

NAGARJUNA GOVERNMENT COLLEGE,

AUTONOMOUS:NALGONDA

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(Re Accredited by NAAC with "A" Grade)

BOARD OF STUDIES MEETING

DEPARTMENT OF PHYSICS

2014-15

2014-15

NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
(Autonomous) (Reaccredited with "A" Grade by NAAC)
(Affiliated to Mathatma Gandhi University)
DEPARTMENT OF PHYSICS
BOARD OF STUDIES MEETING 2014-15


The members of Board of studies in Physics Department, N.G. College, Nalgonda met under the chairmanship of Sri M.Srinivas Reddy on 15- 05 -2014 and passed the following Resolutions.

AGENDA :

1. To consider and approve the syllabus for B.Sc I,II,III years(I, II, III, IV, V & VISEmesters) during 2014-15.
2. To consider and approve the introduction of Internal Assessment for the students admitted into I,II & III years degree course during 2014-15.
3. To consider and approve the model question paper for B.Sc I,II,&III year 2014-15
4. 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 2014-15.
5. Any other related academic matters.

RESOLUTIONS:

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 2014-15 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 Theory and 30 Marks for Internal Examinations (20 Marks for written examination 5 Marks for Assignment and 5 marks for Seminar) introduce for the year 2014-15 as per the direction of CCE, Hyd.
3. It is resolved to organize class wise and year wise Class Seminar, Group Discussion and Guest Lecture.


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

**PROCEEDINGS OF NAGARJUNA GOVT. COLLEGE, NALGONDA
AUTONOMOUS**

Present: Dr.R.Nagender Reddy, M.A.LLB.Ph-D

Rc.No.Spl/BOS/2014.


Date:12.05.2014.

Sub:- Approval of BOS for the Academic year 2014 – 2015 Order
issued - Req – Reg.

As per the instructions of the Commissioner of Collegiate Education to ensure the employability to the Under Graduate Students, the College is introducing Choice Based Credit System (CBCS) this academic year 2014 – 2015 by offering inter-disciplinary courses, which is mandatory to all the students to be pursued in any one of the semesters through the three years Degree course.

2. The Examinations are conducted on Semester Basis.


3. Each semester is of 100 marks in which 70 marks for Theory and 30 marks for Internal Examinations (20 marks for written examination, 5 marks for Assignment and 5 marks for Seminar).


Principal
Nagarjuna Govt. College
(Autonomous) NALGONDA.

Commissionerate of Collegiate Education, A.P., Hyderabad

**Tentative schedule for completion of the process for introduction of CBCS in Govt.,
Autonomous Colleges from the academic year 2014-15**

S.No	Activity	Time line
1	Preparation of draft Blue prints for Modular & CBS system for 11 subjects	16.4.2014
2	Preparation of draft Blue prints CGPA evaluation system for BA. B.Sc and B.Com programmes	17.4.2014
3	Vetting of draft Blue prints in 11 subjects by the respective department in colleges. Preparation of Blue prints for all other subjects in respective colleges	26.4.2014
4	All preliminary permissions from the CCE office to the principals	02.5.2014
5	Completion of verification of final Blue prints by O/o CCE officers by visiting the colleges	10.5.2014
6	Approval of Modular, CBCS and CGPA by respective BoS	15.5.2014
7	Approval of CBCS by Academic Councils of the respective colleges	20.5.2014
8	Approval of CBCS by respective GBs	25.5.2014
9	Commencement of CBCS in 10 Govt., autonomous colleges	01.6.2014


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PANEL OF EXAMINERS FOR THE YEAR 2014-15

SNO	Paper	Name of the Examiners with full Addresses	Phone Numbers
1	I	Dr.J.Chinnababu G.D.C. City College ,Hyd.	9394801744
2	I	V.Buchi Reddy , GDC, Ramannapet	9440383327
3	I	B.Charadra Shekar, GDC Kukatpally, X HYD	9440322507
4	II	R.Venkateswarlu GDC Kodad.	9440493244
5	II	V.Buchi Reddy , GDC, Ramannapet	9440383327
6	II	Dr.J.Chinnababu G.D.C. City College ,Hyd.	9394801744
7	III	M.Satyanarayana, GDC Devarkonda	9491992201
8	III	R.Venkateswarlu GDC Kodad.	9440493244
9	III	P.Balabhaskar, GDC Kukatpally, HYD X	9966212197
10	IV	M.Satyanarayana, GDC Devarkonda	9491992201
11	IV	Dr.K.Yadaiah, S.V. X College, Suryapet, Nalgonda.	9885051657
12	IV	P.Balabhaskar, GDC Kukatpally, HYD X	9966212197
13	V	Dr.J.Chinnababu G.D.C. City College ,Hyd.	9394801744
14	V	M.Satyanarayana, GDC Devarkonda	9491992201

M. Acharya
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15	V	B.Charadra Shekar, GDC Kukatpally, HYD	X	9440322507
16	VI	Dr.J.Chinnababu G.D.C. City College ,Hyd.		9394801744
17	VI	Dr.J.Chinnababu G.D.C. City College ,Hyd.		9394801744
18	VI	B.Charadra Shekar, GDC Kukatpally, HYD	X	9440322507
19	VII	P.Balabhaskar, GDC Kukatpally,HYD	X	9966212197
20	VII	V.Buchi Reddy , GDC, Ramannapet		9440383327
21	VII	R.Venkateswarlu GDC Kodad.		9440493244
22	VIII	P.Balabhaskar, GDC Kukatpally,HYD	X	9966212197
23	VIII	V.Buchi Reddy , GDC, Ramannapet		9440383327
24	VIII	B.Charadra Shekar, GDC Kukatpally, HYD	X	9440322507


6 Approved to conduct practical examination at the end of second, fourth and sixth semester.

2014-15


Signatures:


1. M.Srinivas Reddy
H.O.D of Physics
N.G. College, Nalgonda
Chairman B.O.S.
2. Prof.M.Anjan Reddy
Chairman B.O.S.
Physics Dept. M.G.U
Hon'ble Member
3. R.Venkateswarlu
Lecturer in Physics
GDC,Kodad
Subject Expert
4. Ch.Satyanarayana,
Lecturer in Physics
GDC,DVK.
Subject Expert
5. CH.Bixamaiah,
Lecturer in Physics,
N.G. College, Nalgonda
Member
6. G.Linga Reddy
Lecturer in Physics,
N.G. College, Nalgonda
Member
7. CH.Srinivasu,
Lecture in Physics,
N.G. College, Nalgonda.
Member


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NAGARJUNA GOVERNMENT COLLEGE, NALGONDA

DEPARTMENT OF PHYSICS

ALLOCATION OF CREDITS AT SUBJECT LEVEL

COURSE : SCIENCE

SUBJECT: PHYSICS

S. No	Semester	Module(Paper)	Hours per week	Max. Marks	No. of credits
1	I (CORE)	Mechanics	4	100	3
2	II (CORE)	Waves & Oscillation	4	100	3
3	Practicals	Mechanics , Waves ,Oscillations	3	50	2
4	III (CORE)	Thermodynamics	4	100	3
5	IV (CORE)	Optics	4	100	3
6	Practicals	Thermodynamics, Optics	3	50	2
7	V Core	Electricity ,Magnetism ,Eletronics	4	100	3
8	V Elective (Advanced)	Solidstate Physics , Nuclear Physics	3	100	2
9	V Elective (Advanced)	Nano Science & Technology	3	100	
10	Practicals	Electricity , Magnetism ,Eletronics	3	50	2
11	VI Core	Atomic, Molecular Spectroscopy,Quantum Mechanics	4	100	3
12	VI Elective (Applied)	Non Conventional Energy Sources	3	100	2
13	VI Elective (Applied)	Radiological Physics	3	100	
14	Practicals	Modern Physics	3	50	2
15	Project Work	Student Individual		Grade	
16	Others(General Elective)	House Wiring, Cell Phone Repairing		50	


CHAIRMAN

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

Department of Physics
Nagarjuna Government College, Nalgonda

Name of the Module: Mechanics

Semester: I

Nature of the Module: Core

Subject: Physics

Mode of Learning: Regular

No. of Hours: 04

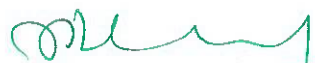
Credits: 03

Total Hours: 60

CURRICULAR PLAN

Semester: I

S. No	Month and Week	No. of Hours	Topic	Curricular Activity	Co-curricular Activity	Remarks
1	June II	4	Scalar & vector fields, Gradient, Divergence, Curl	Lecture Method	Self Study on basics	
2	June III	4	Line, Surface, Volume Integrals, Stokes Theorem	Lecture Method		
3	June IV	4	Gauss & Green Theorem, Laws of motion, Variable mass System	Lecture Method	Assignment	
4	July I	4	Motion of Rocket Conservation of Energy & Momentum, collisions in 2&3 dimensions	PPT		
5	July II	4	Impact parameter, scattering cross section, Rutherford scattering, Rigid Body	Lecture Method	Quiz	
6	July III	4	Equation of motion, Angular momentum, Euler's equation	Invited Talk		
7	July IV	4	Precession of a top, Gyroscope, Precession of Equinoxes	PPT	Assignment	
8	Aug I	4	types of beams, types of bending, point load, distributed load, shearing force	Lecture Method		
9	Aug II	4	Simple Supported beam, cantilever beam	Lecture Method	Seminar	
10	Aug III	4	Central forces, Conservative nature, Equation of motion under central force	Lecture Method	Quiz	
11	Aug IV	4	Gravitational potential & field, Inverse square Law	Lecture Method	Group Discussion	
12	Sep I	4	Derivation of Kepler Laws, Coriolis force and its expressions	Lecture Method	Seminar	
13	Sep II	4	Galilean relativity, Absolute frames, Michelson & Morley Expt.	Lecture Method	Student Carrier Counselling	
14	Sep III	4	Postulates of spl. theory of Relativity, Lorentz transformation	Revision	Mock test	
15	Sep IV	4	Time delation, length contraction, addition of velocities	Remedial		



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Department of Physics
Nagarjuna Government College, Nalgonda

Name of the Module: Waves & Oscillations

Semester: II

Nature of the Module: Core

Subject: Physics

Mode of Learning: Regular

No. of Hours: 04

Credits: 03

Total Hours: 60

CURRICULAR PLAN

Semester: II

S. No	Month and Week	No. of Hours	Topic	Curricular Activity	Co-curricular Activity	Remarks
1	Nov I	4	Simple harmonic oscillator, and solution of the differential equation-Physical	Teaching & Practical	Self Study on basics	
2	Nov II	4	Damped har-monic oscillator, solution of the differential equation of damped oscillator.	Teaching & Practical		
3	Nov III	4	logarithmic decre-ment, relaxation time, quality factor, differential equation of forced oscillator and its	Teaching & Practical	Assignment	
4	Nov IV	4	solution, amplitude resonance, velocity resonance.	Teaching & Practical		
5	Dec I	4	Addition of two simple harmonic mo-tions with different frequencies	Teaching & Practical	Student Seminar	
6	Dec II	4	Fourier theorem and evaluation of the Fourier coefficients, analysis of periodic functions-square, triangular	Teaching & Practical		
7	Dec III	4	Fourier energy theorem, Transverse wave propagation along a stretched string, general solution of wave equation and its	Teaching & Practical	Quiz	
8	Dec IV	4	modes of vibration of stretched string clamped at both ends, overtones, energy transport, trans-verse impedance	Teaching & Practical	Assignment	
9	Jan I	4	Reflection and transmission of waves ,Longitudinal waves in air, solution, of a differential equation, reflection and	Teaching & Practical	Student Seminar	
10	Jan II	4	Longitudinal vibrations in bars-wave equation and its general solution. Special cases (i) bar fixed at both ends (ii) bar	Teaching & Practical		
11	Jan III	4	bar free at both ends (iv) bar fixed at one end. Transverse vibrations in a bar-wave equation and its general solution.	Teaching & Practical	Group Discussion	
12	Jan IV	4	Boundary conditions, clamped free bar, free-free bar, bar supported at both ends, Tuning fork.	Teaching & Practical		
13	Feb I	4	Ultrasonics, properties of ultrasonic waves, production of ultra-sonics by piezoelectric and magnetostriction	Teaching & Practical	Student Carrier Counselling	
14	Feb II	4	detection of ultrasonics, de-termination of wavelength of ultrasonic waves. Velocity of ultrasonics in liquids by	Teaching & Practical	Quiz	
15	Feb III	4	Revision of the Syllabus	Discussio n	Mock test	
16	Feb IV	4	Remedial Classes	Discussio n		

SYLLABUS

UNITS :-

I.A. Vector Analysis (10) : 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.

I.B. Collisions (6) : Collisions in two and three dimensions, center of mass and Lab frames, concept of impact parameter, differential scattering cross-section, Rutherford scattering.

II. Newton's Laws and motion under central force (14): Laws of motion, mass and force, motion under force dependant upon position, velocity, time and their combinations, motion of variable mass system, motion of a rocket, multi-stage rocket, conservation of energy and momentum.


Central forces- definition and examples, conservative nature of central forces, force as a negative gradient of potential energy, gravitational potential and gravitational field, centre of mass of many body system, two body problem, equation of motion under a central force, motion under inverse square law, derivation of Kepler's laws, Coriolis force and its expressions.

III.A . Mechanics of rigid bodies (10) : Definition of Rigid body, rotational kinematic relations, equation of motion for a rotating body, angular momentum and inertial tensor. Eulers equation, torque free motion of symmetric top. Symmetric top and pre-cessional motion, Gyroscope and navigation precession of the equinoxes.

III.B. Mechanics of continuous media (10) : Stress and strain relation, Elastic constants of isotropic solids, Uniform and non uniform strains with examples, Poisson's ratio and expression for Poisson's ratio in terms of ν , n , k . Fluid motion and its equilibrium properties, basic concepts leading to equation of continuity.

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, position and velocity as four vectors, four momentum, mass-energy relation.

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College: NAGARJUNA GOVT. DEGREE COLLEGE **Course: B.Sc.**
Year : 2014-15 **Subject: Physics**
Name of the Module: WAVES AND OSCILLATIONS **Semester: II**
Nature of the Module: Core
Mode of the Learning: Regular

UNITS :-

- I. Fundamentals of vibrations (16):** Simple harmonic oscillator, and solution of the differential equation-Physical characteristics of SHM, torsion pendulum, -measurements of rigidity modulus, compound pendulum, measurement of g, 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.
- II.A. Superposition of Harmonic motions (8):** Addition of two simple harmonic motions with different frequencies and phases, addition of many simple harmonic motions, combination of two mutually perpendicular simple harmonic vibrations of same frequency and different frequencies, Lissajous figures.
- II.B. Fourier analysis of complex vibrations (6):** Fourier theorem and evaluation of the Fourier coefficients, analysis of periodic functions-square, triangular, saw-tooth functions. Fourier energy theorem.
- III. Transverse and Longitudinal waves (12) :** Transverse wave propagation along a stretched string, general solution of wave equation and its significance, modes of vibration of stretched string clamped at both ends, overtones, energy transport, transverse impedance. Reflection and transmission of waves.
- Longitudinal waves in air, solution, of a differential equation, reflection and transmission of acoustic waves, Mach number.
- IV. A. Vibrations of bars (12) :** Longitudinal vibrations in bars-wave equation and its general solution. Special cases (i) bar fixed at both ends (ii) bar fixed at the mid point (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.
- IV.B. Ultrasonics (6) :** Ultrasonics, properties of ultrasonic waves, production of ultrasonics by piezoelectric and magnetostriction methods, detection of ultrasonics, determination of wavelength of ultrasonic waves. Velocity of ultrasonics in liquids by Sear's method. Applications of ultrasonic waves.



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N.G. College, NALGONDA.

NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
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Unitization of Physics Syllabus-2014-15
B.SC-IInd Year Semester-II Paper-III

UNITS:-

1A. Kinetic theory of gases: (8)

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

1B. Thermodynamic potentials and Maxwell's equations: (10)

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.

II. Thermodynamics: (12)

Introduction – Reversible and irreversible processes – Carnot's engine and its efficiency – Carnot's theorem – Second law of thermodynamics, Kelvin's and Clausius statements – 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.

IIIA Low temperature Physics: (10)

Introduction – 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. Working of refrigerator and Air conditioning machines. Effects of Chloro and Fluro Carbons on Ozone layer;

IIB. Statistical Mechanics: (10)

Introduction to statistical mechanics, concept of ensembles, Phase space, Maxwell-Boltzmann's distribution law, Molecular energies in an ideal gas, Bose-Einstein Distribution law, Fermi-Dirac Distribution law, comparison of three distribution laws, Black Body Radiation, Rayleigh-Jean's formula, Planck's radiation law, Weins Displacement, Stefan's Boltzmann's law from Plancks formula.

IV. Quantum theory of radiation: (10)

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, from Planck's law - easurement of radiation – Types of pyrometers –Disappearing filament optical pyrometer – Angstrom pyroheliometer -determination of solar constant, estimation of temperature of sun.

NAGARJUNA GOVERNMENT COLLEGE, NALGONDA

(Autonomous)

Unitization of Physics Syllabus-2014-15

B.SC-IInd Year Semester-III Paper-IV

UNITS:-

I. The Matrix methods in paraxial optics: (8)

Introduction, the matrix method, effect of translation, effect of refraction, imaging by a spherical refracting surface. Imaging by a co-axial optical system. Unitplanes. Nodal planes. A system of two thin lenses.

II. Aberrations: (7)

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.

III. Laser, Fiber Optics and Holography: (10)

Lasers: Introduction – Spontaneous emission – Stimulated emission – Population inversion . Laser principle – Einstein coefficients – Types of Lasers – He-Ne laser – Ruby laser – Applications of lasers. 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 (qualitative treatment only) and advantages of fiber communication. Holography: Basic Principle of Holography – Gabor hologram and its limitations, Holography applications.

III Interference: (15)

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 D₁, D₂ lines and thickness of a thin transparent plate.

IV A Diffraction: (10)

Introduction – Distinction between Fresnel and Fraunhofer diffraction Fraunhofer diffraction:- Diffraction due to single slit and circular aperture –Limit of resolution – Fraunhofer diffraction due to double slit – Fraunhofer 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 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.

IV B Polarization (10)

Polarized light : Methods of Polarization, Polarization by reflection, refraction, Double refraction, selective absorption , scattering of light – Brewsters 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.

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

FACULTY OF SCIENCE
B.SC-IInd YEAR 2014-15

PHYSICS

Textbooks

1. **Optics** by Ajoy Ghatak. *The McGraw-Hill companies.*
2. **Optics** by Subramaniam and Brijlal. *S. Chand & Co.*
3. **Fundamentals of Physics.** Halliday/Resnick/Walker.C. *Wiley India Edition 2007.*
4. **Optics and Spectroscopy.** R.Murugesan and Kiruthiga Siva Prasath. *S. Chand & Co.*
5. **Second Year Physics – Telugu Academy.**
6. **Modern Physics** by R. Murugesan and Kiruthiga Siva Prasath (for statistical Mechanics) *S. Chand & Co.*
7. **Thermodynamics** by R.C. Srivastava, Subit K. Saha & Abhay K. *Jain Eastern Economy Edition.*
8. **Heat and thermodynamics – Brijlala and Subrahamanyam (S.Chand)**

Reference Books

1. **Modern Physics** by G. Aruldas 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. **Modern Engineering Physics** by A.S. Vasudeva. *S.Chand & Co. Publications.*
5. **Feynman's Lectures on Physics** Vol. 1,2,3 & 4. *Narosa Publications.*
6. **Fundamentals of Optics** by Jenkins A. Francis and White E. Harvey, *McGraw Hill Inc.*

NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
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Unitization of Physics Syllabus-2014-15
B.Sc. III Year Physics Paper VI
SEMESTER - V

Unit - I:

Atomic Spectra: Introduction – Drawbacks of Bohr's atomic model, – Sommerfeld's elliptical orbits, relativistic correction (no derivation), Stern & Gerlach experiment, Vector atom model and quantum numbers associated with it, L-S and j-j coupling schemes, Spectral terms, selection rules, intensity rules, Spectra of alkali atoms, doublet fine structure, Alkaline earth spectra, singlet and triplet fine structure, Zeeman Effect, Paschen-Back Effect, and Stark Effect (basic idea). (12)

Unit – II:

Molecular Spectroscopy: Types of molecular spectra, pure rotational energies and spectrum of diatomic molecule, determination of internuclear distance, Vibrational energies and spectrum of diatomic molecule, Raman effect, Classical theory of Raman effect, Experimental arrangement for Raman effect and its applications. (7)

Unit – III:

Quantum Mechanics

Inadequacy of classical Physics: (Discussion only)

Spectral radiation – Planck's law, Photoelectric effect – Einstein's photoelectric equation, Compton's effect, (quantitative) experimental verification, Stability of an atom – Bohr's atomic theory, Limitations of old quantum theory. (6)

Matter Waves:

de Broglie's hypothesis, – wavelength of matter waves, properties of matter waves, Phase and group velocities, Davisson and Germer experiment, Double slit experiment, Standing de Broglie waves of electron in Bohr orbits. (6)

Unit – IV:

Uncertainty Principle:

Heisenberg's uncertainty principle for position and momentum (x and p_x), Energy and time (E and t), Gamma ray microscope, Diffraction by a single slit, Position of electron in a Bohr orbit, Particle in a box, Complementary principle of Bohr. (6)

Schrodinger Wave Equation:

Schrodinger time independent, and time dependent wave equations, Wave function properties – Significance, Basic postulates of quantum mechanics, Operators, eigen functions and eigen values, expectation values, Application of Schrodinger wave equation to particle in one, and three dimensional boxes, potential step, and potential barrier. (9)

* * *

total (47)



NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
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B.Sc. III Year Physics Paper -VIII
Unitization of Physics Syllabus-2014-15
SEMESTER -VI

Unit – I:

Nuclear Physics

Nuclear Structure: Basic properties of nucleus – size, charge, mass, spin, magnetic dipole moment and electric quadrupole moment. Binding energy of nucleus, deuteron binding energy/p-p and n-p scattering (concepts), nuclear forces. Nuclear models – liquid drop model, shell model.

Alpha and Beta Decays: Range of alpha particles, Geiger – Nuttal law, Gammow's theory of alpha decay. Geiger – Nuttal law from Gammow's theory. Beta spectrum – neutrino hypothesis, Fermi's theory of β -decay (qualitative).

Unit – II:

Nuclear Reactions: Types of nuclear reactions, channels, nuclear reaction kinematics. Compound nucleus, direct reactions (concepts).

Nuclear Detectors: GM counter, proportional counter, scintillation counter, Wilson cloud chamber and solid state detector.

Unit – III:

Solid State Physics

Crystal Structure: Crystalline nature of matter. Crystal lattice, Unit Cell, Elements of symmetry. Crystal systems, Bravais lattices. Miller indices. Simple crystal structures (S.C., BCC, CsCl, FCC, NaCl diamond and Zinc Blends).

X-ray Diffraction: Diffraction of X – rays by crystals, Bragg's law, Experimental techniques – Laue's method and powder method.

Nanomaterials: Introduction, nanoparticles, metal nanoclusters, semiconductor nanoparticles, carbon clusters, carbon nanotubes, quantum nanostructures – nanodot, nanowire and quantum well. Fabrication of quantum nanostructures.

Unit – IV:

Bonding in Crystals: Types of bonding in crystals – characteristics of crystals with different bindings. Lattice energy of ionic crystals – determination of Madelung constant for NaCl crystal, calculation of Born coefficient and repulsive exponent. Born – Haber cycle.

Magnetism: Magnetic properties of dia, para and ferromagnetic materials. Langevin's theory of paramagnetism. Weiss' theory of ferromagnetism – Concepts of magnetic domains, antiferromagnetism and ferrimagnetism ferrites and their applications.

Superconductivity: Basic experimental facts – zero resistance, effect of magnetic field, Meissner effect, persistent current, Isotope effect Thermodynamic properties, specific heat, entropy. Type I and Type II superconductors.

Elements of BCS theory-Cooper pairs. Applications. High temperature superconductors (general information).

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

B.Sc. III Year Physics Paper IV
(Syllabus for 2014-15)

Text Books

1. **Modern Physics** by G. Aruldas & P. Rajagopal. Eastern Economy Edition.
2. **Concepts of Modern Physics** by Arthur Beiser. Tata McGraw-Hill Edition.
3. **Modern Physics** by R. Murugesan and Kiruthiga Siva Prasath. S. Chand & Co.
4. **Nuclear Physics** by D.C. Tayal, Himalaya Publishing House.
5. **Molecular Structure and Spectroscopy** by G. Aruldas. Prentice Hall of India, New Delhi.
6. **Spectroscopy – Atomic and Molecular** by Gurdeep R Chatwal and Shyam Anand – Himalaya Publishing House.
7. **Third Year Physics** – Telugu Academy
8. **Elements of Solid State Physics** by J.P. Srivastava. (for chapter on nanomaterials) – Prentice-hall of India Pvt. Ltd.

Reference Books

1. **University Physics with Modern Physics** by Young & Freedman. A. Lewis Ford. Low Price Edition (Eleventh Edition).
2. **Quantum Physics** by Eyvind H. Wichman. Volume.4, The McGraw-Hill Companies.
3. **Quantum Mechanics** by Mahesh C. Jani. Eastern Economy Edition.
4. **Nuclear Physics** Irving Kaplan – Narosa Publishing House.
5. **Introduction to Solid State Physics** by Charles Kittel. John Wiley and Sons.
6. **Solid State Physics** by A.J. Dekker. Mac Millan India.

NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
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B.Sc. III Year Physics Paper V
Unitization of Physics Syllabus-2014-15

Semester – V

Unit - I:

Electrostatics: Gauss law and its applications – Uniformly charged sphere, charged cylindrical conductor and an infinite conducting sheet of charge. Deduction of Coulomb's law from Gauss law, Mechanical force on a charged conductor, Electrical Potential – Potential due to a charged spherical conductor, electric field strength from the electric dipole and an infinite line of charge. Potential of a uniformly charged circular disc.

Unit – II:

Dielectrics: An atomic view of dielectrics, potential energy of a dipole in an electric field. Polarization and charge density, Gauss's law for dielectric medium – Relation between D, E and P. Dielectric Constant, susceptibility and relation between them. Boundary conditions at the dielectric surface. Electric fields in cavities of a dielectric – needle shaped cavity and disc shaped cavity.

Capacitance: Capacitance of concentric spheres and cylindrical condenser, capacitance of parallel plate condenser with and without dielectric. Electric energy stored in a charged condenser – force between plates of condenser, construction and working of attracted disc electrometer, measurement of dielectric constant and potential difference.

Unit – III:

Magnetostatics: Magnetic shell – potential due to magnetic shell – field due to magnetic shell – equivalent of electric circuit and magnetic shell – Magnetic induction (B) and field (H) – permeability and susceptibility – Hysteresis loop.

Moving charge in electric and magnetic field: Motion of charged particles in electric and magnetic fields. Hall effect, cyclotron, synchrocyclotron and synchrotron – force on a current carrying conductor placed in a magnetic field, force and torque on a current loop, Biot – Savart's law and calculation of B due to long straight wire, a circular current loop and solenoid.

Unit – IV:

Electromagnetic induction: Faraday's law – Lenz's law – expression for induced emf – time varying magnetic fields – Betatron – Ballistic galvanometer – theory – damping correction – self and mutual inductance, coefficient of coupling, calculation of self inductance of a long solenoid – toroid – energy stored in magnetic field – transformer – Construction, working, energy losses and efficiency.

NAGARJUNA GOVERNMENT COLLEGE, NALGONDA
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B.Sc. III Year Physics Paper VII
(Syllabus for 2014-15)
Semester – VI

Unit – I:

Varying and alternating currents: Growth and decay of currents in LR, CR and LCR circuits – Critical damping. Alternating current, relation between current and voltage in pure R, C and L- vector diagrams – Power in ac circuits, LCR series and parallel resonant circuit – Q-factor, AC & DC motors – single phase, three phase (basics only).

Unit – II:

Maxwell's equations and electromagnetic waves: A review of basic laws of electricity and magnetism – displacement current – Maxwell's equations in differential form – Maxwell's wave equation, plane electromagnetic waves - Transverse nature of electromagnetic waves, Poynting theorem, production of electromagnetic waves (Hertz experiment).

Unit – III:

Basic Electronics: Formation of energy bands in solids, classification of solids in terms of forbidden energy gap. Intrinsic and extrinsic semiconductors, Fermi level, continuity equation – p-n junction diode, half wave and full wave rectifiers and filters, ripple factor (quantitative), Characteristics of Zener diode and its application as voltage regulator – p n p and n p n transistors, current components in transistors, CB, CE and CC configurations – concept of transistor biasing, operating point, fixed bias and self bias (Qualitative only), transistor as an amplifier – concept of negative feed back and positive feed back – Barkhausen criterion, RC coupled amplifier and phase shift oscillator (qualitative).

Unit – IV:

Digital Principles: 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, De Morgan's Laws – statement and proof, Half and Full adders. Parallel adder circuits.

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


**B.Sc. III Year Physics Paper III
(Syllabus for 2014-15)**

Text Books

1. **Modern Physics** by R. Murugesan and Kiruthiga Siva Prasath – S. Chand & Co. for semi conductor & Digital Principles)
2. **Fundamentals of Physics** – Halliday/Resnick/Walker – Wiley India Edition 2007.
3. **Berkeley Physics Course – Vol. II – Electricity and Magnetism** – Edward M Purcell – The McGraw – Hill Companies.
4. **Electricity and Magnetism** – D.N. Vasudeva. S. Chand & Co.
5. **Electronic devices and circuits** – Millman and Halkias. Mc.Graw-Hill Education.
6. **Electricity and Magnetism** – Brijlal and Subramanyam. Ratan Prakashan Mandir.
7. **Digital Principles and Applications** by A.P. Malvino and D.P. Leach. McGraw Hill Education.

Reference Books

1. **Electricity and Electronics** – D.C. Tayal. Himalaya Publication House.
2. **Electricity and Magnetism** – C.J. Smith. Edward Arnold Ltd.
3. **Electricity, Magnetism with Electronics** – K.K. Tewari. R.Chand & Co.
4. **Third year Physics** – Telugu Academy
5. **Principles of Electronics** by V.K. Mehta – S. Chand & Co.


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**B.Sc. III Year Physics Paper III
(Practical Syllabus for 2014-15)
Semester – V**

1. Carey Foster's Bridge – comparison of resistances.
2. Internal resistance of a cell by potentiometer.
3. Figure of merit of a moving coil galvanometer.
4. Voltage sensitivity of a moving coil galvanometer.
5. Determination of time constant using RC.
6. LCR circuit series/ parallel resonance – Q factor.
7. Power factor of an A.C. circuit.

B.Sc. III Year Physics Paper III
(Practical Syllabus for 2014-15)
Semester – VI

1. Determination of ac – frequency – sonometer
2. Design and construction of multimeter.
3. Determination of Ripple factor – Half wave. Full wave and Bridge rectifier.
4. Determination of Ripple factor – L Section filter, π section filters.
5. Characteristics of a Junction Diode.
6. Characteristics of Transistor
7. Characteristics of Zener Diode.
8. Verification of Kirchhoff's laws.

B.Sc. III Year Physics Paper IV
(Practical Syllabus for 2014-15)
Semester – V

- 1 e/m of an electron using Thomson Method.
- 2 Energy gap of semiconductor using a junction diode.
- 3 Temperature characteristics of thermistor.
- 4 R.C. coupled amplifier.
- 5 Verification of Logic gates AND, OR, NOT, X-OR gates (Using discrete components).
- 6 Verification of De Morgan's Theorems.
- 7 Construction and verification of truth tables for half and full adders.

**B.Sc. III Year Physics Paper IV
(Practical Syllabus for 2014-15)
Semester – VI**

1. Phase shift Oscillator.
2. Hysteresis curve of transformer core.
3. Determination of the Plank's constant (photocell).
4. Characteristics of G.M. Counter.
5. Study of absorption of β and γ rays using G.M detector.
6. Hall-probe method for measurement of magnetic field.
7. Determination of Magnetic susceptibility – Capillary rise method.
8. Study of alkaline earth spectra using a concave grating.

Not for examination:

Servicing of domestic appliances – Electric Iron, immersion heater, fan, hot plate, grinder, emergency lamp, battery charger, micro-oven, loud speaker, eliminator, cell-phones, servicing of refrigerator.

Suggested Books for Practicals

1. **A text book 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 – Voice in Advanced Physics** – R. C. Gupta and Saxena P.N. – Pragathi Prakashan, Meerut.
6. **Viva – Voice in Physics** – R.C. Gupta, Pragathi Prakashan, Meerut.

MODEL PAPER

NAGARJUNA GOVERNMENT COLLEGE (AUTONOMOUS), NALGONDA

MODEL QUESTION PAPER

COURSE: B.Sc.,
Semester: I
Max. Marks: 70

SUBJECT: PHYSICS
Module: Mechanics
Time: 2:30 Hours

PART - A
(Very Short Questions) 5 X 2 = 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
(At least one question 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)
- B)

(OR)

- C)
- D)

13. A)
- B)

(OR)

- C)
- D)

14. A)
- B)

(OR)

- C)
- D)

15. A)
- B)

(OR)

- C)
- D)

NAGARJUNA GOVERNMENT COLLEGE (AUTONOMOUS), NALGONDA

MODEL QUESTION PAPER

COURSE: B.Sc.,
Semester: II
Max. Marks: 70

SUBJECT: PHYSICS
Module: Waves & Oscillations
Time: 2:30 Hours

PART - A
(Very Short Questions)

5 X 2 = 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
(At least one question 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)
B)

C)
D)

(OR)

13. A)
B)

C)
D)

(OR)

14. A)
B)

C)
D)

(OR)

15. A)
B)

C)
D)

(OR)

FACULTY OF SCIENCE
B.Sc. II Year, Semester -I, Examination 2014-15
PHYSICS

Time: 2.30 Hours

(THERMODYNAMICS)

Max. Marks.40

SECTION-A

Answer all the Questions.

4x6=24

1. (A) On the basis of kinetic theory, obtain an expression for the coefficient of viscosity of a gas.

(OR)

{B) Describe Joule-kelvin experiment and discuss its results.

2. (A) Define entropy, show that entropy remains constant in a reversible process.

(OR)

(B) Explain T-S diagram and how a Carnot cycle looks on such a diagram,

3. (A) Derive an expression for Joule-Thomson cooling and hence define temperature of inversion.

(OR)

(B) Write the Maxwell-Boltzmann, Fermi-Dirac and Bose-Einstein distribution laws and also their applications.

4. (A) Derive Rayleigh - Jeans formula for energy distribution in a black body radiation.

(OR)

(B) Obtain Wien's equation for energy distribution of a black body.

SECTION-B

Answer any four Questions.

4x2=8

5. Distinguish between classical and quantum statistics.
6. What are the thermodynamic potentials.
7. A refrigerator works under a reversible cycle between the temperatures 300K and 400K. Calculate its thermal efficiency.
8. Write an expression for the work done during an isothermal process.
9. Write the properties of Helium - II.
10. What is the "Seebeck effect".
11. What is the ratio between C_p, C_v, C_{rms} velocities?
12. What is the indicator diagram and also write its significance.

SECTION-C

Solve any four problems

4x2=8

13. At what temperature is the r.m.s. Speed of oxygen molecules twice their r.m.s speed at 27°C.
14. Considering mercury at 0°C and 1 at mospheric prersure calculate the ratio of the two specific heats
— • = r
15. A cornot engine working between 227°C and 27°C. What is its efficiency.
16. What is the change in entrophy when 1 0 grams of ice at 0°C converts in to water at 0°C (L=80 calries/gr)
17. Calculate the fermi energy in copper. Density of copper $\rho = 8.94 \times 10^3 \text{ kg/m}^3$ and atomic mass of copper is 63.5 amu.
18. Find the energy of oscillator at 300k° temperature when it vibraties with a frequency $5.6 \times 10^{12} / \text{sec}$.
19. Using wien's displacement law calculate the temparature of the sun when wavelength of maximum energy $\lambda_m = 490 \text{ (U}^\circ \text{ and wien's constant is } 2.92 \times 10^3 \text{ mk}$.
20. A refrigrotor is working between 300k° and 400k° . Find the coefficient of performance.

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FACULTY OF SCIENCE

B.Sc. III year Examination – Model Question Paper

PHYSICS

Paper – IV

Semester – V

Time: 2 ½ Hours

Maximum Marks: 40

Section – A

Answer all questions.

4 x 6 = 24

- 1 (a) Explain discrete set of electronic energies of molecules. (4)
(b) Explain the origin of pure rotational and rotational vibrational spectra (4)

OR

(c) Describe in detail the different sources of excitation in the ultra violet and visible regions (5).

(d) Explain emission and absorption spectra. (3)

- 2 (a) Explain Gamow's theory of Alpha Decay. (5)

(b) Write a short notes on Geiger Nuttal Law (3)

OR

(c) Explain what is meant by nuclear fission and nuclear fusion. (3)

(d) Explain the energy production in stars by carbon – nitrogen cycle. (5)

3. Explain LS – coupling and JJ - coupling (8)

OR

(a) Mention the properties and uses of x-rays. (3)

(b) Compare X-ray spectra with optical spectra. (5)

4. Explain the principle and working of scintillation counter. (8)

OR

Explain the principle and working of cloud chamber. Discuss the merits and demerits. (8).

Section – B

5 Answer any Four of the following. 4 x 2 = 8

- (a) What are the advantages and disadvantages of G.M. Counter.
(b) Explain the energy production in stars by proton-proton cycle.
(c) What are stokes and anti stokes lines in Raman Effect?
(d) State and explain Moseley's Law.
(e) Give a general concept of nuclear forces.
(f) Mention the chief aspects of continuous x-ray spectrum.
(g) What is spectral rotation? Explain with example.
(h) State and explain Bohr's Postulates to explain hydrogen spectra.

Section – C

6 Answer any Four questions. 4 x 2 = 8

Two problems from each unit.

Total: Eight problems

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FACULTY OF SCIENCE
B.Sc. III year Examination – Model Question Paper

PHYSICS
Paper – III
Semester – V

Time: 2 ½ Hours

Maximum Marks: 40

Section – A

Answer all questions.

4 x 6 = 24

1. (a) State and prove Gauss's Law in electrostatics. 8
OR
(b) Obtain an expression for electric field due to a uniform charged sphere using Gauss's Theorem.
Find the electric field on the surface of the sphere of radius 1 cm and a charge of 100 coulombs. 8
2. (a) Define D, E and P. Obtain the relation between D, E and P. 8
OR
(b) Obtain an expression for the capacitance of a cylindrical condenser. 8
3. (a) Explain magnetic susceptibility and magnetic permeability. Find the relation between them. 8
OR
(b) What is Hall Effect? Describe how Hall Effect is useful to know the nature of charge carriers in a conductor. 8
4. (a) Explain the construction and working of a Betatron. 8
OR
(b) Explain self and mutual inductance. Derive an expression for the co-efficient of mutual inductance between two coils. 8

Section – B

5. Answer any Four of the following. 4 x 2 = 8
(a) What is an electric dipole? What is the dipole moment?
(b) Find the electric potential on the surface of a gold nucleus. The radius of the nucleus $6.6 \times 10^{-15} \text{m}$ and atomic number is 79.
(c) Discuss the Boundary conditions at the surface of a dielectric.
(d) Show the energy stored in a capacitor is $\frac{1}{2} CV^2$.
(e) What is Hysteresis Loop?
(f) State and explain the Biot Savart Law.
(g) Find the self inductance of a coil of 500 turns if a coil of 600 turns of the same dimensions as a self inductance of 108 H.
Explain the principle and working of a transformer.
(h)

Section – C

6. Answer any Four questions. 4 x 2 = 8

Two problems from each unit.
Total: Eight problems

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FACULTY OF SCIENCE

B.Sc. III year Examination – Model Question Paper
PHYSICS
Paper – III
Semester – VI

Time: 2 ½ Hours

Maximum Marks: 40

Section – A

Answer all questions.

4 x 6 = 24

1. (a) Discuss in detail growth and decay of current in L-R circuit. 8
OR
(b) Draw vector diagram for relation between voltage and current in pure RC circuit. 8
2. (a) State Maxwell's equations in differential and integral form. 8
OR
(b) What is pointing vector? Explain its significance. 8
3. (a) Explain the working of a Half-Wave Rectifier and Full Wave Rectifier. 8
OR
(b) Draw the circuit diagram of a phase-shift oscillator and explain its operation. 8
4. (a) Draw the circuit diagram for OR, AND and NOT gates using discrete components and explain their operations. Give the truth tables. 8
OR
(b) State and explain De Morgan's Laws. 8

Section – B

5 Answer any Four of the following. 4 x 2 = 8

- (a) A parallel resonant circuit is formed with $c = 1 \mu\text{F}$, $L = 10 \text{ mH}$
(b) Derive an expression for growth of current in an inductance – resistance circuit.
(c) Explain what is meant by displacement current.
(d) Show that electromagnetic waves are transverse in nature.
(e) Explain the difference between Zener Diode and a Junction Diode.
(f) Explain how transistor acts an amplifier.
(g) Convert the following:
(1) $(15)_{10} = (\dots)_2$ (2) $(1101.11)_2 = (\dots)_{10}$ (3) $(11010)_2 = (\dots)_{10}$
(4) $(34.6)_{10} = (\dots)_2$
(h) Draw the logic diagram for Half Adder.

Section – C

6 Answer any Four questions. 4 x 2 = 8

Two problems from each unit.
Total: Eight problems

FACULTY OF SCIENCE
B.Sc. III year Examination – Model Question Paper
PHYSICS
Paper – IV
Semester – VI

Time: 2 ½ Hours

Maximum Marks: 40

Section – A

Answer all questions.

4 x 6 = 24

- 1 (a) What are matter waves? Write their properties.
(b) Write the de-Broglie concept of matter waves.
OR
(c) Discuss the dual nature of matter waves.
Derive an expression for de-Broglie wave length.
- 2 (a) What is the importance of Schrodinger wave equation.
(b) Deduce Schrodinger time independent wave equation.
OR
(c) Derive an expression for the energy levels of a harmonic oscillator.
3. (a) What is Bragg's Law. Derive Bragg's Law for diffraction of X-rays by a crystal.
OR
(b) Explain the terms space lattice, and unit cell. What are miller indices?
(c) Explain with neat diagram of the NaCl crystal.
4. (a) Distinguish between dia, para and ferromagnetic materials.
Describe the Weiss Theory of ferromagnetism. State Weiss Law.
OR
(b) What is superconductivity? Mention properties and applications.
(c) What is Meissener's effect in superconductivity?

Section – B

- 5 **Answer any Four of the following. 4 x 2 = 8**
(a) Explain Curie-Weiss Law.
(b) Write a short note on ferrites.
(c) Explain Bravais's Space Lattices.
(d) What are miller indices? How they are calculated?
(e) What are eigen functions any eigen values?
(f) Explain a single step potential barrier.
(g) What is the importance of schrodinger wave equation.
(h) Explain Heisenberg Uncertainty Principle.

Section – C

- 6 **Answer any Four questions. 4 x 2 = 8**

Two problems from each unit.
Total: Eight problems

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

M. Arun Reddy

**DIRECTOR
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NALGONDA.**

[Signature]

**CHAIRMAN
Board of Studies in Physics
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