Re-Accredited 'B++' 2.86 CGPA by NAAC
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 સંલગ્ન તમામ કોલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, NEP-2020 અંતર્ગત શૈક્ષણિક વર્ષ ૨૦૨૪–૨૫ થી અમલમાં આવનાર S.Y.B.Sc. Physics Sem.- 4 Major, Minor અને SEC નો પેટાસમિતિ દ્વારા તૈયાર કરવામાં આવેલ અભ્યાસક્રમ ભૌતિકશાસ્ત્ર વિષયની અભ્યાસ સમિતિના ચેરમેનશ્રીએ અભ્યાસ સમિતિવતી અને વિજ્ઞાન વિદ્યાશાખાના અધ્યક્ષશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિદ્યાશાખાવતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલની તા.૦૧/૦૩/૨૦૨૪ ની સભાના ઠરાવ ક્રમાંકઃ૧૦૪ અન્વયે માન.કુલપતિશ્રીને આપેલ સત્તા અંતર્ગત માનનીય કુલપતિશ્રી દ્વારા મંજૂર કરેલ છે.જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

(બિડાણઃ ઉપર મુજબ)

ક્રમાંક :ઓથોરીટીઝ/સાયન્સ/પરિપત્ર/૨૨૯૮૫/૨૦૨૪
તા.૨૫–૧૦–૨૦૨૪

કુલસચિવ

પ્રતિ,
૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન તમામ કોલેજોનાં આચાર્યશ્રીઓ.
..... આપશ્રીની કોલેજના સંબંધિત શિક્ષકો તથા વિદ્યાર્થીઓને જાણ કરી અમલ કરવા સારૂ.
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,Surat
Proposed Syllabus
For

B.Sc. Sem-IV
Course: PHYSICS MAJOR (NEP)
From : Academic Year :2024-25

Veer Narmad South Gujarat University, Surat

Syllabus

For

B. Sc. Semester IV

Physics (Major) (NEP-2020)

Effective from the Academic Year 2024-25

Paper: MJ-PH (TH) – 403 (2 Credits)

UNIT 1 Dielectrics

Dielectrics (6.1), dielectric and atomic view (6.2), forces and torque on dipoles (6.3), polarization and charge density (6.4), potential and filed outside of dieletric (6.5), induced charge on the dielectric in an electric field (6.6), Gauss' law in a dielectric (6.7), three electric vectors (6.8), boundary conditions at the dielectric surface (6.9), effects of dielectric (6.10).

UNIT 2 Crystal Structure and Crystal Vibrations

Periodic array of atoms, fundamental types of lattices, index systems for crystal planes, simple crystal structures, direct imagining of atomic structure, non-ideal crystal structures Chapter 1 (includes subtopics).

Diffraction of waves by crystals, Brillouin zones Chapter 2 (includes subtopics).

Vibrations of crystals with monoatomic bases, two atoms per primitive bases Chapter 4 (includes subtopics).

Reference books:

1. Electricity and Magnetism by D. C. Tayal, 4th Ed., Himalaya Publishing House.
2. Introduction to Electrodynamics by D. J. Griffiths, 4th Ed., Pearson India Education.
3. Introduction to Solid State Physics by C. Kittel, 8th Ed., John Wiley and Sons, 2005.

Bajaj

Practical MJ-PH (PRA) – 403 (2 Credits)

Sr. No.	Title
1.	To study parallel resonance in LCR circuit.
2.	To determine the self-inductance of a coil by Anderson's bridge.
3.	To determine absorption coefficient of liquid.
4.	To study Owen's bridge.
5.	To determine the resistance of a BG.
6.	To determine capacitance of a capacitor by discharging it through a voltmeter.
7.	To determine phase angle between voltage and current using voltage vector triangle for an RC circuit.
8.	To find impedance, inductive reactance and capacitive reactance of an LCR ac series network for two different frequencies.
9.	To determine moment of inertia of different specimen using bifilar suspension method.
10.	To determine dielectric constant of a dielectric material.
11.	Study of thermocouple.
12.	To determine the capacitance of a capacitor using Schering bridge.

Reference Books:

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

Note:

1. The duration of each experiment is of 2 hours.
2. There should not be more than 10 students per batch as per NEP 2020 guidelines.
3. In the external exam, a student will have to perform two experiments. The experiment will be of 2-hour duration.
4. There should be two examiners per batch in the external examination.
5. There should not be more than 10 students per examiner per session in the external examination.

Bajaj

Paper: MJ-PH (TH) – 404 (2 Credits)

UNIT 1 JFETs and MOSFETs

Basic Ideas (11.1), drain curves (11.2), the transconductance curve (11.3), biasing in the ohmic region (11.4), biasing in the active region (11.5,) transconductance (11.6), JFET amplifiers (11.7), the JFET analog switch (11.8).

The Depletion-Mode MOSFET (12.1), D-MOSFET curves (12.2), Depletion-Mode MOSFET Amplifiers (12.3), the Enhancement-Mode MOSFET (12.4), the ohmic region (12.5), digital switching (12.6), CMOS (12.7).

UNIT 2 Aberrations

Introduction (6.1), Chromatic aberration (6.2), The achromatic doublet (6.2.1), Removal of chromatic aberration of a spherical doublet (6.2.2), Monochromatic aberrations (6.3), Spherical aberration (6.3.1), Coma (6.3.2), astigmatism and curvature of field (6.3.3), Distortion (6.4).

Reference books:

1. Electronics Principles by A. P. Malvino, 8th Ed., Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1999.
2. Optics by Ajoy Ghatak 6th Ed., McGraw Hill Education (India) Pvt. Ltd., New Delhi, 2017.

Bajaj

Practical MJ-PH (PRA) – 404 (2 Credits)

Sr. No.	Title
1.	To determine wavelength of spectral lines by plane transmission grating. (For normal incidence)
2.	To determine spherical aberration of a plano-convex lens.
3.	To determine refractive endex of different transparent liquids using a hollow prism.
4.	To determine the resolving power of a telescope.
5.	To determine stopping potential of a metal using photocell.
6.	To determine k_B/e using a power transistor.
7.	To study the characeristics of JFET.
8.	To study the characeristics of D-MOSFET.
9.	To study the characeristics of E-MOSFET.
10.	To study FET amplifier.
11.	To study MOSFET amplifier.
12.	To determine lattice parameters of a cubic single crystals structure. (From XRD pattern).

Reference Books:

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

Note:

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3. In the external exam, a student will have to perform two experiments. The experiment will be of 2-hour duration.
4. There should be two examiners per batch in the external examination.
5. There should not be more than 10 students per examiner per session in the external examination.

Bajaj

Paper: MJ-PH (TH) – 405 (4 Credits)

UNIT 1 Astrophysics

Light and its porpeerties (1.1), the Earth's atmosphere and the electromagnetic rdaition (1.2), optical telescopes (1.3), radio telescopes (1.4), the hubble space telescope (HST) (1.5), astronomical spectrograph (1.6), photographic photometry (1.7), photoelectric photometry (1.8), spectrophotometry (1.9), detectors and image processing (1.10).

UNIT 2 Quantum Mechanics

Quantum mechanics (5.1), wave equation (5.2), Schrodinger's equation: time dependent form (5.3), linearity and superposition (5.4), expectation values (5.5), operators (5.6), Schrodinger's equation: steady-state form (5.7), particle in box (5.8), finite potential (5.9), tunnel effect (5.10), harmonic oscillator (5.11).

UNIT 3 Free Energy and Chemical Thermodynamics

Free energy as available work (5.1), free energy as a force towards equilibrium (5.2), phase transformations of pure substances (5.3), phase transformations of mixtures (5.4), dilute solutions (5.5), chemical equilibrium (5.6).

UNIT 4 Radioactivity

Introduction (3.1), laws of disintegration (3.2), activity and its units (3.2.1), half-life (3.2.2), average life (3.2.3), radioactive series (3.3), law of successive disintegration (3.4), radioactive equilibrium (3.4.1), alpha emission (3.5), properties of alpha particles (3.5.1), alpha spectrum (3.5.2), range of alpha-particles (3.5.3), Geiger-Nuttal law (3.5.4), beta decay (3.6), conditions for spontaneous emission of β^--particles (3.6.1), conditions for spontaneous emission of β^+-particles (3.6.2), gamma decay (3.7.1).

Reference books:

1. An Introduction to Astrophysics by Baidyanath Basu, Tanuka Chatto-padhyay and Sudhindra Nath Biswas PHI Learning Private Ltd, 2nd Ed.
2. Concepts of Modern Physics by A. Beiser, 6th Ed., Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2003
3. Introduction to Thermal Physics by Daniel V. Schroeder, 2nd Ed., Oxford University Press, 2021.
4. Introduction to Nuclear and Particle Physics by Mittal, Verma and Gupta, 3rd Ed., PHI Learning Pvt. Ltd.

Baid

Veer Narmad South Gujarat University, Surat

Proposed Syllabus

For

B. Sc. Sem. IV

Course: Physics Minor

From

Academic year: 2024-25

Sem. IV

Paper I MN-PH (TH) – 401 (CREDITS – 02)

Unit	Content	No. of hr
1	**Rotational Motion**	**15**
1.1	Rotational motion (8.1), the rotational variables (8.2), rotational quantities as vectors (8.3), rotation with constant angular acceleration (8.4), relationships between linear and angular variables (8.6).	8
1.2	Torques (9.1), rotational inertia and Newton's second law (9.2), rotational inertia of solid bodies (9.3), torque due to gravity (9.4), equilibrium applications of Newton's laws for rotation (9.5).	7
2	**Magneto-statics and Electromagnetic Induction**	**15**
1.1	Magneto-statics: Magnetic interactions and magnetic poles (32.1), the magnetic force on a moving charge (32.2), circulating charges (32.3), the magnetic force on a current carrying wires (32.5), the torque on a current loop (32.6).	8
1.2	Electromagnetic Induction: Faraday's experiments (34.1), Faraday's law of induction (34.2), Lenz's law (34.3), motional emf (34.4), generator and motor (34.5).	7

Reference books:

1. Physics by Halliday, Resnik and Krane, Vol. 1, 5th edition, Wiley.
2. Physics by Halliday, Resnik and Krane, Vol. 2, 5th edition, Wiley.

Bajaj

Practical MN-PH (PRA) – 401 (CREDITS – 02)

Sr. No.	Title
1.	To verify the perpendicular axes theorem of moment of inertia.
2.	To verify the parallel axes theorem of moment of inertia.
3.	To determine moment of inertia of a circular disc using torsional pendulum (η to be given).
4.	To determine moment of inertia of a flywheel.
5.	To determine self-inductance of an inductor using Maxwell's bridge.
6.	To determine figure of merit of a BG.
7.	To study simple harmonic motion.
8.	To determine moment of inertia of different specimen using bifilar suspension method.
9.	To determine Young's modulus of a beam by the method of vibration.
10.	To determine Young's modulus of a beam by the method of elevation.

Reference Books:

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

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3. In the external exam, a student will have to perform two experiments, one from each group. The experiment will be of 2-hour duration.
4. There should be two examiners, one for each group, in the external examination.
5. There should not be more than 10 students per examiner per session in the external examination.

Veer Narmad South Gujarat University, Surat

Proposed Syllabus

For

B. Sc. Semester IV

Physics (SEC) (NEP-2020)

Effective from the Academic Year 2024-25

Paper: PH -SEC-1 (Practical Only) (2 Credits)

SEC- Basic Electronics Circuit & Designing -II_Sem-4

1. Design and test AND Gate Using Diode.
2. Design and test OR Gate Using Diode.
3. Design and test NOT Gate Using Transistor.
4. Design and test AND Gate Using Transistor.
5. Design and test OR Gate Using Transistor.
6. Design and test Temperature to frequency Convertor Using IC-555 and Thermistor.
7. Design and test X-OR gate using NAND gate.
8. Design and test Ex-or gate using Basic logic gates.
9. Design and test Seven segment using LED.
10. To Determine the Plank's constant using LED.
11. Project work (Equivalent to 5 Experiment)

Reference:

Text book electrical Technology by B L Theraja, S Chand Co.

A text book of Electronics By Santanu Chattopadhyay

Asthali, 24-10-24

Bajaj

Proposed Syllabus
For
B. Sc. Semester IV
Physics (SEC) (NEP-2020)
Effective from the Academic Year 2024-25

Paper: PH -SEC-2 (Practical Only) (2 Credits)

SEC- Instrumentation -II_Sem-4

1. To find Absorption coefficient of Liquid.
2. To verify square law of radiation photo- electric cell.
3. To find figure of merit using Ballistic Galvanometer
4. To design voltage divided bias amplifier using transistor.
5. Find cardinal points using two lens system.
6. Study of LVDT transducer for displacement measure.
7. Study of resistance temperature detector for temperature measurement.
8. Celebration of thermistor for temperature management.
9. To perform experiment on displacement measurement using capacitor transducer.
10. Pressure measurement using pressure cell.
11. Calibration of strain gauge for temperature measurement.
12. Conversion of digital to analogue signals using R-2R network.
13. Analogue to digital converter using ADC 0804 IC
14. Write programs of additional subtraction using 8085 simulators.
15. Integrated and differentiator amplifier using salt 741 Op- Amps
16. Summing / subtracting amplifier using 741 Op-Amps.
17. Instrument amplifier using 741 Op-Amps.

Asstt
24-10-24

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Veer Narmad South Gujarat University, Surat

Syllabus for B.Sc. Semester IV

Paper-SEC PH (PRA)-401 (2 Credits)

Course Title: Programming in C Language.

Total Hrs: 60 (Practical)

Develop algorithm, flow chart and program to study the following problems:

Sr. No.	Practical
1	Two dimensional dynamics of a body moving under gravity. (Projectile motion) without considering drag forces.
2	Two dimensional dynamics of a body moving under gravity. (Projectile motion) considering drag forces.
3	Two dimensional dynamics of Collision between two bodies.
4	Using random numbers to model Radioactivity.
5	Study of Rutherford scattering experiment.
6	Study of decay of charge in an R-C circuit.
7	Study of current in an L-R circuit.
8	Study of trajectory of an electron in H_2^+ ion.
9	Project work (equivalent to 4 experiments)

Text Books:

1. ANSI C by Balaguruswamy, TATA McGraw-Hill Publication
2. Introduction to Computational Physics, Marvin L. Dejong, Addison Wesley Longman Publishing Co.

Ashali
24-10-24