B. Sc. (Physics) with effect from June 2021

(Semester V & VI)

Structure for B. Sc. Syllabus

Inforce from June 2021

B. Sc. (PHYSICS)

Semester V

Sr. No.	Course Code	Course Title	Credits
1	PH –506	Physics Paper VI	02
2	PH –507	Physics Paper VII	02
3	PH –508	Physics Paper VIII	02
4	PH – 509	Physics Paper IX	02
5	PH – 510	Physics Paper X	02
6	PH – 511	Physics Paper XI	02
7	PH – 512	Practical	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.	V	PH – 506	Theory	02	20	50	70
		PH – 507	Theory	02	20	50	70
		PH – 508	Theory	02	20	50	70
		PH – 509	Theory	02	20	50	70
		PH – 510	Theory	02	20	50	70
		PH – 511	Theory	02	20	50	70
		PH – 512	Practical	06	60	120	180
		Elective Course	Theory	02	20	50	70

Note:

1. Student must opt one Elective Paper in each semester (V & VI) out of different Elective Papers offered by the College.
2. College can offer more than one Elective Paper as a choice to the students depending on the available staff and infrastructure.

Veer Narmad South Gujarat University, Surat

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

Physics Paper VI (PH – 506)

Classical Mechanics and Solid State Physics

Unit 1	Motion in Central Force Field (Introduction to Classical Mechanics by R G Takwale and P S Puranik, McGraw Hill Edu. (India) Pvt. Ltd., 2017)
	(5.1) Eqivalent One-body Problem, (5.2) Motion in a Central Force Field, (5.3) General Features of the Motion, (5.4) Motion in an Inverse Square Law force field, (5.5) Equation of the Orbit, (5.6) Kepler's Law of Planetary Motion
Unit 2	Lagrangian Formulation (Introduction to Classical Mechanics by R G Takwale and P S Puranik, McGraw Hill Edu. (India) Pvt. Ltd., 2017)
	(8.1) Constraints, (8.2) Generalised Coordinates, (8.3) D'Alembert's Principles, (8.4) Lagrange's Equations, (8.5) General Expression for Kinetic Energy, (8.6) Symmetries and Laws of Conservation, (8.7) Cyclic or Ignorable Coordinates, (8.8) Velocity-Dependent of Potential of Electromagnetic Field
Unit 3	Free Electron Fermi Gas(Solid State Physics Charles Kittel , John Wiley& Sons, 8th ed., 2005)
	Ch:6 Energy levels in one dimension, Effect of temperature on the Fermi Dirac distribution, free electron gas in 3 dimensions, heat capacity of the electron gas, electrical conductivity and Ohm's law, motion in magnetic field, thermal conductivity of metals, Problems (including sub topics)
Unit 4	Energy Bands(Solid State Physics Charles Kittel , John Wiley & Sons, 8th ed., 2005)
	Ch:7 Nearly free electron model, Bloch functions, Kronig – Penny model, wave equation of electron in periodic potential, number of orbitals in a band, Summary, Problems (inclusive of sub topics)

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 Physicsby S O Pillai, New Age International Publishers, 2018.

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

Physics Paper VII (PH – 507)

Electrodynamics and Optics

Unit 1	Electric Fields in Matter(Introduction to Electrodynamics by David J. Griffiths, Pearson India Education, 4th ed.)
	1 Polarization: Dielectrics (1.1),Induced Dipoles (1.2),Alignments of Polar molecules (1.3), Polarization (1.4) **2 The field of a polarized object:** Bound Charges (2.1),Physical interpretation of bound charges, The field inside a Dielectric (2.3) **3 The electric displacement:** Gauss's law in presence of dielectrics(3.1),A deceptive parallel (3.2),Boundary Conditions (3.3) **4 Linear dielectrics:** Susceptibility, permittivity, Dielectric Constant (4.1),Boundary value Problems with linear dielectrics(4.2),Energy in dielectric systems(4.3),Forces on dielectrics (4.4)
Unit 2	Magnetic Fields in Matter(Introduction to Electrodynamics by David J. Griffiths, Pearson India Education, 4th ed.)
	1 Magnetization: Diamagnets, Paramagnets, Ferromagnets (1.1), Torques and Forces on Magnetic Dipoles (1.2),Effect of magnetic field on Atomic orbits (1.3), Magnetization (1.4) **2 The field of a magnetized object:** Bound Currents (2.1), Physical interpretation of Bound Currents (2.2), The Magnetic Field Inside Matter (2.3) **3 The Auxiliary Field H:** Ampere's Law in Magnetized Materials (3.1), A deceptive parallel (3.2), **4 Linear and Non-linear media:** Magnetic Susceptibility and Permeability (4.1), Ferromagnetism (4.2)
Unit 3	Multiple Beam Interferometry (Optics by Ajoy Ghatak, McGraw Hill Edu. (India) Pvt. Ltd., 6th ed. 2017)
	Introduction (16.1), Multiple Reflections from a Plane Parallel Film (16.2), The Fabry-Perot Etalon (16.3), The Fabry- Perot Interferometer (16.4), Resolving Power (16.5), The Lummer-Gehrcke Plate (16.6), Interference Filters (16.7) Summary (16.11), Problems (16.12)
Unit 4	Holography (Optics by Ajoy Ghatak, McGraw Hill Edu. (India) Pvt. Ltd., 6thed. 2017)
	Introduction (21.1), Basic Theory (21.2), Requirements (21.3), Some Applications of Holography (21.4), Summary (21.9), Problems (21.9)

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

Physics Paper VIII (PH – 508)

Atomic and Molecular Physics and Nuclear Physics

Unit 1	Quantum Theory of Hydrogen Atom (Concepts of Modern Physics by Arthur Beiser, McGraw Hill Publishing Co. Ltd. New Delhi,6th ed.)
	(6.1) Schrodinger's Equation for the Hydrogen Atom, (6.2) Separation Variables, (6.3) Quantum Numbers, (6.4) Principal Quantum Number, (6.5) Orbital Quantum Number, (6.6) Magnetic Quantum Number
Unit 2	Quantum Theory of Hydrogen Atom (Concepts of Modern Physics by Arthur Beiser, McGraw Hill Publishing Co. Ltd. New Delhi, 6th ed.)
	(6.7) Electron Probability Density, (6.8) Radiative Transitions, (6.9) Selection Rules, (6.10)Zeeman Effect, (7.1) Electron Spin, (7.2) Exclusion Principle, (7.3) Symmetric and Antisymmetric Wave Functions
Unit 3	Nuclear Models (Introduction to Nuclear and Particle Physics by V.K.Mittal, R.C. Verma, S.C. Gupta, PHI, 3rd ed., 2014)
	Introduction (2.1), Liquid Drop Model (2.2), Shell Model (2.3), Fermi Gas Model (2.4), Collective Model (2.5) (including all subtopics)
Unit 4	Radioactivity(Introduction to Nuclear and Particle Physics by V.K.Mittal, R.C. Verma, S.C. Gupta, PHI, 3rd ed., 2014)
	Alpha emission (3.5), Beta decay (3.6) Gamma decay (3.7), Artificial or induced radioactivity (3.8), Applications of radioactivity (3.9) (including all subtopics)

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

Physics Paper IX (PH – 509)

Statistical Mechanics and Special Relativity

Unit 1	Blackbody radiation (Thermal Physics by Garg, Bansal and Ghosh, 2nd ed., McGraw Hill Education (India) Pvt Ltd. Chennai, 2012)
	Blackbody radiation as a thermodynamics system (11.4), The Stefan-Boltzmann law (11.4.1), Isothermal and adiabatic expansion of blackbody radiation (11.4.2), Spectral distribution of radiant energy (11.5), Wien's law (11.5.1), Rayleigh-Jeans law (11.5.2), Planck's law (11.5.3)
Unit 2	Basic concepts of Statistical Mechanics (Thermal Physics by Garg, Bansal and Ghosh, 2nd Ed., McGraw Hill Education (India) Pvt Ltd. Chennai, 2012)
	Introduction (12.1), Bridging microscopic and macroscopic behaviours (12.2), Phase space and quantum states (12.3), Specification of the state of the system (12.4), Macrostate and microstates (12.5), Probability calculations (12.6), Types of Ensembles (12.7), Entropy and probability (12.8) (Including subtopics)
Unit 3	The Experimental Background of the Theory of Special Relativity (Introduction to Special Relativity by Robert Resnick; Wiley India Pvt. Ltd., 2007)
	Introduction (1.1), Galilean Transformations (1.2), Newtonian Relativity (1.3), Electromagnetism and Newtonian Relativity (1.4), Attempts to Locate the Absolute Frame; the Michelson-Morley Experiment (1.5), Attempts to Preserve the Concept of a Preferred Ether Frame; the Lorentz-Fitzgerald Contraction Hypothesis (1.6), Attempts to Preserve the Concept of a Preferred Ether Frame; the Ether-Drag Hypothesis (1.7), Attempts to Modify Electrodynamics (1.8), The Postulates of Special Relativity Theory (1.9)
Unit 4	Relativistic Kinematics (Introduction to Special Relativity by Robert Resnick; Wiley India Pvt. Ltd., 2007)
	The Relativity of Simultaneity (2.1), Derivation of the Lorentz Transformation Equations (2.2), Some Consequences of the Lorentz Transformation Equations (2.3), The Relativistic Addition of Velocities (2.6), Aberration and Doppler Effect of Relativity (2.7)

Suggestedbooks:

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

Physics Paper X (PH – 510)

Electronics

Unit 1	MOSFET,Thyristor & UJT (Electronic Principles by A Malvino and D. Bates, McGraw Hill Edu. (India) Pvt. Ltd, New Delhi, 7th ed.)
	MOSFETS: The Depletion-mode MOSFET(14-1), D-MOSFET Curves(14.2), Depletion-Mode MOSFET Amplifiers(14.3), The Enhancement -mode MOSFET (14.4), The Ohmic region (14-5), Digital switching (14.6), CMOS (14.7), Power FETs (14.8), E-MOSFET amplifiers (14.9) **Thyristors:** The Four – Layer Diode(15.1),The Silicon Controlled Rectifier (15.2), The SCR crowbar (15.3), SCR Phase control (15.4), Bidirectional thyristors (15.5), Other thyristors (15.7)
Unit 2	**Differential Amplifier (Electronic Principles by A Malvino and D. Bates, McGraw Hill Edu. (India) Pvt. Ltd, New Delhi, 7th ed.)**
	Differential Amplifier (17.1),DC Analysis of a Differential Amplifier (17.2), AC analysis of Differential Amplifier (17.3),Input Characteristic of an Op Amp (17.4), Common Mode Gain (17.5), Integrated circuits (17.6), The current mirror (17.7), The loaded diff amp (17.8)
Unit 3	**Digital logic and combinational logic circuit** **(Digital Principles and Applications by A. Malvino and D. Leach, McGraw Hill Edu. (India) Pvt. Ltd. 7th ed.)**
	Digital Logic: The Basic Gates-NOT,OR,AND(2.1),Universal Logic Gates(2.2),AND –OR Invert Gates(2.3) **Combinational Logic Circuit:** Boolean Law And Theorems(3.1),Sum of Product Method(3.2), Truth Table To Karnaugh Map(3.3),Pairs, Quads And Octets (3.4) Karnaugh Simplifications(3.5), Don't Care Conditions(3.6), Product Of Sum Method(3.7), Product OF Sum Simplification(3.8)
Unit 4	**Digital logic and combinational logic circuit (Digital Principles and Applications by A. Malvino and D. Leach, McGraw Hill Edu. (India) Pvt. Ltd 7th ed.)**
	Multiplexer (4.1), Demultiplexer (4.2), 1 Of -16 Decoder, BCD to Decimal Decoders(4.4), Encoders(4.6), Exclusive OR Gates(4.7),Parity Generators and Checkers(4.8),Magnitude Comparator (4.9), Binary Number system(5.1),Binary To Decimal Conversion(5.2), Decimal To binary Conversion(5.3), Octal Number(5.4), Hexadecimal Numbers(5.5)

Suggestedbooks:

1. Functional Electronics by K.V. Ramanan – McGraw Hill Edu. (India) Pvt. Ltd 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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Proposed Syllabus for T. Y. B. Sc. Sem V

Physics Paper XI (PH – 511)

Mathematical Methods of Physics and C-Programming

Unit 1	**Vector Analysis : (Mathematical Method for Physicists by Arfken and Weber (6th ed.)**
	Orthogonal coordinates in R^3(2.1), Differential Vector Operators (2.2), Spatial Coordinate System; Introduction (2.3), Circular Cylindrical Coordinates (2.4), Spherical Polar Coordinates (2.5)
Unit 2	**Numerical Methods (Introductory Methods of Numerical Analysis by S.S.Sastry, PHI publication, 4th ed.)**
	Solutions of algebraic equations: Introduction(2.1), the bisection method(2.2), the method of false position(2.3), the iteration method(2.4), Newton-Raphson method(2.5) **Interpolation:** Introduction(3.1), errors in polynomial interpolation(3.2), finite differences(3.3), forward differences(3.3.1), backward differences(3.3.2),central differences(3.3.3), symbolic relations and separation of symbols(3.3.4), detection of errors by use of difference tables(3.4), differences of a polynomial(3.5), Newton's formula for interpolation(3.6) Divided differences and their properties(3.10), Newton's general interpolation formula(3.10.1)
Unit 3	**C Programing (Computer Programing in C by V Rajaraman by PHI Learning Private Ltd, Delhi (24thPrinting))**
	Numerical Constant and Variables: Constants (5.1), Scalar Variable (5.2), Declaring Variable Names (5.3), Defining Constants (5.4), **Arithmetic Expressions:** Arithmetic operators and Modes of expressions (6.1), Integer expressions(6.2), Floating point expressions (6.3), Operatorprecedence in expressions (6.4), Examples of Arithmeticexpressions (6.5), Assignment statements (6.6), Defining variables (6.7), Arithmetic conversion (6.8), Assignment expressions (6.9), Increment and decrement operators (6.10), Multiple assignments (6.11)
Unit 4	**C Programing (Computer Programing in C by V Rajaraman by PHI Learning Private Ltd, Delhi (24thPrinting))**
	Input and Output in C Programs Output function (7.1), Input function (7.2) **Conditional Statements** Relation Operators (8.1), Compound statement (8.2), Conditional statements (8.3), Example programs using conditional statements (8.4) **Implementing Loops in Programs** The *while* loop (9.1), The *for* Loop (9.2), The *do while* loop

Suggested books:

1. Mathematical Physics by H K Dass and Dr. Rama Verma, S.Chand Co.7[th]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

Veer Narmad South Gujarat University, Surat

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

PH-512

LIST OF EXPERIMENTS

	GROUP A
1	To determine Young's modulus of a wire using optical lever.
2	To determine Gravitational acceleration by Keter's pendulum
3	To study Measurement of susceptibility of paramagnetic material
4	To determine Elastic constants for the material of flat spiral spring
5	To determine angle of contact and surface tension of mercury by Quinck's method.
6	To determine Moment of Inertia by Bifilar suspension.
	GROUP B
1	To determine wave length of light by constant deviation spectrometer
2	To determine the cardinal points of a lens system using turn table.
3	To determine separation between plates of a Fabry Perot Etalon.
4	To determine the resolving power of a telescope.
5	To determine Hartman formula using prism.
6	To determine refractive index of a liquid by total internal reflection.
	GROUP C
1	To determine activation energy of semiconductor
2	To determine electronic charge 'e' using photo –emissive cell.
3	To determine absorption coefficient of liquid using photo cell.
4	To determine dielectric constant of a dielectric material with frequency.
5	To determine value of Planck's constant using LEDs of at least 4 different colors.
6	To determine thermal conductivity of Rubber Tubing
	GROUP D
1	Study of Parallel resonance using LCR circuit.
2	To determine Temperature Coefficient of Resistance for Platinum using Carey-Foster's bridge
3	To determine self-inductance by Anderson's bridge
4	To determine absolute value of capacitance using ballistic galvanometer.
5	Comparison of capacitance by the method of mixture.
6	To determine figure of merits of ballistic galvanometer.
	GROUP E
1	Design built and test adder/ subtractor using IC 741
2	Design built and test astable multivibrator using IC-555/Op-Amp
3	Design built and study Wien bridge oscillator
4	Design built and test Integrator and differentiator using IC 741.
5	Design built and test AND, OR, NOT gates using NAND/NOR gates.
6	Design built and test two stage RC coupled amplifier.
	GROUP F
1	C-program for calculation of days between two dates of a year
2	C-program to solve the sum of the sine and cosine series and print out the curve.
3	C-program to convert a given integer into binary and octal systems and vice versa.
4	C-program to find Inverse of a matrix

5	Find roots of f(x) = 0 by using Newton-Raphson method
6	Find roots of f(x) = 0 by using iteration method
7	Use of Newton's forward, backward and general interpolation formula
8	Use of Newton's interpolation formula to estimate the first order and the second order differentials numerically.

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), R. Chand & Co.

Note:
1. The duration of each experiment is of 2 hours.
2. In the external exam, a student shall perform six experiments, one fromeach 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 should be completed in two days by arranging three sessions of 2 hours each in a day.

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Proposed Syllabus for T. Y. B. Sc. SemV

Elective Paper - I

Modern Digital and Analog Communication System-I

Unit 1	**Introduction :Communication System (Modern Digital And Analog Communication Systemby B P Lathi & Zhi Ding, Oxford University Press (2011)**
	Communication Systems (1.1), Analog and Digital Messages (1.2), Channel Effect, Signal-to-Noise Ratio and Capacity(1.3), Modulation and Detection (1.4) (Including Subtopics)
Unit 2	**Amplitude Modulations and Demodulations (Modern Digital And Analog Communication Systemby B P Lathi & Zhi Ding, Oxford University Press (2011)**
	Baseland Versus Carrier Communications(4.1), Double-Sideband Amplitude Modulation(4.2), Amplitude Modulation (AM)(4.3), Bandwidth-Efficient Amplitude Modulations(4.4), Amplitude Modulations: Vestigial Sideband(VSB) (4.5), Local Carrier Synchronization (4.6), Frequency Division Multiplexing (FDM) (4.7), Phase-Locked Loop and some Applications(4.8)(Including Subtopics)
Unit 3	**Angle Modulation and Demodulation (Modern Digital And Analog Communication Systemby B P Lathi & Zhi Ding, Oxford University Press (2011)**
	Nonlinear Modulation (5.1), Bandwidth of Angle-Modulated Waves(5.2), Generating FM Waves (5.3), Demodulation of FM Signals (5.4), Effects of Nonlinear Distortion and Interference (5.5), Superheterodyne Analog AM/FM Receivers (5.6), FM Broadcasting System(5.7)
Unit 4	**Sampling and analog-to Digital Conversion (Modern Digital And Analog Communication Systemby B P Lathi & Zhi Ding, Oxford University Press (2011)**
	Sampling Theorem (6.1), Pulse Code Modulation (PCM) (6.2), Digital Telephony: PCM in T1 Carrier Systems (6.3), Digital Multiplexing (6.4), Differential Pulse Code Modulation (DPCM) (6.5), Adaptive Differential PCM (ADPCM) (6.6), Delta Modulation (6.7) Vocoders and Video Compression (6.8)(Including Subtopics)

Suggested books:

1. Modern Digital And Analog Communication System, Publisher : Oxford University press, 2011
2. Introduction to Analog & Digital Communications : Simon Haykin & Michael Moher, 2014

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Proposed Syllabus for T. Y. B. Sc. (Physics) Sem V
Elective Paper II
Astrophysics-I

Unit 1	Astronomical Instruments(An Introduction to Astrophysics by Baidyanath Basu, Tanuka Chattopadhyay and Sudhindra Nath Biswas PHI Learning Private Ltd, 2nded.)
	Optical Telescopes (1.3), Radio Telescopes (1.4), The Hubble Space Telescope (HST) (1.5), Astronomical Spectrograph (1.6), Spectrophotometry (1.9)
Unit 2	Star (An Introduction to Astrophysics by Baidyanath Basu, Tanuka Chattopadhyay and Sudhindra Nath Biswas PHI Learning Private Ltd, 2nded.)
	Magnitudes, Motions, and Distances of Stars Stellar Magnitude Sequence (3.1), Absolute Magnitude and the Distance Module (3.2), Radiometric Magnitudes (3.5), The colour index of a star (3.6), Luminosities of Star (3.7) **Spectral Classification of Stars** Introduction (4.1), Boltsmann's Formula (4.2), Saha's Equation of thermal Ionization (4.3), Importance of Ionization Theory in Astrophysics (4.6)
Unit 3	The Sun (An Introduction to Astrophysics by Baidyanath Basu, Tanuka Chattopadhyay and Sudhindra Nath Biswas PHI Learning Private Ltd, 2nded.)
	Sun- A Typical Star (5.1), The Photosphere: Limb- darkening (5.2), Solar Granulation (5.3), The Chromosphere (5.5), Solar Corona (5.6), Prominences (5.7), The 11 Year Solar Cycle and Sunspots (5.8), The Solar Magnetic Fields (5.9), Theory of Sunspots (5.10), Solar Flares (5.11), Radio Emissionfrom the Sun (5.12), Solar Wind (5.13), The Solar Neutrino Puzzle (5.14)
Unit 4	Binary and Multiple Stars(An Introduction to Astrophysics by Baidyanath Basu, Tanuka Chattopadhyay and Sudhindra Nath Biswas PHI Learning Private Ltd, 2nded.)
	Introduction (7.1), Visual Binary (7.2), Spectroscopic Binary (7.3), Eclipsing Binary (7.4), Multiple Stars (7.5), Origin of Binary Stars (7.6), Steller Masses and Mass Luminosity Relation (7.7), Mass Transfer in close Binary Systems (7.8)

Suggested books:

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

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Proposed Syllabus for T. Y. B. Sc. (Physics) Sem V
Elective Paper III
Measurements and Instrumentation-I

Unit 1	Optoelectronic measurement (Electrical and Electronic Measurements and Instrumentation By A.K. Sawhney, Dhanpat Rai & Co 19th ed.)
	Introduction (19.1), Monochromatic light (19.2), Polarized wave shape(19.3), Refraction and refractive index (19.4), Reflection, Absorption and transmission(19.5), Radiometry and photometry(19.6), Terms relating to photometry(19.7), Laws of illumination(19.11), Terms relating to radiometry(19.12), Photometry/radiometry measurement systems(19.13), Optical sources(19.14), Optical detectors(19.15).
Unit 2	Electronic Instruments(Electrical and Electronic Measurements and Instrumentation By A.K. Sawhney, Dhanpat Rai & Co 19th ed.)
	Introduction (20.1), Electronic voltmeter and their advantages(20.2), Vacuum tube voltmeter(20.3), Differential amplifier(20.4), Difference amplifier type of electronic voltmeter(20.5), Source follower types of electronic voltmeter(20.6), DC voltmeter with direct-coupled amplifier(20.7), Chopper stabilized amplifier(20.8), Electronic voltmeter using rectifier(20.9)
Unit 3	Cathode Ray Oscilloscope(Electrical and Electronic Measurements and Instrumentation By A.K. Sawhney, Dhanpat Rai & Co 19th ed.)
	Introduction (21.1), Cathode ray tube(21.2), Electron gun(21.3), Electrostatic focusing(21.4), Electrostatic deflection(21.5), Post deflection acceleration of electron beam(21.6), Effect of beam transit time and frequency limitations(21.7), Deflection plates(21.8), Graticule(21.10), Time base generator(21.13), Oscilloscope amplifiers(21.14), Vertical input and sweep generator signal synchronization(21.15), Attenuators(21.16), Basic CRO circuits(21.17), Observation of waveform on CRO(21.18), Measurements of voltage and currents(21.19), measurements of phase and frequency(21.20)
Unit 4	Transducers(Electrical and Electronic Measurements and Instrumentation By A.K. Sawhney, Dhanpat Rai & Co 19th ed.)
	Transducers (25.6), Electric-transducers (25.7), Classification Transducers (25.8), Characteristics and choice of transducers (25.9), Summary of factors influencing the choice of transducers (25.10), Resistive transducers (25.11), Potentiometers (25.12), Materials used for potentiometer (25.14), Advantages and disadvantages of resistance potentiometer (25.15)

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