NAGARJUNA GOVERNMENT COLLEGE, NALGONDA

(Autonomous) Reaccredited by NAAC with 'A' Grade
(Affiliated to Mahatma Gandhi University)
(www.ngcnalgonda.org)

BOARD OF STUDIES 2018-19

DEPARTMENT OF PHYSICS

NAGARJUNA GOVERNMENT COLLEGE, NALGONDA

NAGARJUNA GOVERNMENT COLLEGE, NALGONDA

(Autonomous) (Reaccredited by NAAC with "A" Grade)

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DEPARTMENT OF PHYSICS

BOARD OF STUDIES MEETING 2018-19

NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
(Autonomous) (Reaccredited by NAAC with "A" Grade)
(Affiliated to Mahatma Gandhi University)
<u>DEPARTMENT OF PHYSICS</u>

BOARD OF STUDIES MEETING 2018-19

The members of Board of studies in Physics Department, N.G. College, Nalgonda met under the chairmanship of Sri G.Srinivas on 29-09-2018 and passed the following Resolutions.

<u>AGENDA :</u>

1. To consider and approve the syllabus for B.Sc. I, II, III years (I, II, III, IV, V &VI Semesters) during 2018-19.

2. To consider and approve the Continuation of Internal Assessment for the students admitted into I, II & III years degree course during 2018-19.

3. To consider and approve the new syllabus for the CBCS and CGPA system for I , II &III year students.

4. To consider and approve the model question paper for B.Sc. I, II&III year 2018-19

5. To consider and approve the list of examiners for paper setting, evaluation for B.Sc. I, II, & III year (I, II, III, IV, V & VI Semester) during 2018-19.

6. To consider and approve to conduct practical exams for Semester wise for I ,II & III year students

7. Any other related academic matters.

<u>RESOLUTIONS:</u>

1. It is resolved to approve the Syllabus and Question papers Models for the I, II, III, IV, V and VI Semester for the year 2018-19 and also in authorized the chairman of Board of Studies to nominate panel of Examiners and paper setter.

2. It is resolved to adopt each semester is of 100 marks in which 70 marks for external and 30 marks for Internal Examination best one out of two (20 Marks for written examination, 5 Marks for one Assignment and 5 marks for one student Seminar) introduced from the year 2014-15 as per the direction of CCE, Hyd.

3. Approved practical exams for semester wise for I, II & III year students.

4. Approved to conduct practical examination at the end of each semester for I,II & III year students .

5. Approved List of Examiners.

6. Approved that it is mandatory to get a maximum of 28 marks in semester and on the whole 40 marks to get through the paper.

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Board of Studies in Physics
N.G. College, NALGONDA,

BOS PANEL MEMBERS-SIGNATURES

1. G.Srinivas
    Head, Dept. of Physics
    N.G. College, Nalgonda

    Chairman B.O.S.

2. Dr. Y. Raja Rao
    Head,Dept. of Physics
    MKR GDC, Devarakonda.

    University Nominee

    Subject Expert

3. Ch.Bixmaiah
    Asst. Prof. of Physics
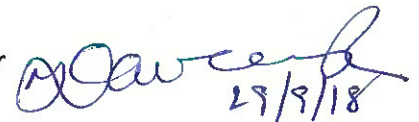   GDC, Rammanapet.

4. M.Srinivas Reddy
    Asst. Prof. of Physics
    GDC Chandur, Nalgonda.
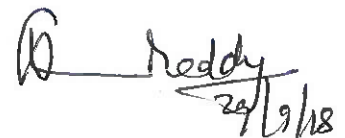
    Subject Expert

5. M.Naveen
    Asst. Prof. of Physics,
    N.G. College, Nalgonda.

    Member

6. G.Lingareddy
    Lecturer in physics
    N.G.College,Nalgonda.

    Member

7. J.Venkatesh
    Lecturer in physics
    N.G.College,Nalgonda.

    Member

8. Ch.Raju
    Lecturer in physics
    N.G.College,Nalgonda.

    Member

9. Ch.Srinivas
    Lecturer in physics
    N.G.College,Nalgonda.

    Member

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PANEL OF QUESTION PAPER SETTERS FOR THE YEAR 2018-19

S.No.	Semester	Name of the Examiners with full Addresses	Year of Experience	Papers Taught	Phone Numbers
1	I&II	P. Gattaiah, S.V. College, Suryapet	11 Years	I, II	8985928257
2		Ch. Nagaraju, Tara GDC, Sangareddy	4 Years	I, II	9160409268
3		Dr.J.Chinnababu G.D.C. City College ,Hyd.	6 Years	I, II	9394801744
4		D.Madhu GDC,Ramannapet.	6 Years	I, II	8886694554
5	III&IV	Dr.Srinadh Reddy, Nizam college, Hyderabad	16 Years	III, IV	9849936509
6		Ch.Aruna, GDC(W), Nalgonda	4 Years	III, IV	9441495293
7		R.Venkateswarlu, GDC(w), Nalgonda.	5 Years	III, IV	9440493244
8		M.Srinivas Reddy, GDC Chandur	6 Years	III, IV	9491992201
9		Dr.K.Narender,KGDC Hanamkonda.	4 Years	III,IV	9393662344
10	V & VI	M.Kondaiah,NM GDC Jogipet,Medak.	6 Years	V, VII	9966586998
11		Dr.N.Vijaya Laxmi, NM GDC Jogipet,Medak.	11 Years	V, VII	9441899369
12		T.Suresh, Tara GDC, Sangareddy	5 Years	V, VII	9666266222
13		Ch.Bixamaiah GDC,Ramannapet.	6 Years	V, VII	8886694554
14		N.Chandana,GDC,City College,HYD.	8 Years	VI, VIII	9866557935
15		Y.Vasudeva Reddy, GDC Ibrahimpatnam	6 Years	VI , VIII	9440136451
16		Dr.Y.Rajarao GDC Hayath Nagar	11 Years	VI, VIII	9866863432
17		Dr.Ch.Snehalatha Reddy Pingili GDC,Hanamkonda	6 Years	VI,VIII	9491317880
18		U.Nagalingam, S.V. College, Suryapet	6 Years	VI, VIII	9704742172

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M.G. College, NALGONDA,

College: NAGARJUNA GOVT. DEGREE COLLEGE
Year: 2018-19
Name of the Module: MECHANICS   **Course: B.Sc.**
Nature of the Module: Core   **Subject: Physics**
Mode of the Learning: Regular   **Semester: I**

UNIT – I

Vector Analysis

Scalar and vector fields, gradient of a scalar field and its physical significance. Divergence and curl of a vector field and related problems. Vector integration, line, surface and volume integrals. Stokes, Gauss and Greens theorems - simple applications.

UNIT – II

Mechanics of Particles

Laws of motion, motion of variable mass system, motion of a rocket, multi-stage rocket, conservation of energy and momentum. Collisions in two and three dimensions, concept of impact parameter, scattering cross-section.

Mechanics of rigid bodies

Definition of Rigid body, rotational kinematic relations, equation of motion for a rotating body, angular momentum and inertial tensor. Euler's equation, precession of a top, Gyroscope.

UNIT- III

Central forces

Central forces – definition and examples, conservative nature of central forces, conservative force as a negative gradient of potential energy, equation of motion under a central force, gravitational potential and gravitational field, motion under inverse square law, derivation of Kepler's laws, Coriolis force and its expressions.

UNIT – IV

Special theory of relativity

Galilean relativity, absolute frames, Michelson-Morley experiment, Postulates of special theory of relativity. Lorentz transformation, time dilation, length contraction, addition of velocities, mass-energy relation. Concept of four vector formalism.

NOTE: Problems should be solved at the end of every chapter of all units.

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Textbooks

1. Berkeley Physics Course. Vol.1, **Mechanics** by C. Kittel, W. Knight, M.A. Ruderman - *Tata- McGraw hill Company Edition 2008.*
2. **Fundamentals of Physics.** Halliday/Resnick/Walker *Wiley India Edition 2007.*
3. **First Year Physics** - *Telugu Academy.*
4. **Introduction to Physics for Scientists and Engineers.** F.J. Ruche. *McGraw Hill.*
5. **College Physics-I.** T. Bhimasankaram and G. Prasad. *Himalaya Publishing House*

Reference Books

1. **Fundamentals of Physics** by Alan Giambattista et al *Tata-McGraw Hill Company* Edition,2008.
2. **University Physics** by Young and Freeman, *Pearson Education, Edition 2005.*
3. **Sears and Zemansky's University Physics** by Hugh D. Young, Roger A. Freedman *PearsonEducation Eleventh Edition.*
4. **An introduction to Mechanics** by Daniel Kleppner & Robert Kolenkow. *The McGraw HillCompanies.*
5. **Mechanics.** Hans & Puri. *TMH Publications.*
6. **Engineering Physics.** R.K. Gaur & S.L. Gupta. *Dhanpat Rai Publications.*
7. R P Feymman, RB Lighton and M Sands - The Feymman Lectures in Physics, Vol.-1, BI Publications,
8. J.C. Upadhyay - Mechanics.
9. P.K. Srivastava - Mechanics, New Age International.

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FIRST SEMISTER
PRACTICALS
Practical Paper – I :: Mechanics

1. Study of a compound pendulum determination of 'g' and 'k'.

2. Y' by uniform Bending

3. Y by Non-uniform Bending.

4. Moment of Inertia of a fly wheel.

5. Measurement of errors –simple Pendulum.

6. 'Rigidity moduli by torsion Pendulum.

7. Determination of surface tension of a liquid   through capillary rise

    method.

8. Determination of Surface Tension of a liquid by different methods.

9. Determination of Viscosity of a fluid.

10. Calculation of slope and intercept of a $Y = mX + C$ by theoretical

method

Note: Minimum of eight experiments should be performed. Maximum of 15 students per batch and maximum of three students per experiment should be allotted in the regular practical class of three hours per week.

Text and reference books

1. D.P. Khandelwal, "A laboratory manual for undergraduate classes" (Vani Publishing House, New Delhi.

2. S.P. Singh, "Advanced Practical Physics" (Pragati Prakashan, Meerut).

3. Workshop and Flint- Advanced Practical physics for students.

4. "Practical Physics" R.K Shukla, Anchal Sriva

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College: **NAGARJUNA GOVT. DEGREE COLLEGE**
Year: 2018-19
Name of the Module: **WAVES AND OSCILLATIONS**
Nature of the Module: **Core**
Mode of the Learning: **Regular**

Course: **B.Sc.**
Subject: **Physics**
Semester: **II**

UNIT – I

FUNDAMENTALS OF VIBRATIONS

Simple harmonic oscillator, and solution of the differential equation– Physical characteristics of SHM, torsion pendulum, measurements of rigidity modulus, compound pendulum, measurement of 'g', combination of two mutually perpendicular simple harmonic vibrations of same frequency and different frequencies, Lissajous figures.

UNIT – II

DAMPED AND FORCED OSCILLATION

Damped harmonic oscillator, solution of the differential equation of damped oscillator. Energy considerations, comparison with undamped harmonic oscillator, logarithmic decrement, relaxation time, quality factor, differential equation of forced oscillator and its solution, amplitude resonance, velocity resonance. Coupled Oscillators.

UNIT – III

VIBRATING STRINGS

Transverse wave propagation along a stretched string, general solution of wave equation and its significance, modes of vibration of stretched string clamped at ends, overtones, energy transport, transverse impedance

UNIT – IV

VIBRATIONS OF BARS

Longitudinal vibrations in bars- wave equation and its general solution. Special cases (i) bar fixed at both ends ii) bar fixed at the midpoint iii) bar free at both ends iv) bar fixed at one end. Transverse vibrations in a bar- wave equation and its general solution. Boundary conditions, clamped free bar, free-free bar, bar supported at both ends, Tuning fork.

NOTE: Problems should be solved at the end of every chapter of all units.

Text books

1. **Fundamentals of Physics.** Halliday/Resnick/Walker.C. *Wiley India Edition 2007.*
2. **First Year Physics** – *Telugu Academy.*
3. **University Physics.** FW Sears, MW Zemansky and HD young 13/e,1986.Addision-Wesley
4. **Engineering Mechanics, Basudeg Bhattacharya, 2nd edn.,2015, Oxford University Press.
5. **P.K.Srivastava** – Mechanics , New Age International.

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Practical Paper – II :: Waves and Oscillations

1. Study of damping of an oscillating disc in Air and Water logarithmic decrement.
2. Study of Oscillations under Bifilar suspension.
3. Study of oscillations of a mass under different combination of springs.
4. Verification of Laws of a stretched string (Three Laws).
5. Determination of frequency of a Bar-Melde's experiment.
6. Observation of Lissajous figures from CRO.
7. Volume Resonator –determination of frequency of a tuning fork.
8. Velocity of Transverse wave along a stretched string.
9. Study of damping of a bar pendulum
10. Study of coupled oscillator.

Note: Minimum of eight experiments should be performed. Maximum of 15 students per batch and maximum of three students per experiment should be allotted in the regular practical class of three hours per week.

Text and reference books

1. D.P. Khandelwal, "A laboratory manual for undergraduate classes" (Vani Publishing House, New Delhi).

2. S.P. Singh, "Advanced Practical Physics" (Pragati Prakashan, Meerut).

3. Worsnop and Flint- Advanced Practical physics for students.

4. "Practical Physics" R.K Shukla, Anchal Srivastav

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H.G. College, NALGONDA.

College: NAGARJUNA GOVT. DEGREE COLLEGE
Year: 2018-19
Name of the Module: THERMAL PHYSICS
Nature of the Module: Core
Mode of the Learning: Regular

Course: B.Sc.
Subject: Physics
Semester: III

UNIT – I

KINETIC THEORY OF GASES

Introduction – Deduction of Maxwell's law of distribution of molecular speeds, Transport Phenomena – Viscosity of gases – thermal conductivity – diffusion of gases.

THERMODYNAMICS

Basics of thermodynamics-Carnot engine, Kelvin's and Claussius statements of 2nd law of Thermodynamics – Thermodynamic scale of temperature – Entropy, physical significance – Change in entropy in reversible and irreversible processes – Entropy and disorder – Entropy of universe – Temperature- Entropy (T-S) diagram – Change of entropy of a perfect gas-change of entropy when ice changes into steam.

UNIT – II

THERMODYNAMIC POTENTIALS AND MAXWELL'S EQUATIONS

Thermodynamic potentials – Derivation of Maxwell's thermodynamic relations – Clausius-Clayperon's equation – Derivation for ratio of specific heats – Derivation for difference of two specific heats for perfect gas. Joule Kelvin effect – expression for Joule Kelvin coefficient for perfect and Vanderwaal's gas.

LOW TEMPERATURE PHYSICS

Joule Kelvin effect – liquefaction of gas using porous plug experiment. Joule expansion – Distinction between adiabatic and Joule Thomson expansion – Expression for Joule Thomson cooling – Liquefaction of helium, Kapitza's method – Adiabatic demagnetization – Production of low temperatures – Principle of refrigeration, vapour compression type.

UNIT – III

QUANTUM THEORY OF RADIATION

Black body-Ferry's black body – distribution of energy in the spectrum of Black body – Wein's displacement law, Wein's law, Rayleigh-Jean's law – Quantum theory of radiation - Planck's law – deduction of Wein's law, Rayleigh-Jeans law, Stefan's law from Planck's law Measurement of radiation using pyrometersDisappearing filament optical pyrometer – experimental determination – Angstrom pyroheliometer - determination of solar constant, effective temperature of sun.

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Unit – IV

Statistical Mechanics

Introduction, postulates of statistical mechanics. Phase space, concept of ensembles and some known ensembles ,classical and quantum statistics and their differences, concept of probability, Maxwell-Boltzmann's distribution law -Molecular energies in an ideal gas-Maxwell-Boltzmann's velocity distribution law, Bose-Einstein Distribution law, Fermi-Dirac Distribution law, comparison of three distribution laws, Application of B-E distribution to Photons-planks radiation formula, Application of Fermi-Dirac statistics to white dwarfs and Neutron stars.

Textbooks
1. **Fundamentals of Physics.** Halliday/Resnick/Walker.*C. Wiley India Edition 2007.*
2. **Second Year Physics** – *Telugu Academy.*
3. **Modern Physics** by R. Murugeshan and Kiruthiga Siva Prasath (for statistical Mechanics) *S. Chand & Co.*

Reference Books

1. **Modern Physics** by G. Aruldhas and P. Rajagopal, *Eastern Economy Education.*

2. Berkeley Physics Course. Volume-5. **Statistical Physics** by F. Reif. *The McGraw-Hill Companies.*

3. **An Introduction to Thermal Physics** by Daniel V. Schroeder.*Pearson Education Low Price Edition.*

4. **Thermodynamics** by R.C. Srivastava, Subit K. Saha&Abhay K. *Jain Eastern Economy Edition.*

5. **Modern Engineering Physics** by A.S. Vasudeva. *S.Chand& Co. Publications.*

6. **Feyman's Lectures on Physics** Vol. 1,2,3& 4. *Narosa Publications.*

7. **Fundamentals of Optics** by Jenkins A. Francis and White E. Harvey, *McGraw Hill Inc.*

8. B.B. Laud **"Introduction to statistics Mechanics"** (Macmillan 1981)

9. F.Reif: **Statistical Physics** (Mcgraw-Hill, 1998)

10. K.Haung: **Statistical Physics** (Wiley Eastern 1988)

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THIRD SEMISTER PRACTICALS

Practical Paper – III :: Thermal Physics

1. Co-efficient of thermal conductivity of a bad conductor by Lee's method.

2. Measurement of Stefan's constant.

3. Specific heat of a liquid by applying Newton's law of cooling correction.

4. Heating efficiency of electrical kettle with varying voltages.

5. Calibration of thermo couple

6. Cooling Curve of a metallic body

7. Resistance thermometer

8. Thermal expansion of solids.

9. Study of conversion of mechanical energy to heat.

10. Determination of the Specific of a solid (graphite rod)

Note: Minimum of eight experiments should be performed. Maximum of 15 students per batch and maximum of three students per experiment should be allotted in the regular practical class of three hours per week.

Text and reference books

1. D.P. Khandelwal, "A laboratory manual for undergraduate classes" (Vani

   Publishing House, New Delhi).

2. S.P. Singh, "Advanced Practical Physics" (Pragathi Prakashan, Meerut).

3. Worsnop and Flint- Advanced Practical physics for students.

4. "Practical Physics" R.K Shukla, Anchal Srivastava

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College: NAGARJUNA GOVT. DEGREE COLLEGE

Year: 2018-19
Name of the Module: Optics
Nature of the Module: Core
Mode of the Learning: Regular

Course: B.Sc.
Subject: Physics
Semester: IV

UNIT I

INTERFERENCE

Principle of superposition – coherence – temporal coherence and spatial coherence – conditions for Interference of light

INTERFERENCE BY DIVISION OF WAVE FRONT: Fresnel's biprism – determination of wave length of light. Determination of thickness of a transparent material using Biprism – change of phase on reflection – Lloyd's mirror experiment.

INTERFERENCE BY DIVISION OF AMPLITUDE: Oblique incidence of a plane wave on a thin film due to reflected and transmitted light (Cosine law) – Colours of thin films – Non reflecting films – interference by a plane parallel film illuminated by a point source – Interference by a film with two non-parallel reflecting surfaces (Wedge shaped film) – Determination of diameter of wire-Newton's rings in reflected light with and without contact between lens and glass plate, Newton's rings in transmitted light (Haidinger Fringes)   – Determination of wave length of monochromatic light – Michelson Interferometer – types of fringes – Determination of wavelength of monochromatic light, Difference in wavelength of sodium D_1, D_2 lines and thickness of a thin transparent plate.

UNIT II

DIFFRACTION

Introduction – Distinction between Fresnel and Fraunhoffer diffraction Fraunhoffer diffraction:- Diffraction due to single slit and circular aperture – Limit of resolution – Fraunhoffer diffraction due to double slit – Fraunhoffer diffraction pattern with N slits (diffraction grating)

Resolving Power of grating – Determination of wave length of light in normal and oblique incidence methods using diffraction grating.

Fresnel's diffraction-Fresnel's half period zones – area of the half period zones –zone plate – Comparison of zone plate with convex lens – Phase reversal zone plate – diffraction at a straight edge – difference between interference and diffraction.

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UNIT III
POLARIZATION

Polarized light : Methods of Polarization, Polarization by reflection, refraction, Double refraction, selective absorption , scattering of light – Brewster's law – Malus law – Nicol prism polarizer and analyzer – Refraction of plane wave incident on negative and positive crystals (Huygen's explanation) – Quarter wave plate, Half wave plate – Babinet's compensator – Optical activity, analysis of light by Laurent's half shade polarimeter.

UNIT IV

ABERRATIONS AND FIBER OPTICS

Introduction – Monochromatic aberrations, spherical aberration, methods of minimizing spherical aberration, coma, astigmatism and curvature of field, distortion. Chromatic aberration – the achromatic doublet – Removal of chromatic aberration of a separated doublet.

Fiber Optics : Introduction – Optical fibers – Types of optical fibers – Step and graded index fibers – Rays and modes in an optical fiber – Fiber material – Principles of fiber communication and advantages of fiber communication.

NOTE: Problems should be solved at the end of every chapter of all units.

Textbooks

1.**Optics** by Ajoy Ghatak. *The McGraw-Hill companies.*
2.**Optics** by Subramaniyam and Brijlal. *S. Chand & Co.*
3.**Fundamentals of Physics.** Halliday/Resnick/Walker.*C. Wiley India Edition 2007.*
4.**Optics and Spectroscopy.** R. Murugeshan and Kiruthiga Siva Prasath. *S. Chand & Co.*
5.**Second Year Physics** – *Telugu Academy.*

Reference Books

1. **Modern Engineering Physics** by A.S. Vasudeva. *S.Chand& Co. Publications.*
2. **Feyman's Lectures on Physics** Vol. 1,2,3& 4. *Narosa Publications.*
3. **Fundamentals of Optics** by Jenkins A. Francis and White E. Harvey, *McGraw Hill Inc.*
4. K. Ghatak, **Physical Optics'**
5. D.P. Khandelwal, Optical and Atomic Physics' (Himalaya Publishing House, Bombay,1988)
6. Jenkins and White: 'Fundamental of Optics' (McGraw-Hill)
7. Smith and Thomson: 'Optics' (John Wiley and sons)

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Practical Paper – IV :: Optics

1. Thickness of a wire using wedge method.
2. Determination of wavelength of light using Biprism.
3. Determination of Radius of curvature of a given convex lens by forming Newton's rings.
4. Resolving power of grating.
5. Study of optical rotation-polarimeter.
6. Dispersive power of a prism
7. Determination of wavelength of light using diffraction grating minimum deviation method.
8. Wavelength of light using diffraction grating – normal incidence method.
9. Resolving power of a telescope.
10. Refractive index of a liquid and glass (Boy's Method).
11. Pulfrich refractometer – determination of refractive index of liquid.
12. Wavelength of Laser light using diffraction grating.

Note: Minimum of eight experiments should be performed Maximum of 15 students per batch and maximum of three students per experiment should be allotted in the regular practical class of three hours per week.

Text and reference books

1. D.P. Khandelwal, "A laboratory manual for undergraduate classes" (Vani Publishing House, New Delhi).
2. S.P. Singh, "Advanced Practical Physics" (Pragati Prakashan, Meerut).
3. Worsnop and Flint- Advanced Practical physics for students.
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(DSE- Compulsory)

42 hrs
3 hrs / week)

Unit I : Electrostatics (11 hrs)

Electric Field:- Concept of electric field lines and electric flux, Gauss law (Integral and differential forms), application to linear, plane and spherical charge distributions. Conservative nature of electric field E, irrotational field. Electric Potential: - Concept of electric potential, relation between electric potential and electric field, potential energy of a system of charges. Energy density in an electric field. Calculation of potential from electric field for a spherical charge distribution.

Unit II: Magnetostatics (12 hrs)

Concept of magnetic field B and magnetic flux, Biot-Savart's law, B due to a straight current carrying conductor. Force on a point charge in a magnetic field. Properties of B, curl and divergence of B, solenoid field. Integral form of Ampere's law, applications of Ampere's law: field due to straight, circular and solenoid currents. Energy stored in magnetic field. Magnetic energy in terms of current and inductance. Magnetic force between two current carrying conductors. Magnetic field intensity. Ballistic Galvanometer: - Torque on a current loop in a uniform magnetic field, working principle of B.G., current and charge sensitivity, electromagnetic damping, critical damping resistance.

Unit III: Electromagnetic Induction (9 hrs)

Faraday's laws of induction (differential and integral form), Lenz's law, self and mutual Induction. Continuity equation, modification of Ampere's law, displacement current, Maxwell equations

Unit IV: Electromagnetic waves (10 hrs)

Maxwell's equations in vacuum and dielectric medium, boundary conditions, plane wave equation: transverse nature of EM waves, velocity of light in vacuum and in medium, polarization, reflection and transmission. Polarization of EM waves, Brewster's angle, description of linear, circular and elliptical polarization.

Text Books

1. Fundamentals of electricity and magnetism By Arthur F. Kip (McGraw-Hill, 1968)
2. Electricity and magnetism by J.H.Fewkes & John Yarwood. Vol. I (Oxford Univ. Press, 1991).
3. Introduction to Electrodynamics, 3rd edition, by David J. Griffiths, (Benjamin Cummings,1998).

Reference Books

4. Electricity and magnetism By Edward M. Purcell (McGraw-Hill Education, 1986)
5. Electricity and magnetism. By D C Tayal (Himalaya Publishing House,1988)
6. Electromagnetics by Joseph A.Edminister 2nd ed.(New Delhi: Tata Mc Graw Hill, 2006).

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<u>V SEMISTER Practicals Paper – V : Electromagnetism</u>

PHYSICS LABORATORY
1. To verify the Thevenin Theorem
2. To verify Norton Theorem
3. To verify Superposition Theorem
4. To verify maximum power transfer theorem.
5. To determine a small resistance by Carey Foster's bridge.
6. To determine the (a) current sensitivity, (b) charge sensitivity, and (c) CDR of a B.G.
7. To determine high resistance by leakage method.
8. To determine the ratio of two capacitances by De Sauty's bridge.
9. To determine self-inductance of a coil by Anderson's bridge using AC.
10. To determine self-inductance of a coil by Rayleigh's method.
11. To determine coefficient of Mutual inductance by absolute method.

Note: Minimum of eight experiments should be performed.
Maximum of 15 students per batch and maximum of three students per experiment should be allotted in the regular practical class of three hours per week.

Suggested Books for Reference
1. B. L. Worsnop and H. T. Flint, Advanced Practical Physics, Asia Publishing House, New Delhi.
2. Indu Prakash and Ramakrishna, A Text Book of Practical Physics, Kitab Mahal

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B.Sc. (Physics)Semester V-Theory Syllabus 42 hrs
Paper-VI-A – Solid State Physics (3hrs / week)

(DSE- Elective-I)

Unit-I (11hrs)

Crystal Structure: Solids Amorphous and Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis – Central and Non-Central Elements. Unit Cell. Miller Indices. Types of Lattices, Reciprocal Lattice. Brillouin Zones. Diffraction of X-rays by Crystals. Bragg's Law. Atomic and Geometrical Factor.

Elementary Lattice Dynamics: Lattice Vibrations and Phonons: Linear Monoatomic and Diatomic Chains. Acoustical and Optical Phonons. Qualitative Description of the Phonon Spectrum in Solids. Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids. T^3 law

Unit-II (11 hrs)

Magnetic Properties of Matter: Dia-, Para-, Ferri - and Ferromagnetic Materials. Classical Langevin Theory of dia–and Paramagnetic Domains. Curie's law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains. Discussion of B-H Curve. Hysteresis and Energy Loss.

Dielectric Properties of Materials: Polarization. Local Electric Field at an Atom. Depolarization Field. Electric Susceptibility. Polarizability. Clausius Mosotti Equation. Classical Theory of Electric Polarizability.

Unit-III (10 hrs)

Elementary band theory: Kronig Penny model. Band Gap. Brillouin zones, effective mass of electron. Conductor, Semiconductor (P and N type) and insulator. Conductivity of Semiconductor, mobility, Hall Effect, Electric Conductivity by four probe method & Hall coefficient.

UNIT IV (10 hrs)

Lasers: Einstein's A and B coefficients. Metastable states. Spontaneous and Stimulated emissions. Optical Pumping and Population Inversion. Three-Level and Four-Level Lasers. Ruby Laser and He-Ne Laser.
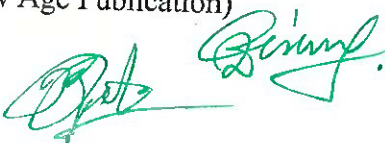
Superconductivity: Experimental Results. Critical Temperature. Critical magnetic field. Meissner effect. Type I and type II Superconductors, London's Equation and Penetration Depth. Isotope effect. Idea of BCS theory. D.C and A.C Josephson effects.

Text Books:

1. Solid-state Physics, H. Ibach and H. Luth, 2009, Springer
2. Elementary Solid State Physics, 1/e M. Ali Omar, 1999, Pearson India
3. Solid State Physics, M.A. Wahab, 2011, Narosa Publications
4. Solid State Physics – S. O. Pillai (New Age Publication)
5. Modern Physics by R.Murugesham

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Reference Books:

1. Introduction to Solid State Physics, Charles Kittel, 8th Edition, 2004, Wiley India Pvt. Ltd.
2. Elements of Solid State Physics, J.P. Srivastava, 2nd Edition, 2006, Prentice-Hall of India
3. Introduction to Solids, Leonid V. Azaroff, 2004, Tata Mc-Graw Hill
4. Solid State Physics, N.W. Ashcroft and N.D. Mermin, 1976, Cengage Learning
5. Solid State Physics- R.K.Puri &V.K. Babbar (S.Chand Publication)2013
6. Lasers and Non linear Optics –B.B.Laud-Wiley Eastern.
7. LASERS: Fundamentals and Applications – Thyagarajan and Ghatak (McMillanIndia)

36 hrs
2hrs/week

V SEMISTER Practicals Paper – VI A
Solid State Physics

1. Measurement of susceptibility of paramagnetic solution (Quinck's Tube Method)
2. To measure the Magnetic susceptibility of Solids.
3. To determine the Coupling Coefficient of a Piezoelectric crystal.
4. To measure the Dielectric Constant of a dielectric Materials with frequency .
5. To study the PE Hysteresis loop of a Ferroelectric Crystal.
6. To draw the BH curve of Fe using Solenoid & determine energy loss from Hysteresis.
7. To measure the resistivity of a semiconductor (Ge) with temperature by four-probe method (room temperature to 150^0 C) and to determine its band gap.
8. To determine the Hall coefficient of a semiconductor sample.
9. Calculation of d-values of a given Laue''s pattern.

10. Calculation of d-values of powder diffraction method.

12. To study the spectral characteristics of a Photo- Voltaic cell.

13. Verification of Bragg''s equation.

Reference Books

• Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.

• Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.

• A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Ed., 2011, Kitab Mahal

• Elements of Solid State Physics, J.P. Srivastava, 2nd Ed., 2006, Prentice-Hall of India

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42 hrs
(3 hrs / week)

B.Sc. (Physics) Semester V-Theory Syllabus
Paper-VI-B – QUANTUM MECHANICS AND APPLICATIONS
(DSE- Elective-I)

Unit-I (11 hrs)

Schrodinger equation & the operators: Time dependent Schrodinger equation and dynamical evolution of a quantum state; Properties of Wave Function. Interpretation of Wave Function Probability and probability current densities in three dimensions; Conditions for Physical Acceptability of Wave Functions. Normalization. Linearity and Superposition Principles. Hermitian operator, Eigen values and Eigen functions. Position, momentum and Energy operators; commutator of position and momentum operators; Expectation values of position and momentum. Wave Function of a Free Particle.

Unit II (11 hrs)

Time independent Schrodinger equation-Hamiltonian, stationary states and energy eigen values; expansion of an arbitrary wave function as a linear combination of energy eigen functions; General solution of the time dependent Schrodinger equation in terms of linear combinations of stationary states; Application to spread of Gaussian wave-packet for a free particle in one dimension; wave packets, Fourier transforms and momentum space wave function; Position-momentum uncertainty principle.
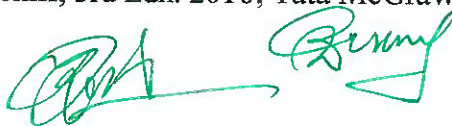
Unit-III (10 hrs)

General discussion of bound states in an arbitrary potential- continuity of wave function, boundary condition and emergence of discrete energy levels; application to one-dimensional problem-square well potential; Quantum mechanics of simple harmonic oscillator-energy levels and energy eigen functions ground state, zero point energy & uncertainty principle. One dimensional infinitely rigid box- energy eigen values and eigen functions, normalization; Quantum dot as example; Quantum mechanical scattering and tunneling in one dimension across a step potential & rectangular potential barrier.

Unit-IV (10 hrs)

Atoms in Electric & Magnetic Fields: Electron angular momentum. Space quantization. Electron Spin and Spin Angular Momentum. Larmor's Theorem. Spin Magnetic Moment. SternGerlach Experiment. Zeeman Effect: Electron Magnetic Moment and Magnetic Energy, Gyromagnetic Ratio and Bohr Magneton. Atoms in External Magnetic Fields:- Normal and Anomalous Zeeman Effect. Paschen Back and Stark Effect (Qualitative Discussion only).

Text Books:

1. A Text book of Quantum Mechanics, P. M.Mathews and K.Venkatesan, 2nd Ed., 2010, McGraw Hill
2. Quantum Mechanics, Robert Eisberg and Robert Resnick, 2nd Edn., 2002, Wiley.
3. Quantum Mechanics, Leonard I. Schiff, 3rd Edn. 2010, Tata McGraw Hill.

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Reference Books:
1. Quantum Mechanics, G. Aruldhas, 2nd Edn. 2002, PHI Learning of India.
2. Cohen-Tannoudji, B Diu and F Laloë, Quantum Mechanics (2 vols) Wiley-VCH 1977 • Basic Quantum Mechanics –A.Ghatak (Mc Millan India) 2012
3. Introduction to Quantum Mechanics, D.J. Griffith, 2nd Ed. 2005, Pearson • Quantum Physics----S. Gasiorowicz (Wiley India) 2013

36 hrs
2hrs/week

V – SEMESTER   Practicals Paper – VI B
Quantum Mechanics and Applications

Use C/C++/Scilab for solving the following problems based on Quantum Mechanics like

1. Solve the s-wave Schrodinger equation for the ground state and the first excited state of the hydrogen atom: Here, m is the reduced mass of the electron. Obtain the energy eigenvalues and plot the corresponding wave functions. Remember that the ground state energy of the hydrogen atom is $\approx$ -13.6 eV. Take e = 3.795 (eVÅ)1/2, ħc = 1973 (eVÅ) and m = 0.511x106 eV/c2.

2. Solve the s-wave radial Schrodinger equation for an atom: where m is the reduced mass of the system (which can be chosen to be the mass of an electron), for the screened coulomb potential Find the energy (in eV) of the ground state of the atom to an accuracy of three significant digits. Also, plot the corresponding wavefunction. Take e = 3.795 (eVÅ)1/2, m = 0.511x106 eV/c2, and a = 3 Å, 5 Å, 7 Å. In these units ħc = 1973 (eVÅ). The ground state energy is expected to be above -12 eV in all three cases.

3. Solve the s-wave radial Schrodinger equation for a particle of mass m: For the anharmonic oscillator potential for the ground state energy (in MeV) of particle to an accuracy of three significant digits. Also, plot the corresponding wave function. Choose m = 940 MeV/c2, k = 100 MeV fm-2, b = 0, 10, 30 MeV fm-3In these units, cħ = 197.3 MeV fm. The ground state energy I expected to lie between 90 and 110 MeV for all three cases.

4. Solve the s-wave radial Schrodinger equation for the vibrations of hydrogen molecule: Where μ is the reduced mass of the two-atom system for the Morse potential Find the lowest vibrational energy (in MeV) of the molecule to an accuracy of three significant digits. Also plot the corresponding wave function. Take: m = 940x106eV/C2, D = 0.755501 eV, α = 1.44, ro = 0.131349 Å

5. Study of Electron spin resonance- determine magnetic field as a function of the resonance frequency
6. Study of Zeeman effect: with external magnetic field; Hyperfine splitting
7. To show the tunneling effect in tunnel diode using I-V characteristics.
8. Quantum efficiency of CCDs

1. Schaum's outline of Programming with C++. J.Hubbard, 2000,McGraw---Hill Publication
2. Numerical Recipes in C: The Art of Scientific Computing, W.H. Pressetal., 3rd Edn., 2007, Cambridge University Press.
3. An introduction to computational Physics, T.Pang, 2nd Edn.,2006, Cambridge Univ. Press • Simulation of ODE/PDE Models with MATLAB®, OCTAVE and SCILAB: Scientific & Engineering Applications: A. Vande Wouwer, P. Saucez, C. V. Fernández.2014 Springer.
4. Scilab (A Free Software to Matlab): H. Ramchandran, A.S. Nair. 2011 S. Chand & Co.
5. Scilab Image Processing: L.M.Surhone.2010 Betascript Publishing ISBN:978-613345927

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DEPARTMENT OF PHYSICS
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(Autonomous) (Reaccredited by NAAC with "A" Grade)
B.Sc. (Physics) Semester VI-Theory Syllabus
Paper-VII – MODERN PHYSICS

42 hrs
(3 hrs / week)

(DSC- Compulsory)

UNIT-I (11hrs)
Atomic Spectra and Models Inadequacy of classical physics:

Brief Review of Black body Radiation, Photoelectric effect, Compton effect, dual nature of radiation, wave nature of particles. Atomic spectra, Line spectra of hydrogen atom, Ritz Rydberg combination principle. Alpha Particle Scattering, Rutherford Scattering Formula, Rutherford Model of atom and its limitations, Bohr's model of H atom, explanation of atomic spectra, correction for finite mass of the nucleus, Bohr correspondence principle, limitations of Bohr model, discrete energy exchange by atom, Frank Hertz Expt. Somerfield's Modification of Bohr's Theory.

UNIT-II (11hrs)

Wave Particle Duality de Broglie hypothesis, Experimental confirmation of matter wave, Davisson Germer Experiment, velocity of de Broglie wave, wave particle duality, Complementarity. Superposition of two waves, phase velocity and group velocity , wave packets ,Gaussian Wave Packet , spatial distribution of wave packet, Localization of wave packet in time. Time development of a wave Packet; Wave Particle Duality, Complementarity . Heisenberg Uncertainty Principle, Illustration of the Principle through thought Experiments of Gamma ray microscope and electron diffraction through a slit. Time independent and time dependent Schrodinger wave equation. Estimation of ground state energy of harmonic oscillator and hydrogen atom, non-existence of electron in the nucleus. Uncertainty and Complementarities.

UNIT-III (9 hrs)

Nuclear Physics Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle. Nature of nuclear force, NZ graph, Liquid Drop model: semi-empirical mass formula and binding energy, Nuclear Shell Model and magic numbers.

Unit IV (11 hrs)

Radioactivity: stability of the nucleus; Law of radioactive decay; Mean life and half-life; Alpha decay; Beta decay- energy released, spectrum and Pauli's prediction of neutrino; Gamma ray emission, energy-momentum conservation: electron-positron pair creation by gamma photons in the vicinity of a nucleus. Fission and fusion- mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Nuclear reactor: slow neutrons interacting with Uranium 235; Fusion and thermonuclear reactions driving stellar energy (brief qualitative discussions), Classification of Elementary Particles

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Text Books:

1. Concepts of Modern Physics, Arthur Beiser, 2002, McGraw-Hill.
2. Modern Physics ---Murugesan and Sivaprasad --(S. Chand Higher Academics)
3. Introduction to Modern Physics, Rich Meyer, Kennard, Coop, 2002, Tata McGraw Hill
4. Introduction to Quantum Mechanics, David J. Griffith, 2005, Pearson Education.
5. Physics for scientists and Engineers with Modern Physics, Jewett and Serway, 2010, Cengage Learning. •
6. Quantum Mechanics: Theory & Applications, A.K.Ghatak & S.Lokanathan, 2004, Macmillan

Reference Books

1. Modern Physics – Bernstein, Fishbane and Gasiorowicz (Pearson India) 2010
2. Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles -- R. Eisberg (Wiley India) 2012 Additional Books for Reference
3. Modern Physics, J.R. Taylor, C.D. Zafiratos, M.A. Dubson, 2004, PHI Learning.
4. Theory and Problems of Modern Physics, Schaum`s outline, R. Gautreau and W. Savin, 2nd Edn, Tata McGraw-Hill Publishing Co. Ltd.
5. Quantum Physics, Berkeley Physics, Vol.4. E.H.Wichman, 1971, Tata McGraw-Hill Co.
6. Basic ideas and concepts in Nuclear Physics, K.Heyde, 3rd Edn., Institute of Physics Pub.
7. Six Ideas that Shaped Physics: Particle Behave like Waves, T.A.Moore, 2003, McGraw Hill
8. Modern Physics-Serway (CENGAGE Learnings) 2014
9. Physics of Atoms and Molecules – Bransden (Pearson India) 2003

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VI SEMISTER Practicals Paper – VII :
Modern Physics

1. Measurement of Planck's constant using black body radiation and photo-detector

2. Photo-electric effect: photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light

3. To determine the Planck's constant using LEDs of at least 4 different colors.

4. To determine the ionization potential of mercury.

5. To determine the absorption lines in the rotational spectrum of Iodine vapour.

6. To determine the value of e/m by (a) Magnetic focusing or (b) Bar magnet.

7. To setup the Millikan oil drop apparatus and determine the charge of an electron.

8. To show the tunneling effect in tunnel diode using I-V characteristics.

9. To determine the wavelength of laser source using diffraction of single slit.

10. To determine the wavelength of laser source using diffraction of double slits.

11. To determine (1) wavelength and (2) angular spread of He-Ne laser using plane diffraction grating

12. To determine the value of e/m for electron by long solenoid method.

13. Photo Cell – Determination of Planck's constant.

14. To verify the inverse square law of radiation using a photo-electric cell.

15. To find the value of photo electric work function of a material of the cathode using a photo-electric cell.

16. Measurement of magnetic field – Hall probe method.

17. To determine the dead time of a given G.M. tube using double source.

18. Hydrogen spectrum – Determination of Ridge berg's constant

19. Energy gap of intrinsic semi-conductor

20. G. M. Counter – Absorption coefficients of a material.

21. To draw the plateau curve for a Geiger Muller counter.

22. To find the half-life period of a given radioactive substance using a G.M. Counter.

Reference Books

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House

2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers

3. A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Edn, 2011,Kitab Mahal

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B.Sc. (Physics) Semester VI-Theory Syllabus
Paper-VIII-A : Basic Electronics

(DSE- Elective-II)

Unit-I: (10 hrs)
Network Elements and Network Theorems

Passive elements, Power sources, Active Elements, Network Models: T and π Transformations, Superposition theorem, Thevenin's Theorem, Norton's theorem. Reciprocity Theorem and Maximum power transfer theorem (Simple problems).
Two-port Networks – Introduction- Z-parameters, Y-parameters, h-parameters and ABCD-parameters (Simple problems).

Unit – II: (10 hrs)
Band theory of P-N junction

Energy band in solids (band theory), valence band, conduction band and forbidden energy gap solids, Insulators, semi conductors and, pure or intrinsic semiconductors and impurity or extrinsic semi-conductors. N-type extrinsic semi-conductors, P-type extrinsic semi-conductors, Fermi level, continuity equation.
Diodes: P-N junction diode, Bridge rectifier. Zener diode & its Characteristics. Zener diode as voltage regulator.

Unit-III: (11hrs)
Bipolar Junction Transistor (BJT) – p-n-p and n-p-n transistors, current components in transistors, CB, CE and CC configurations – transistor as an amplifier -RC coupled amplifier. (Qualitative analysis)
Feedback Concept & Oscillators: Feedback, General theory of feedback–Concepts of a Oscillators, Barkhausen's criteria, Phase shift Oscillator.

Unit-IV: (11 hrs)
Digital Electronics

Binary number system, converting Binary to Decimal and vice versa. Binary addition and subtraction (1's and 2's complement methods). Hexadecimal number system. Conversion from Binary to Hexadecimal – vice versa and Decimal to Hexadecimal vice versa.

Logic gates:
OR, AND, NOT gates, truth tables, realization of these gates using discrete components.
NAND, NOR as universal gates, Exclusive – OR gate (EX-OR). De Morgan's Laws – Statement and proof.

NOTE: Problems should be solved from every chapter of all units.

Textbooks

1. Electronic devices and circuits – Millman and Halkias. *Mc.Graw-Hill Education.*
2. Principles of Electronics by V.K. Mehta – *S. Chand & Co.*
3. Basic Electronics (Solid state) – B. L. Theraja , S. Chand & Co.
4. A First Course in Electronics- Anwar A. Khan& Kanchan K. Dey, PHI.

Reference Books

1. Basic Electronics – Bernod Grob.
2. Third year Electronics – Telugu Academy
3. Digital Principles & Applications – A.P. Malvino and D.P. Leach
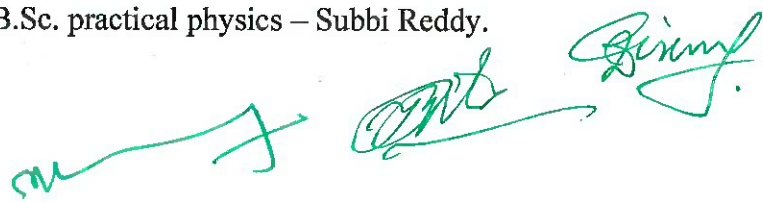4. Circuit theory- Umesh.

36hours
2hrs/week

VI SEMISTER Practicals Paper – VIII A :
Basic Electronics

1. AND, OR, NOT, gates – Truth table Verification

2. AND, OR, NOT – gates constructions using universal gates – Verification of truth tables.

3. NAND and NOR gates truth table verification

4. Characteristics of a Transistor in CE configuration

5. R.C. coupled amplifier – frequency response.

6. Verification of De Morgan"s Theorem.

7. Zener diode V-I characteristics.

8. Verification Thevenin"s theorem.

9. Maximum Power Transfer theorem

10. P-n junction diode V- I characteristics.

11. Zener diode as a voltage regulator

12. Construction of a model D.C. power supply

13. R C phase shift Oscillator –determination of output frequency

Note: Every student should complete minimum 06 experiments.

Text Books :

1. B.Sc. Practical Physics – C. L. Arora – S. Chand & Co.

2. Viva-voce in Physics – R.C. Gupta, Pragathi Prakashan, Meerut.

3. Laboratory manual for Physics Course by B.P. Khandelwal.

4. Practical Physics by M. Arul Thakpathi by Comptex Publishers.

5. B.Sc. practical physics – Subbi Reddy.

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B.Sc. (Physics) Semester VI-Theory Syllabus
Paper-VIII-B : Physics of Semiconductor Devices

42hrs
(3 hrs / week)

(DSE- Elective-II)

Unit-I: (11 hrs)

Semiconductor Physics: Conductors, Semiconductors, forbidden orbits, energy levels, crystals and covalent bonds, free electrons and holes, recombination and life-time, energy bands. Intrinsic Semiconductor- intrinsic carrier concentration, density of electrons in conduction band, fermi-level, mass action law. Carrier transport phenomena- mobility, resistivity, diffusivity, Einstein's relation, current density equation. Extrinsic semiconductor-N-type semiconductor, P-type semiconductor, energy band diagram of extrinsic semiconductor. Hall effect- mobility and Hall angle, experiment arrangement for the study of Hall effect, significance of Hall effect.

Unit – II: (11 hrs)

P-N junction-Depletion layer, Energy level diagram of P-N junction, Band structure of an open circuited p-n junction, Biasing of P-N junction, effect of barrier potential on forward bias, reverse leakage current, reverse breakdown, P-N junction under various conditions-thermal equilibrium, forward and reverse bias, current-voltage characteristics. Derivation of ideal diode equation of P-N junction, diode model and its approximations. Forward and reverse resistance of diode. Dynamic characteristic of diode.

Unit-III: (10 hrs)

Special diodes-Zener diode, Light –emitting diode (LED), Photo-diode, Schottky diode, Backward diodes and Tunnel diode.
Transistors- Bipolar junction transistor (BJT), transistor characteristics, transistor equation in active region, field effect transistor (FET), Phototransistor and MOSFETTs.

Unit-IV: (10 hrs)

Control devices- Shockley Diode, Silicon Controlled Rectifier (SCR), Silicon Controlled Switch (SCS), Unijunction transistor (UJT), Solar Cells, Opto-couplers.

Text books

1. A First Course in Electronics- Anwar A. Khan& Kanchan K. Dey, PHI
2. Physics of Semiconductor Devices- S. M. Sze
3. Physics of Semiconductors- Streetman

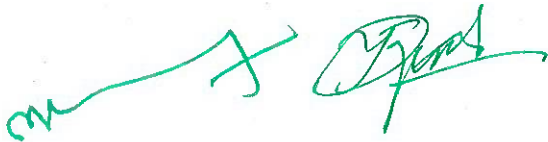CHAIRMAN
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VI SEMISTER Practicals Paper – VIII-B :

Physics of Semiconductor Devices

1. Characteristics of a Transistor in CE configuration
2. Zener diode V-I characteristics.
3. P-n junction diode V- I characteristics.
4. Zener diode as a voltage regulator
5. Determination of carrier concentration using Hall effect
6. Thermistor characteristics
7. Efficiency of a LED
8. Solar cell: fill factor and efficiency
9. FET characteristics
10. SCR characteristics
11. UJT characteristics

Note: Every student should complete minimum 06 experiments.

Text Books:

1. Basic electronics -Grob
2. Practical Electronics- Zbar

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Suggested Books for Practicals

1. **A textbook of Practical Physics** by M.N. Srinivasan. *S. Chand & Co.*
2. **Practical Physics** by M. Arul Thakpathi by *Comptek Publishers.*
3. **A. Laboratory manual for Physics Course** by B.P. Khandelwal.
4. **B.Sc. Practical Physics** – C.L. Arora – *S. Chand & Co.*
5. **Viva-voce in Advanced Physics** – R.C. Gupta and Saxena P.N. – *Pragathi Prakashan, Meerut.*
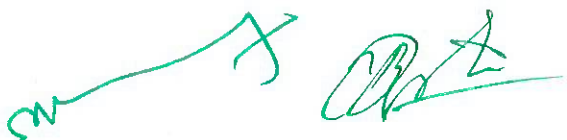6. **Viva-Voce in Physics – R.C. Gupta,** *Pragathi Prakashan, Meerut.*

Practical scheme of valuation [For Examiner use only]

1. Formula and explanation of symbols ------------------------------- 5 marks
2. Tabular forms with circuit diagram wherever necessary ---------- 5 marks
3. Observations --- 15 marks
4. Calculations and graphs --- 8 marks
5. Result --- 2 marks
6. Viva - Voice --- 5 marks
7. Practical Record -- 10 marks

Total Marks = 50 marks

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NAGARJUNA GOVERNMENT COLLEGE (AUTONOMOUS), NALGONDA

Question Paper Patern

COURSE: B.Sc.   **SUBJECT: PHYSICS**

Semester: I ,II,III,IV,V&VI

Max. Marks: 70   **Time: 2:30 Hours**

PART -A
(Very Short Questions)   5X2=10

I. Answer all the questions

1.

2.

3.

4.

5.

PART - B
(Short Questions)   4 X 5=20.

II Answer any four of the following problems.
(At least one problem from each unit)

6.

7.

8.

9.

10.

11.

PART-C
(Essay Type Questions)

III. Answer the following questions   4 X 10=40

12.   (A)

                            (OR)

      (B)

13.   (A)

                            (OR)

      (B)

14.   (A)

                            (OR)

      (B)

15.   (A)

                            (OR)

      (B)

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Question Paper Pattern– INTERNAL EXAMINATION (For All Semesters)

Time: 50 Minutes   Total Marks: 20

Section-A
(Long Answer Questions)

Answer any two of the following questions   2 * 5 = 10

1.
2.
3.
4.

Section-B
(Very Short Answer Questions)

Answer all questions.   5 * 1 = 5

5.
6.
7.
8.
9.

Section-C
(Multiple Choice Questions)

Answer all questions. Select any one correct answer from below options.   5 * 1 = 5

10.
11
12.
13.
14.

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