

GOVERNMENT COLLEGE [A]::RAJAHMUNDRY
[Re-accredited by NAAC with grade "A"]

DEPARTMENT OF PHYSICS




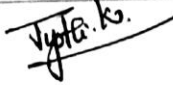




BOARD OF STUDIES
2015-16

19 MARCH 2015

**BOARD OF STUDIES
DEPARTMENT OF PHYSICS
RESOLUTIONS OF THE BOARD FOR THE YEAR 2015-16**

The Board of Studies of Department of Physics of Government College [A], Rajahmundry has met in the e-class room of the Department at 10: 30 AM on 19 March 2015. The meeting was chaired by the Incharge of the Department Sri B.V. Tirupanyam.




The following members attended and took part actively in the deliberations

S.No	Name and Address	Designation	Signature
1	<i>Sri C. Satyanarayana</i> Lecturer in Physics S.K.V.T. College, Rajahmundry	University nominee	
2	<i>Sri S. S.R. Murthy</i> Lecturer in Physics Ideal College, Kakinada	Subject Expert	
3	<i>Dr. K. Jyothi</i> Government College [A], Rajahmundry	Member	
4	<i>Sri Valluru Srinivasa Rao,</i> Lecturer in Physics, Government College [A], Rajahmundry	Member	
5	<i>Sri Vobhilineni Srinivasa Rao</i> Lecturer in Physics, Government College [A], Rajahmundry	Member	
6	<i>Sri P.V.L. Narayana</i> Lecturer in Physics, Government College [A], Rajahmundry	Member	
7	<i>Sri K. Srinivasa Rao,</i> Lecturer in Physics, Government College [A], Rajahmundry	Member	

Board of Studies

Dept. of Physics

Govt. College [A], Rajahmundry

8	Sri T.K. Visweswara Rao Lecturer in Physics, Government College [A], Rajahmundry	Member	
9	Sri T.Y.H.A.G Gandhi Lecturer in Physics, Government College [A], Rajahmundry	Member	
10	Dr. K. Ramachandra Rao Lecturer in Physics, Government College [A], Rajahmundry	Member	
11	Student	Member	
12	Student	Member	
13	Student	Member	


CHAIRMAN
BOARD OF STUDIES IN PHYSICS

CHAIRMAN
BOARD OF STUDIES IN PHYSICS

Resolutions adopted

1. It is resolved to continue the Modular and CBCS introduced during the academic year 2014-15.
2. It is resolved to accept the modifications suggested by the Chairman, nominees and members to the tune of 20-30% in each module for all three years.
3. It is resolved to modify the I B.Sc question paper pattern in the following manner.

Section	No.of questions	No.of questions to be answered	No.of marks
A [Essay type questions]	Six questions covering all the chapters without internal choice. (Q.Nos:1-6)	Four questions are to be answered out of six given.	4x10 = 40
B [Problems @5 marks per problem]	Six problems covering all the chapters. (Q.Nos:7-12)	Four problems are to be solved out of given six problems	4X5 = 20
C [Short answer questions @3 marks per question]	Eight questions covering all the chapters.	Five questions are to be answered out of eight questions given.	5x3 = 15
TOTAL			75

4. It is resolved to incorporate Kinematics of moving fluids, equation of continuity, Euler's equation, Bernoulli's theorem, applications and delete the chapter entitled "the mechanics of continuous media" as it is being offered in the Intermediate education. Further the topic - four vector formalism was deleted from the chapter Special theory of relativity.
5. It is resolved to offer Interdisciplinary paper entitled "Household electrical wiring" in the IV semester with 40 Marks for theory and 10 Marks for practical examination. It is further resolved to allocate 45 classes for theory and 20 classes for practical training.

6. It is resolved to approve the modified syllabi for II and III B.Sc courses for all semesters and related prescribed text books besides reference books.
7. It is resolved to approve the topics added under additional input component for advanced students of II and III B.Sc students on non-credit basis in all semesters.
8. It is resolved to continue the existing question paper pattern for III-VI semesters.
9. It is resolved to approve the list of examiners and paper setters for the year 2015-16.
10. It is resolved to continue the existing scheme of valuation for practical examinations being conducted at the end of even semesters- i.e., end a maximum of 75 marks for External examination and 25 marks for Internal examination.
11. It is resolved to introduce a new undergraduate programme - B.Sc (Mathematics, Physics and Statistics) as most of the stakeholders are evincing interest in the said course due to its potentiality in providing employment opportunities.
12. It is resolved to offer certificate course in Motor Mechanism in the academic year 2015-16.
13. It is resolved to organize one National seminar on “ Synthesis and Characterization of thin films”; One National workshop on Synthesis and Characterization of Photovoltaic Cells (Soalar cells) and an educational tour to SDSC-SHAR, Sriharikota during 2015-16.

University nominee

Subject expert

Chairman,
Board Of Studies

GOVERNMENT COLLEGE (A):: RAJAHMUNDRY
Department of Physics

I B.Sc syllabus:: MODULE-I [MECHANICS]
SEMESTER-I

(As Approved in the BOS meeting held on 19 March 2015 for 2015-16)

UNIT-I

Chapter I: Vector Analysis

Scalar and vector fields. Divergence and curl of a vector field and related problems. *Vector integration*: Line, Surface and Volume integrals. Stokes theorem, Gauss theorem and Green's theorem and their Simple applications.

Chapter II: Mechanics of Particles

Newton's laws of motion and applications, Motion of variable mass system, motion of a rocket' Multi-stage rocket- Conservation of energy - Conservation of momentum- Collisions: Collisions in two dimensions, Collisions in three dimensions- Rutherford scattering: Concept of impact parameter, Scattering cross-section.

Chapter III: Mechanics of rigid bodies

Definition of Rigid body, Rotational kinematics relations, Equation of motion for a rotating body, Angular momentum, Inertial tensor. Euler's equation, Precession of a top, Gyroscope, precession of the equinoxes.

UNIT-II

Chapter IV: Kinematics of moving fluids

Equation of continuity, Euler's equation, Bernoulli's theorem, applications

Chapter V: Central forces

Central forces - definition and examples , Conservative nature of central forces ,Conservative force as a negative gradient of potential energy ,Radial and centripetal acceleration in polar coordinates. 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

Chapter VI: Special theory of relativity

Galilean relativity, Absolute frames, Michelson-Morley experiment, Postulates of special theory of relativity - Lorentz transformations, Time dilation, Length contraction, Variation of mass with velocity, addition of velocities, mass and energy relation

NOTE: Numerical Problems are to be solved at the end of every chapter in all chapters

Text Books & References

1. Berkeley Physics Course. Vol 1. Mechanics by Kittle W Knight, M.A.Ruderman- Tata-McGraw Hill Company Edition 2008
2. Fundamentals of Physics Halliday/Resnick/Walker Wiley India Edition 2007.
3. Waves and Oscillations by S.Badami, V.Balasubramanian and K.Rama Reddy Orient Longman
4. First Year Physics - Telugu Academy.
5. Mechanics of Particles, Waves and Oscillations. Anwar Kamal, New Age International
6. College Physics-1 by T.Bhimasankaram and G. Prasad. Himalaya Publishing House.
7. Introduction to Physics for Scientists and Engineers. F.J.Ruche. McGraw Hill.
8. Waves and Oscillations. N.Subramanaian and Brijlal Vikas Publishing House Private Limited

GOVERNMENT COLLEGE [A]:: RAJAHMUNDRY
DEPARTMENT OF PHYSICS
EVALUATION SCHEME &

MODEL OF SEMESTER END EXAMINATION QUESTION PAPER [THEORY]
 MODULE I (MECHANICS) :: (SEMESTER I)
 (As Approved in the BOS meeting held on 19 March 2015 for 2015-16).

EVALUATION SCHEME

Examination	No.of Marks	Remarks
Semester end examination	75	Model of examination pattern furnished below
Internal examination	25	Written examination : 10 Viva-voce : 5 Seminar : 5 Assignment : 5

MODEL OF SEMESTER END EXAMINATION QUESTION PAPER [THEORY]

Section	No.of questions	No.of questions to be answered	No.of marks
A [Essay type questions]	Six questions covering all the chapters without internal choice. (Q.Nos:1-6)	Four questions are to be answered out of six given.	4x10 = 40
B [Problems @5 marks per problem]	Six problems covering all the chapters. (Q.Nos:7-12)	Four problems are to be solved out of given six problems	4X5 = 20
C [Short answer questions @3 marks per question]	Eight questions covering all the chapters.	Five questions are to be answered out of eight questions given.	5x3 = 15
TOTAL			75

GOVERNMENT COLLEGE (A):: RAJAHMUNDRY
 Department of Physics
 I B.Sc syllabus:: MODULE-II [WAVES & OSCILLATIONS]
SEMESTER-II

(As Approved in the BOS meeting held on 19 March 2015 for 2015-16)

UNIT-I

Chapter I:

Fundamentals of vibrations, Simple harmonic oscillator and solution of the differential equation. Physical characteristics of SHM . Phase velocity and group velocity'. Combination of two mutually perpendicular simple harmonic vibrations of same frequency. Combination of two mutually perpendicular simple harmonic Vibrations with different frequencies Lissajous figures

Chapter II:

Damped and forced Oscillations Damped harmonic oscillator Solution of the differential equation of damped oscillator. Energy considerations Comparison with undamped harmonic oscillator, Logarithmic decrement, quality factor differential equation of forced oscillator and its solution Amplitude resonance Velocity resonance.

UNIT-II

Chapter III:

Complex vibrations Fourier theorem Evaluation of the Fourier Coefficients. Analysis of periodic wave functions - Square wave, Triangular wave , Saw-tooth wave.

Chapter IV:

Vibrating Strings, Transverse wave propagation along a stretched string, General solution of wave equation for a stretched string and its significance velocity of a transverse wave along a stretched string. Modes of Vibration of stretched string, clamped at both the ends, Overtones, Energy transport in strings, Transverse impedance.

Chapter V:

Ultrasonics. Production of Ultrasonics, Properties of ultrasonic waves , Production of ultrasonics by piezoelectric method and by magnetostriction method .Detection of ultrasonic waves Determination of wavelength of ultrasonic waves. Measurement of Velocity of ultrasonic waves in liquids. Applications of ultrasonic waves

Chapter VI:

Gravitation: Definition for gravitational potential and .variation of gravitational potential different cases.

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**
4. **An Introduction to Mechanics** by Daniel Kleppner & Robert Kolenkow. The McGraw Hill Companies.
5. **Mechanics** by Hans & Puri. TMH Publications.
6. **Engineering Physics** by R.K.Gaur & S.L.Gupta. Dhanpat Rai Publications.

GOVERNMENT COLLEGE [A]:: RAJAHMUNDRY
DEPARTMENT OF PHYSICS
MODULE-II

ADDITIONAL INPUT

TOPICS IN THE UNIVERSITY SYLLABUS	ADDITIONAL TOPICS INCLUDED UNDER AUTONOMOUS SETUP
1. Fundamentals of vibrations 2. The damped and forced oscillations 3. Complex vibrations 4. Vibrating strings 5. Ultrasonics	6. Seismology - Seismographs - vertical pendulum, horizontal pendulum, determination of epi centre and the focus - Modern applications of seismograph

MODEL OF SEMESTER END EXAMINATION QUESTION PAPER [THEORY]
 MODULE II [WAVES & OSCILLATIONS]
 (As Approved in the BOS meeting held on 19 March 2015 for 2015-16)

EVALUATION SCHEME

Examination	No.of Marks	Remarks
Semester end examination	75	Model of examination pattern furnished below
Internal examination	25	Written examination : 10 Viva-voce : 5 Seminar : 5 Assignment : 5

MODEL OF SEMESTER END EXAMINATION QUESTION PAPER [THEORY]

Section	No.of questions	No.of questions to be answered	No.of marks
A [Essay type questions]	Six questions covering all the chapters without internal choice. (Q.Nos:1-6)	Four questions are to be answered out of six given.	$4 \times 10 = 40$
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C [Short answer questions @3 marks per question]	Eight questions covering all the chapters.	Five questions are to be answered out of eight questions given.	$5 \times 3 = 15$
TOTAL			75

GOVERNMENT COLLEGE (A) :: RAJAHMUNDRY
Department of Physics
PRACTICAL MODULE - I (I B.Sc)
LIST OF EXPERIMENTS
&
SCHEME OF PRACTICAL EXAMINATION
(To be conducted at the end of II semester)

LIST OF EXPERIMENTS

1. Calculation of errors in calculation of acceleration due to gravity by simple pendulum
2. Calculation of acceleration due to gravity using compound pendulum
3. Calculation of Moment of Inertia of Fly wheel
4. Calculation of Moment of Inertial of Bifilar pendulum
5. Verification of laws of transverse vibrations of strings using Sonometer
6. Calculation of Viscosity of liquid using Poisselles method
7. Verification of the relation between volume of air and its resonating frequency resonator.
8. Calculation of Young's Modulus by Uniform bending method
9. Calculation of Rigidity of Modulus of wire using Torsional pendulum
10. Calculation of surface tension of water
11. Calculation of Young's Modulus by Non-uniform bending method
12. Calculation of viscosity of highly viscous liquids by Searl's viscometer
13. Melde's experiment - Determination of frequency
14. Sonometer - Verification of laws of stretched string
15. Lissajous figures using CRO (demonstration expt.)

SCHEME OF EVALUATION FOR PRACTICAL EXAMINATION

Internal Examination	External Examination		Remarks	
25		Formula	10	
		Tabular form & Readings	20	
		Calculation & Result (Including Graphys)	20	
		Units & Precautions	05	
		Viva-voce	10	
	75 Marks	Record	10	<ul style="list-style-type: none"> • 10 Marks for 10 practicals and above • 08 marks for upto 9 practicals • 06 marks upto 7 practicals • 05 marks upto 5 practical • NIL marks for less than 5 practicals

GOVERNMENT COLLEGE (A): RAJAHMUNDRY
DEPARTMENT OF PHYSICS
SYLLABUS FOR II B.Sc., PHYSICS (w.e.f. 2015-16)
MODULE-III [OPTICS]

SEMESTER III
(As Approved in the BOS meeting held on 19 March 2015 for 2015-16)

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

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

2. Interference: (15)

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

Interference by division of wave front: Introduction and basics of Biprism.(Qualitative treatment only), 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.

3. Diffraction: (10)

Introduction - Distinction between Fresnel and Fraunhofer's diffraction

Fraunhofer's diffraction:-

Diffraction due to single slit- Fraunhofer's diffraction due to double slit - Fraunhofer's 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.

4 Polarization (10)

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 (Huygens's explanation) - Quarter wave plate, Half wave plate - Babinet's compensator - Optical activity, analysis of light by Laurent's half shade polarimeter.

5. Laser: (6)

Lasers: Introduction – Spontaneous emission – Stimulated emission – Population inversion. Laser principle – Einstein coefficients – Types of Lasers – Components of LASER- He-Ne laser – Ruby laser – Applications of lasers- Laser welding, Laser cutting, hole drilling, LADAR, Diffraction of laser beam, Determination of wavelength.

6. Fiber Optics and Holography(6)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.

7.Principles of Photography (5)

8.Aberrations and minimization (**additional input**)

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 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 Prasad. *S. Chand & Co.*
5. **Second Year Physics – Telugu Academy.**
6. **Modern Physics** by R. Murugesan and Kiruthiga Siva Prasad (for statistical Mechanics) *S. Chand & Co.*

Reference Books

1. **Modern Engineering Physics** by A.S. Vasudeva. *S.Chand & Co. Publications.*
2. **Feynman’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.**Lasers theory and applications** – K. Thyagarajan and A.K.Ghatak

DEPARTMENT OF PHYSICS
MODULE III :: SEMESTER III(PAPER II)
OPTICS.

EVALUATION SCHEME

Examination	No.of Marks	Remarks
Semester end examination	75	
Internal examination	25	Written examination : 10 Viva-voce : 5 Seminar : 5 Assignment : 5

PATTERN OF SEMESTER END THEORY EXAMINATION

Section	Description	Marks
A	Essay type questions- Four questions are to be asked with internal choice in each question (A or B). Student has to answer four questions choosing one (A or B) from each question. Each question carries 10 Marks	$4 \times 10 = 40$
B	Short answer type questions - Eight questions are to be asked. Student has to answer any five questions. Each question carries 3 Marks	$5 \times 3 = 15$
C	Very Short answer type questions - Ten questions are to be asked. Student has to answer all ten questions. Each question carries 2 Marks	$10 \times 2 = 20$
	TOTAL MARKS	75

GOVERNMENT COLLEGE (A):: RAJAHMUNDRY
DEPARTMENT OF PHYSICS
SYLLABUS FOR II B.Sc., PHYSICS (w.e.f.2015-16)
MODULE-IV [THERMODYNAMICS]
SEMESTER IV

(As Approved in the BOS meeting held on 19 March 2015 for 2015-16)

Unit - I

1. 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.

2. Thermodynamics: (12)

Introduction - Reversible and irreversible processes - Carnot's engine and its efficiency - Carnot's theorem - Second law of thermodynamics, Heat Engines, Diesel Engines, Auto Engines and calculation of their efficiency. 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-

3. 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.

Unit - II

4. 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. **Cryogenics - definitions and distinctions - Etymology - Industrial applications - Cryogenic processing - Fuels.**

5. Quantum theory of radiation: (10)

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

6. 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, Weans Displacement, Stefan's Boltzmann's law from Planck's formula.

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

Textbooks

- 1. Second Year Physics** - *Telugu Academy*
- 2. Fundamentals of Physics.** Halliday/Resnick/Walker.C. *Wiley India Edition 2007*

Reference Books

- 3. Modern Physics** by R. Murugesan and Kiruthiga Siva Prasad (for statistical Mechanics), *S. Chand & Co.*
- 4. Modern Physics** by G. Aruldas and P. Rajagopal, *Eastern Economy Education.* Berkeley Physics Course. Volume-5.
- 5. Statistical Physics** by F. Reif. *The McGraw-Hill Companies.*
- 6. An Introduction to Thermal Physics** by Daniel V. Schroeder. *Pearson Education Low Price Edition.*
- 7. Thermodynamics** by R.C. Srivastava, Subit K. Saha & Abhay K. *Jain Eastern Economy Edition.*

DEPARTMENT OF PHYSICS
MODULE IV :: SEMESTER IV(PAPER II)
THERMODYNAMICS.

EVALUATION SCHEME

Examination	No.of Marks	Remarks
Semester end examination	75	
Internal examination	25	Written examination : 10 Viva-voce : 5 Seminar : 5 Assignment : 5

PATTERN OF SEMESTER END THEORY EXAMINATION

Section	Description	Marks
A	Essay type questions- Four questions are to be asked with internal choice in each question (A or B). Student has to answer four questions choosing one (A or B) from each question. Each question carries 10 Marks	$4 \times 10 = 40$
B	Short answer type questions - Eight questions are to be asked. Student has to answer any five questions. Each question carries 3 Marks	$5 \times 3 = 15$
C	Very Short answer type questions - Ten questions are to be asked. Student has to answer all ten questions. Each question carries 2 Marks	$10 \times 2 = 20$
	TOTAL MARKS	75

GOVERNMENT COLLEGE (A):: RAJAHMUNDRY

Department of Physics
PRACTICAL MODULE - II (II B.Sc)
LIST OF EXPERIMENTS
&
SCHEME OF PRACTICAL EXAMINATION
(To be conducted at the end of IV semester)

- Co-efficient of thermal conductivity of a bad conductor-Lee's method
2. Heating efficiency of a electrical kettle with varying voltages
 3. Thickness of a wire - wedge method
 4. Determination of wavelength of light - Fresnel's biprism
 5. Determination of radius of curvature of given convex lens - Newton's rings
 6. Determination of wavelength of light - diffraction at thin wire
 7. Resolving power of grating
 8. Determination of mean diameter of Lycopodium powder (Diffraction)
 9. Study of optical rotation Polarimeter
 10. Dispersive power of a prism
 11. Determination of wavelength of light using diffraction grating minimum deviation method
 12. Pulrich diffraction determination of refractive index of a liquid
 13. Wavelength of light using diffraction grating -normal incidence method
 14. I-d curve using spectrometer
 15. Resolving power of a telescope
 16. Refractive index of liquid and glass
 17. Wavelength of a laser using diffraction grating
 18. Stefan's constant
 19. Carey-Foster's bridge - Temperature coefficient of a resistance

* It is mandatory to carry out atleast 10 experiments of the listed above.

SCHEME OF EVALUATION FOR PRACTICAL EXAMINATION

Internal Examination	External Examination		Remarks	
25 Marks	75 Marks	Formula	10	
		Tabular form & Readings	20	
		Calculation & Result (Including Graphys)	20	
		Units & Precautions	05	
		Viva-voce	10	
		Record	10	<ul style="list-style-type: none"> • 10 Marks for 10 practicals and above • 08 marks for upto 9 practicals • 06 marks upto 7 practicals • 05 marks upto 5 practical • NIL marks for less than 5 practicals

GOVERNMENT COLLEGE (A), RAJAHMUNDRY.

DEPARTMENT OF PHYSICS
PAPER - II (SEMESTERS III & IV)
Changes in Syllabus under Autonomy setup

<i>S.No</i>	<i>Paper</i>	<i>Topics deleted</i>	<i>Topics included</i>	<i>justification</i>
1	OPTICS (SEMESTER III)		Applications of LASERS 1.Laser cutting - 2.Lasertwelding - 3.Hole drilling- 4.Lidar	Applications of Lasers are more useful in industry
2	HEAT AND THERMODYNAMICS (SEMESTER IV)		Heat Engines, Diesel Engine, Auto Engine and calculation of their efficiency Cryogenics - Definitions and distinctions - Etymology - Industrial applications - Cryogenic processing - Fuels	Engines have more prominence in the industrial world Cryogenics plays an important role in Low Temperature Physics

**GOVERNMENT COLLEGE (A):: RAJAHMUNDRY.
DEPARTMENT OF PHYSICS
INTERDISCIPLINARY PAPER IN IV-SEMISTER**

**Household Electrical wiring
Syllabus**

S . No	Name Of The Unit	No Of Periods	Short Answers Questions	Essay Type Questions
1	1.0 Wiring accessories 1.1 Types of Wires 1.2 Types of Switches 1.3 Other accessories like lamp holders ceiling roses, sockets , fuses, etc.(Detailed Study) 1.4 Main boards, Distribution boards Switch Boards 1.5 Fuses and Fuse materials 1.6 MCB & CBs	10	1	1
2	2.0 Wiring Tools and Wire Joints 2.1 Wiring Tools 2.2 Wire Joints 2.3 Soldering, Taping and Termination of Wires/Joints.	5	1	1
3	3.0 Wiring Systems and Types of House Wiring 3.1 Looping System and Ring System 3.2 Ring System and Distribution Box System- Selection of Particular System of Wiring 3.3 Types of House Wiring - Cleat Wiring, CTS/TRS Wiring, Conduit Wiring, Casing, Capping Wiring - Detailed Study. 3.4 Comparison between different wiring methods	10	1	1

4	4.0 Wiring Circuits 4.1 Simple Lamp circuits and Bed room lighting circuits 4.2 Stair case wiring , series and parallel circuits 4.3 Master Switch circuits , Corridor wiring circuits 4.4 Fluorescent tube light circuit , flashers, moving lights and sodium vapour and mercury vapour lamp circuits 4.5 Selection of Number of sub circuits and selection of wires/cables.	10	1	1
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5	5.0 Earthing 5.1 Necessity if earthing - definitions of fundamental terms in earthing like earth , earth lead , earth electrode, earth wire etc. 5.2 Types of earthing- Detailed study of pipe earthing Strip earthing and plate earthing. 5.3 Specifications of materials using for earthing 5.4 Measurement of earth resistance.	5		1
6	6.0 Safety precautions and IE rules of wiring 6.1 Precautions in	5	2	

	Handling tools 6.2 Electric Shock – First aid on electric shock 6.3 Precautions to be observed while installing different electric appliances in houses 6.4 I E Rules regarding house wiring			
	Total	45	6	5

REFERENCE BOOKS

1. Electrical Technology -BL Theraja, Chand Publishers ,New Dehli.
2. Electrical Technology, ELBS Publications – EDWARD.
3. Electrical Wiring and Industrial and Domestic Wiring , New Heights , New Delhi
Arora and B . Das
4. House Wiring Practice- T. B. Biht .
5. Relevant IE Rules ans BIS Specifications .
6. Home appliance servicing AUDELS , D.B. Taraporewala and Sons Company co .PTV
LTD-Adwin P. Anderson.

MODEL QUESTION PAPER

**GOVERNMENT COLLEGE (A), COLLEGE RAJAHMUNDRY.
DEPARTMENT OF PHYSICS
INTER DISCIPLINARY ELECTIVE IN IV-SEMESTER
Household Electrical wiring**

Time:1 ½ hrs

Max.Marks:40

SECTION-A

(I). ANSWER **ANY FOUR** OF THE FOLLOWING QUESTIONS. 4 X 5=20.

1. Write any four accessories in House wiring.
2. What are the types of house wiring?
3. Name any four tools used in House wiring?
4. What are the parts in fluorescent tube light?
5. Write the precautions while handling tools?
6. Name IE Rules in House wiring tools

SECTION-B

II. ANSWER **ANY TWO** OF THE FOLLOWING QUESTIONS. 2X 10=20.

7. (a). What are the types of earthing?
(b). Explain pipe earth with neat sketch?
8. Explain Stair case wiring with a neat sketch?
9. (a). Explain types of Switches?
(b). what is fuse? Mention its applications?
10. (a) Name the types of wires used in House wiring?
(b). Explain "T" joint with a neat sketch?

GOVERNMENT COLLEGE (A): RAJAHMUNDRY
DEPARTMENT OF PHYSICS
SYLLABUS FOR III B.Sc., PHYSICS (w.e.f.2015-16)
SEMESTER V - PAPER - III
Electricity & Electromagnetism
(As Approved in the BOS meeting held on 19 March 2015 for 2015-16)

- 1. Electrostatics** (9 Periods): Gauss Law and its applications – Electric field due to an infinite conducting sheet of charge, Uniformly charged sphere and charged cylindrical conductor. Mechanical force on a charged conductor. Electric potential – potential due to charge spherical conductor and Electric dipole – an infinite line of charge. Potential of a uniformly charged circular disc.
- 2. Dielectrics** (5 Periods): An atomic view – potential energy of a dipole in an electric field – polarization and charge density – dielectrics and Gauss’s Law – Relation between D,E and P. Dielectric constant and susceptibility.
- 3. Capacitance** (9 Periods): Capacity of concentric spheres and cylindrical condenser – capacity of parallel plate condenser with and without dielectric – electric energy stored by a charged condenser. **Force between plates of condenser. Attracted disc electrometer- construction and working only.**
- 4. Magnetostatics** (6 Periods): Magnetic shell – potential due to magnetic shell – field due to magnetic shell – equivalent of electric circuit and magnetic shell – application of field due to magnetic shell – magnetic induction (B) and field (H) – permeability and susceptibility – Hysteresis loop.
- 5. Moving charge in electric and magnetic fields** (7 Periods): Hall effect – derivation of hall coefficient – applications – cyclotron, synchrocyclotron and synchrotron –and its applications – force on a current carrying conductor – force and torque on current loop – Biot – Savert’s Law and calculation of B due to long straight wire, circular current loop and solenoid.
- 6. Electromagnetic Induction** (9 Periods): Faraday’s Law – Lenz’s Law – expression for induced emf – electromotive force – time varying magnetic fields – betatron – ballistic galvanometer – theory – damping correction – self and mutual

7. inductance - coefficient of coupling - calculation self inductance of a long solenoid - toroid - energy stored in magnet field. **Transformers** (basics only)
NOTE Problems should be solved at the end of every chapter of all units

Reference Books:

- | | |
|--|---------------------------|
| 1. Physics Vol - III | Halliday and Resnik |
| 2. Electricity | Berkeley physics series |
| 3. Electricity and Electronics | Tayal |
| 4. Electricity and Magnetism | Brijlal and Subrahmanyam |
| 5. Electricity and Magnetism | C. J. Smith |
| 6. Electricity and Magnetism | C. J. Smith and Rangawala |
| 7. Electricity and Magnetism
With Electronics | K. K. Tewari (R. Chand) |
| 8. Third year Physics | Telugu Academy |

DEPARTMENT OF PHYSICS
ADDITIONAL INPUTS

CLASS : III B.Sc
SEMESTER : V
PAPER : III
TITLE OF THE PAPER : ELECTRICITY AND MAGNETISM

TOPICS IN THE UNIVERSITY SYLLABUS	ADDITIONAL TOPICS INCLUDED UNDER AUTONOMOUS SET UP
<ol style="list-style-type: none">1. Electrostatics2. Dielectrics3. Capacitance4. Magnetostatics5. Moving charge in electric and magnetic fields6. Electromagnetic induction	<ol style="list-style-type: none">4. Magnetostatics Determination of constant of BG condenser method.5.C language programming - Constants variables, syntax, for loop, while - do loop and simple programming

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DEPARTMENT OF PHYSICS

SEMESTER V (PAPER III)
Electricity & Electromagnetism
EVALUATION SCHEME

Examination	No.of Marks	Remarks
Semester end examination	75	
Internal examination	25	Written examination: 15 Viva-voce : 10

PATTERN OF SEMESTER END THEORY EXAMINATION

Section	Description	Marks
A	Essay type questions- Four questions are to be asked with internal choice in each question (A or B). Student has to answer four questions choosing one (A or B) from each question. Each question carries 10 Marks	$4 \times 10 = 40$
B	Short answer type questions - Eight questions are to be asked. Student has to answer any five questions. Each question carries 3 Marks	$5 \times 3 = 15$
C	Very Short answer type questions - Ten questions are to be asked. Student has to answer all ten questions. Each question carries 2 Marks	$10 \times 2 = 20$
	TOTAL MARKS	75

GOVERNMENT COLLEGE (AUTONOMOUS) : : RAJAHMUNDRY
DEPARTMENT OF PHYSICS

V SEMESTER End Examinations
III B. Sc PHYSICS PAPER - III
MODEL QUESTION PAPER

ELECTRICITY AND ELECTROMAGNETISM

Time : 3 Hrs

Max Marks : 75

SECTION - A

Answer ALL Questions

(4 X 10 = 40)

1. Using Gauss's Law. Derive expressions for intensity of electric field due to a uniformly charged cylinder at a point outside, on the surface and inside the cylinder.

OR

What is electric dipole? Derive an expression for the electric potential due to an electric dipole.

2. State and Deduce Gauss's Law as applied to a dielectric medium.

OR

Derive an expression for the capacity of a spherical condenser.

3. Establish the equivalence between a magnetic shell and a current circuit. State Ampere's theorem.

OR

Derive the expression for magnetic induction due to long straight conductor carrying current.

4. Explain the construction of a ballistic galvanometer and give the theory of it.

OR

Derive an expression for the coefficient of self induction of a long solenoid.

SECTION - B (5 X 3 = 15)

Answer ANY FIVE Questions of the following

5. Discuss the atomic view dielectrics.
6. What is hysteresis? Explain the terms residual magnetism and coercive force
7. Describe the working of a synchrocyclotron.
8. Explain the Principle of a Transformer.
9. The permittivity of diamond is $1.46 \times 10^{-10} \text{ C}^2 / \text{N} - \text{m}^2$. Compute the dielectric constant and the electric susceptibility of diamond $\epsilon_0 = 8.92 \times 10^{-12} \text{ C}^2 / \text{N} - \text{m}^2$.

10. Calculate the force of attraction between the two plates of an electrometer when a potential difference of 500V is applied between them. The distance between the plates is 25×10^{-4} m and the area of each plate = 10^{-3} m²
11. If the frequency of one oscillator potential applied to the dees of a cyclotron is 9 MHz What must be the magnetic flux density B to accelerate α - particles (Mass of α - particles = $6 \times 643 \times 10^{-27}$ kg charge of α - particles = $2 \times 1.6 \times 10^{-19}$ C).
12. Calculate the self inductance of an air cored toroid of mean radius 20 cm and a circular cross section of area 5 cm². The total number of turns on the toroid is 3000.

SECTION - C (10 X 2 = 20)

Answer ALL Questions

13. State Gauss's Law in Electrostatics.
14. State the boundary conditions at the dielectric surface.
15. Define electric displacement vector and polarization.
16. What is the principle of attracted disc electrometer (Or) Kelvin absolute electrometer?
17. Write an expression for the capacitance of cylindrical capacitor.
18. What is a magnetic shell?
19. Define magnetic permeability and susceptibility.
20. What is Hall Effect? What is its importance?
21. State Faraday's Law and Lenz's Law.
22. Define the terms self inductance and mutual inductance.

DEPARTMENT OF PHYSICS
SYLLABUS FOR III B.Sc., PHYSICS (w.e.f.2015-16)
SEMESTER VI - PAPER - III
ELECTROMAGNETIC WAVE THEORY & ELECTRONICS
(As Approved in the BOS meeting held on 19 March 2015 for 2015-16)

1. **Varying and Alternating currents** (11 Periods): CR circuits -LR circuits - Growth and decay of currents. Alternating current, relation between current and voltage in pure RC and L-Vector diagrams. LCR circuit power factor series and parallel resonant circuit-Q factor.
2. **Maxwell's equations and electromagnetic waves** (10 Periods): A review of basic laws of electricity and magnetism - displacement current - Maxwell's equation in differential form. Maxwell's wave equation. Plane electromagnetic waves- Transverse nature of electromagnetic waves, Poynting theorem, production of electromagnetic waves(Hertz experiment)
3. **Semi-Conductor devices** (13 Periods): P-N Junction diode, Zener diode, Half wave and Full wave rectifiers and filter, ripple factor (quantitative) -PNP AND NPN transistors. Current components CB,CE,CC configurations, Transistor hybrid parameters- determination of hybrid parameters from transistor characterization- transistor as an amplifier - concept of negative feed back and positive feed back Barkhausen condition, phase shift oscillator (qualitative)
4. **Digital Principles** (8 periods): 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 and 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.
5. **Network theorems (5 periods)**
Superposition theorem- Thevenin's theorem - Norton's theorem - Maximum power transfer theorem.

NOTE: problems should be solved from every chapter of all units

REFERENCE BOOKS:

- | | |
|------------------------------------|----------------------|
| 1. Physics Vol.III | Halliday and Resnik |
| 2. Electronic devices and circuits | Milliman and Halkies |
| 3. Electricity and Electronics | Taya |
| 4. Digital Electronics | Malvino |

5. Electricity Magnetism with Electronics
6. Third year Physics

K.K. Tewari(R.Chand)
Telugu Academi

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY
DEPARTMENT OF PHYSICS
ADDITIONAL INPUTS

CLASS : III B.Sc

SEMESTER : VI

PAPER : III

TITLE OF THE PAPER : EM THEORY AND ELECTRONICS

TOPICS IN THE UNIVERSITY SYLLABUS	ADDITIONAL TOPICS INCLUDED UNDER AUTONOMOUS SET UP
<ol style="list-style-type: none">1. Varying and alternating currents2. Maxwell' equations and Electromagnetic waves3. Semi - conductor devices4. Digital principles	<ol style="list-style-type: none">5. Alternating currents: Principles of AC and DC generators and motors6. Digital communications: Fundaments of data communication system. Emergence of data communication system Characteristics of Data transmission circuits. Digital codes error detection and correction. Data sets and Interconnection requirements: Modem classification, modem interfacing Interconnection of data circuits to Telephone loops

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DEPARTMENT OF PHYSICS
SEMESTER VI(PAPER III)
ELECTROMAGNETIC WAVE THEORY & ELECTRONICS EVALUATION
SCHEME OF EVALUATION

Examination	No.of Marks	Remarks
Semester end examination	75	
Internal examination	25	Written examination: 15 Viva-voce : 10

PATTERN OF SEMESTER END THEORY EXAMINATION

Section	Description	Marks
A	Essay type questions- Four questions are to be asked with internal choice in each question (A or B). Student has to answer four questions choosing one (A or B) from each question. Each question carries 10 Marks	$4 \times 10 = 40$
B	Short answer type questions - Eight questions are to be asked. Student has to answer any five questions. Each question carries 3 Marks	$5 \times 3 = 15$
C	Very Short answer type questions - Ten questions are to be asked. Student has to answer all ten questions. Each question carries 2 Marks	$10 \times 2 = 20$
	TOTAL MARKS	75

GOVERNMENT COLLEGE (AUTONOMOUS) : RAJAHMUNDRY
(Accredited by NAAC "A" Grade)
III B.Sc
EXAMINATION AT THE END OF VI SEMESTER
PAPER III - (ELECTRICITY & ELECTROMAGNETISM)
MODEL PAPER

TIME: 3 HOURS

MAX MARKS: 75

SECTION A

ANSWER ALL QUESTIONS

4 X 10 = 40

1. Obtain an expression for the growth and decay of currents in an L-R circuit ?
OR
Deduce the relation between current and voltage in an AC circuit containing
(a) A pure resistance (b) A pure inductance and (c) A pure capacitance?
2. State and discuss the basic laws of electricity and magnetism in their integral form from these laws derive Maxwell's equations in the differential form?
OR
Show that the electromagnetic waves are transverse in nature?
3. Draw the circuit diagram of a full wave rectifier and explain its working .derive the expression for efficiency and ripple factor in the case of a full wave rectifier ?
OR
Explain the operation of a transistor as an amplifier? Explain feedback in amplifiers?
4. Draw an OR gate ?explain its functioning and the truth table for an OR Gate?
OR
State and prove Superposition theorem?

SECTION-B

Answer any **five** questions of the following

(5 X 3=15 MARKS)

5. What do you understand by power factor in an AC circuit? When it will be zero?
6. Describe HERTZ experiment for the production of electromagnetic waves?
7. Write briefly about the hybrid parameters?
8. Explain the functioning of a full adder along with respective truth tables?

9. A capacitance of 50 F and an inductance of 0.2025 Henry are connected in series if the resistance of the circuit is negligible. Find the frequency at which resonance occurs?
10. A Half wave rectifier supplies power to a 2K load. The input supply is 220Vrms. Neglecting forward resistance of the diode calculate (1)Vdc (2)Idc (3)Ripple voltage?
11. Find the binary equivalents of the following numbers expressed in decimal number system? (1) 0.5625 (2) 13 ?
12. Find the decimal equivalent of the following numbers expressed in binary number system (1) 1111 (2) 111001 ?

SECTION-C

Answer all questions

(10 X 2=20 MARKS)

13. What is Q factor?
14. Distinguish between series and parallel resonance?
15. What is meant by displacement current?
16. What is pointing vector?
17. Distinguish between intrinsic and extrinsic semiconductors?
18. Write Barkhausen condition?
19. What is continuity equation?
20. Draw the circuit diagram of transistor in the CE configuration?
21. Define NAND and NOR gates?
22. Draw the circuit diagram of Half adder?

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY
PHYSICS PRACTICALS
PAPER III

1. Figure of merit of a moving coil galvanometer.
2. Voltage sensitivity of a moving coil galvanometer.
3. RC Circuit (Frequency response).
4. LR Circuit (Frequency response)
5. LCR Circuit series and parallel resonance Q-factor.
6. Power factor of an A.C Circuit.
7. Determination of A.C frequency-Sonometer.
8. Design and construction of multimeter.
9. Construction of a model DC power supply.
10. Characteristics of a Junction Diode.
11. Characteristics of Transistor.
12. Characteristics of Zener Diode.
13. Verification of Kirchhoff's Laws.
14. Norton's theorem
15. Thevenin's theorem
16. Maximum power transfer theorem

* One has to complete a minimum of 10 experiments

SCHEME OF EVALUATION FOR PRACTICAL EXAMINATION

Internal Examination	External Examination			Remarks
25 Marks	75 Marks	Formula	10	
		Tabular form & Readings	20	
		Calculation & Result (Including Graphys)	20	
		Units & Precautions	05	
		Viva-voce	10	
		Record	10	<ul style="list-style-type: none"> • 10 Marks for 10 practicals and above • 08 marks for upto 9 practicals • 06 marks upto 7 practicals • 05 marks upto 5 practical • NIL marks for less than 5 practicals

GOVERNMENT COLLEGE (AUTONOMOUS) : RAJAHMUNDRY
(Accredited by NAAC "A" Grade)
TOPICS REMOVED / INCORPORATED IN III B.SC. PHYSICS PAPER - III

S.No	Paper	Topics removed	Topics incorporated	Justification	% of change
1	Physics Paper - III Sem - V		Electric energy stored by a charged condenser. Force between plates of condenser. Attracted disc electrometer-construction and working only.	To know the basic concepts of capacitor	15
2			Transformers	Extension to electromagnetic induction	
4	Physics Paper - III Sem - VI	Band theory of solids (qualitative) - Intrinsic and extrinsic semiconductors-continuity equation-	Network theorems: Superposition theorem- Thevenins theorem - Norton's theorem - Maximum power transfer theorem.	Band theory of solids was studied in Intermediate.	15
5	Paper - III practicals		Practicals included : Norton's theorem Thevinin's theorem	Practical knowledge	

			Maximum power transfer theorem		
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GOVERNMENT COLLEGE (A)::RAJAHMUNDRY
PHYSICS SYLLABUS (w.e.f 2015-16)
III B.Sc. - SEMESTER V
Paper IV-(Modern Physics, Quantum Mechanics)
(As Approved in the BOS meeting held on 19 March 2015 for 2015-16)

Unit - I

20 hrs

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. **Hydrogen spectrum, Fine structure and hyper fine structure** 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). **Spin-Orbit interaction-relativistic variation of mass-contribution to fine and hyper fine structure-qualitative treatment only**

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. **Rotational spectra of poly atomic molecules [Theory only]**

Unit - II: Quantum Mechanics

25Hrs.

Inadequacy of classical Physics: (Discussion only)

Compton's effect (quantitative) experimental verification. Stability of an atom - 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.

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.

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.

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 KiruthigaSiva Prasanth. S.Chand &Co.
4. Molecular Structure & Spectroscopy by G.Aruldas.Prentice Hall of India New Delhi.
5. Spectroscopy- Atomic and Molecular by Gurudeep R Chatwal and Shyam Anand-Himalaya Publishing House.
6. Third Year Physics – Telugu Academy.

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 Jain Eastern Economy Edition Prentice Hall of India.

**GOVERNMENT COLLEGE (AUTONOMOUS)
RAJAHMUNDRY**

**DEPARTMENT OF PHYSICS
ADDITIONAL INPUTS**

Class : III B.Sc

SEMESTER : V

PAPER : IV

TITLE OF THE PAPER : SPECTROSCOPY, SOLID STATE

PHYSICS AND

MODERN MAGNETISM

Topics in the University Syllabus	Additional Topics included under Autonomous setup
1. Molecular Physics 2. Solid State Physics 3. Modern Magnetism	Molecular quantum numbers - Molecular 1. orbitals - ground states of Hydrogen, Nitrogen and Oxygen. 2. Microwave Spectrum of Diatomic molecules.

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**DEPARTMENT OF PHYSICS
SEMESTER V(PAPER IV)
Nuclear Physics, Solid State Physics
SCHEME OF EVALUATION**

Examination	No.of Marks	Remarks
Semester end examination	75	
Internal examination	25	Written examination : 15 Viva-voce : 10

PATTERN OF SEMESTER END THEORY EXAMINATION

Section	Description	Marks
A	Essay type questions- Four questions are to be asked with internal choice in each question (A or B). Student has to answer four questions choosing one (A or B) from each question. Each question carries 10 Marks	$4 \times 10 = 40$
B	Short answer type questions - Eight questions are to be asked. Student has to answer any five questions. Each question carries 3 Marks	$5 \times 3 = 15$
C	Very Short answer type questions - Ten questions are to be asked. Student has to answer all ten questions. Each question carries 2 Marks	$10 \times 2 = 20$
	TOTAL MARKS	75

GOVERNMENT COLLEGE
(A)::RAJAHMUNDRY
DEPARTMENT OF PHYSICS

PHYSICS SYLLABUS (w.e.f ACADEMIC
YEAR 2015-16)

B.Sc. (Physics)
SEMESTER VI
Paper IV-(Nuclear Physics, Solid State Physics)

(As Approved in the BOS meeting held on 19 March 2015
for 2015-16)

Unit - III

20 hrs

Nuclear Physics

Nuclear Structure:

Basic properties of nucleus - Nucleus 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 - Nuttall law. Gamow's theory of alpha decay. Geiger - Nuttall law from Gamow's theory. Beta spectrum - neutrino hypothesis, Fermi's theory of β -decay (qualitative). **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 - IV

25 hrs

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, and 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.

Introduction to material characterisation techniques: characterisation techniques - XRD , SEM, ZETA potential, UV- VIS - qualitative only.

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: Langevin's theory of paramagnetism. Weiss' theory of ferromagnetism - Concepts of magnetic domains, ant ferromagnetism 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.

Reference books :-

1. Quantum mechanics-Mathews and Venkatesan
2. Introduction to Quantum mechanics -Pauling and Wilson.
3. Nuclear Physics -Tayal
4. Elements of modern physics -Patil.

5. Atomic and nuclear physics -T.A Little field as N.thorley
- 6.Quantum chemistry by Ira N.Levine (P.H.I)
7. Nuclear physics by somayajulu, varma, choudary
- 8.Organic spectroscopy - Kalsi, Pawe

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY
DEPARTMENT OF PHYSICS
ADDITIONAL INPUTS

CLASS : III B.Sc

SEMESTER : VI

PAPER : IV

TITLE OF THE PAPER : MODERN PHYSICS (QUANTUM MECHANICS, NUCLEAR PHYSICS)

Topics in the University syllabus	Additional topics included under Autonomous setup
1. photoelectric effect 2. Wave mechanics 3. Quantum mechanics 4. Nuclear Physics	5. Crystal structure (a) Reciprocal Lattice - Bragg's law in Fourier analysis, Fourier space (b) Reciprocal Lattice to bcc and fcc Lattices (c) Photons and Lattice vibrations - vibrations of mono lattice - Diatomic lattice - group velocity - phase velocity - Brillouin zone.

GOVERNMENT COLLEGE (AUTONOMOUS) : RAJAHMUNDRY
(Accredited by NAAC "A" Grade)

BOS 2015-16

Changes removed / incorporated in III B.Sc. Physics Paper - IV

S.No	Paper	Topics removed	Topics incorporated	Justification	% of change
1	IV Sem-v	Spectral radiation, Planck's law. Photoelectric effect, Einstein's photoelectric equation. Bohr's atomic theory. Limitations of old quantum theory.	Hydrogen spectrum, Fine structure and hyper fine structure. Spin-Orbit interaction- relativistic variation of mass-contribution to fine and hyper fine structure-qualitative treatment only. Rotational spectra of poly atomic molecules. (Theory only). Rotational spectra of poly atomic molecules[Theory only	The removed syllabus is covered in intermediate. Incorporated topics are extension.	20%
2	Sem- VI	Basic properties of nucleus - size, charge, mass, spin Magnetic properties of dia, para and ferromagnetic aterials	Introduction to charecterization techniques- qualitative only]		10

Government College(A) :: Rajahmundry

**DEPARTMENT OF PHYSICS
SEMESTER VI(PAPER IV)
Nuclear Physics, Solid State Physics
SCHEME OF EVALUATION**

Examination	No.of Marks	Remarks
Semester end examination	75	
Internal examination	25	Written examination : 15 Viva-voce : 10

PATTERN OF SEMESTER END THEORY EXAMINATION

Section	Description	Marks
A	Essay type questions- Four questions are to be asked with internal choice in each question (A or B). Student has to answer four questions choosing one (A or B) from each question. Each question carries 10 Marks	$4 \times 10 = 40$
B	Short answer type questions - Eight questions are to be asked. Student has to answer any five questions. Each question carries 3 Marks	$5 \times 3 = 15$
C	Very Short answer type questions - Ten questions are to be asked. Student has to answer all ten questions. Each question carries 2 Marks	$10 \times 2 = 20$
	TOTAL MARKS	75

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY
DEPARTMENT OF PHYSICS
LIST OF PRACTICALS IN PAPER IV

and
SCHEME OF EVALUATION

LIST OF PRACTICALS

1. e/m of an electron by Thomson's method.
2. Energy gap of a semiconductor using a Junction Diode.
3. Temperature Characteristics of Thermistors.
4. RC coupled amplifier.
5. Logic Gates (AND OR NOT & NAND) and Verification of Demorgan's theorem.
6. Verification of truth table of Half adder and full adder.
7. Phase shift oscillators.
8. Hysteresis curve of transformer core.
9. Determination of Plank's constant (Photocell).
10. Study of spectra of hydrogen spectrum (Rydberg constant)
11. Study of absorption of α and β rays.
12. Hall-Probe method for measurement of magnetic field.
13. Absorption spectrum of Iodine Vapor.
14. Study of alkaline earth spectra using a concave grating.
15. Draw the characteristics curve of Wein's Bridge.
16. Full wave rectifier Π and L type filters
17. FET characteristics.
18. G.M.counter

19. Experimental arrangement and obtaining of Raman spectra

* One has to complete a minimum of 10 experiments

SCHEME OF EVALUATION FOR PRACTICAL EXAMINATION

Internal Examination	External Examination		Remarks	
25 Marks	75 Marks	Formula	10	
		Tabular form & Readings	20	
		Calculation & Result (Including Graphys)	20	
		Units & Precautions	05	
		Viva-voce	10	
		Record	10	<ul style="list-style-type: none"> • 10 Marks for 10 practicals and above • 08 marks for upto 9 practicals • 06 marks upto 7 practicals • 05 marks upto 5 practical • NIL marks for less than 5 practicals

GOVERNMENT COLLEGE (AUTONOMOUS)::RAJAHMUNDRY
DEPARTMENT OF PHYSICS
 BOS:: 2015-16
LIST OF EXAMINERS & PAPER SETTERS

GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY
 DEPARTMENT OF PHYSICS

EXAMINERS LIST

SUB:PHYSICS

S.NO	CODE	EXAMINER NAME	PAPERS	D.O.B	SERVICE	COLLEGE		CI
1	202081	DR K BALARAJU	3,4		27	GOVT.CITY COLLEGE	HYDER	ABAD
2	202084	P.VENKATESWARAREDDY	2		21	GOVT.CITY COLLEGE	HYDER	ABAD
3	202041	N RANGAJI	2	27/9/1956	20	AMAL COLLEGE	ANAKA	PALL
4	202069	U.DHANAPATHI VARMA	1,3	28/2/1956	20	D.N.R.COLLEGE	BHIMA	VARA
5	202040	M.R.L.GOPAL	1,2	26/4/1957	19	AMAL COLLEGE	ANAKA	PALL
6	202013	A.S.N.MURTHY	2,4	15/9/1957	19	GBR COLLEGE	ANAPA	RTHI
7	202073	K.S.R.P.KUMAR JOHN	3,2	8/9/1958	16	SVKP COLLEGE	PENUG	ONDA
8	202091	S.VENKATARAJU	1,3	12/3/1961	15	D.N.R.COLLEGE	BHIMA	VARA
9	202111	P.V.SRINIVASARAO	1,2,3	1/7/1967	14	S.S.N.COLLEGE	NARSA	RAOP
10	202112	B.VENKATESWARARAO	ALL	15/8/1966	14	S.S.N.COLLEGE	NARSA	RAOP
11	202074	S.SRINIVASARAO	2,4	29/11/1962	13	SVKP COLLEGE	PENUG	ONDA
12	202087	DR.A.NIRMALA JYOSTHANA	1	8/12/1962	13	ST.THERESSA'S	ELURU	
13	302056	G.VENU GOPAL	ALL	26/5/1967	13	MRS.A.V.N.COLLEGE	VISAKH	APAT
14	302055	DR.S.SRINIVASARAO	ALL	4/8/1967	11	MRS.A.V.N.COLLEGE	VISAKH	APAT
15	202096	C.J.SOMARAJU	2	10/7/1967	10	D.N.R.COLLEGE	BHIMA	VARA
16	202022	N.VEERA KUMAR	2	5/3/1969	9	SRVBSJV MAHARANI	PEDDA	PURA
17	202107	P.SUBRAHMANYAM	ALL	5/7/1964	8	JBD COLLEGE	KAVAL	

		NAIDU					
18	202047	DR.SANTHA DEVI	ALL	1/8/1959	8	GOVT.DEGREE COLLEGE	ANANTHAPUR
19	202057	DR.B.V.H.N.SAINATH	1,2,3	15/5/1965	8	MRS.A.V.N.COLLEGE	VISAKHAPATNAM
20	202108	D.RAMAKRISHNA REDDY	3	1/9/1962	7	GOVT DEGREE COLLEGE	KARNATAKA
21	202023	S.RAMARAO	4	5/8/1972	7	SRVBSJV MAHARANI	PEDDAPURAM
22	202097	K.RAMAKRISHNA	ALL	30/8/1975	6	M.G.COLLEGE	ATREYAPURAM
23	202105	P.S.S.SRINIVAS	ALL	26/8/1973	6	GBR COLLEGE	ANAPARTHI
24	302046	M.RAVIKUMAR	ALL	7/3/1965	6	GOVT DEGREE COLLEGE	ANANTHAPUR
25	202092	M.SATYAVANI	1,2	9/6/1966	6	D.N.R.COLLEGE	BHIMAVARAM
26	302058	P.PRAMEELA	ALL	7/6/1972	5	MRS.A.V.N.COLLEGE	VISAKHAPATNAM
27	202101	B.V.R.K.MURTHY	ALL	31/8/1964	5	MAHARAJA'S	VIZIANAGAR
28	202082	DR.I.H.PRASAD	3		4	GOVT.CITY COLLEGE	HYDERABAD
29	202083	DR.B.KRISHNA SENKAR	1,2		4	GOVT.CITY COLLEGE	HYDERABAD
30	302041	R.CHANDRA SEK HAR	ALL	1/6/1970	4	SRVBSJV MAHARANI	PEDDAPURAM
31	202080	P.B.V.A.G.RAVI KIRAN		28/8/1978	3	SKSD MAHILA COLLEGE	TANUKU
32	202109	M.VENKATESWARARAO	4	18/8/1956	3	GOVT DEGREE COLLEGE	KARNATAKA
33	202113	CH.VIJAYA KUMARI	1,2,4	14/3/1975	3	SSN COLLEGE	NARSARAOPET
34	202106	SURIBABU	ALL	11/5/1976	3	GBR COLLEGE	ANAPARTHI
35	202114	A.SUBBARAO	1,2,3	23/5/1975	3	SSN COLLEGE	NARSARAOPET
36	202093	M.V.S.PRASAD	1,2	14/8/1977	2	D.N.R.COLLEGE	BHIMAVARAM
37	202094	N.UDAYASRI	1,2	4/6/1977	2	D.N.R.COLLEGE	BHIMAVARAM
38	202102	G.V.S.JAYAPALRAO	ALL	1/8/1966	2	MAHARAJA'S	VIZIANAGAR
39	202095	A.VEERAYYA	3	8/3/1976	2	D.N.R.COLLEGE	BHIMAVARAM
40	202003	P.SREEDEVI	ELE	18/12/1971	2	ST.THERESSA'S	ELURU
41	202004	K.SUNICYROSE	1,2,ELE	16/5/1975	1	ST.THERESSA'S	ELURU
42	202005	K.LALITHADEVI	1,2	1/6/1977	1	ST.THERESSA'S	ELURU
43	202006	K.SREELATHA	1,2	19/8/1974	1	ST.THERESSA'S	ELURU
44		G.NARAYANARAO	ALL			ASDW COLLEGE	KAKINADA
45		N.R.LEELAKRISHNA PRASAD	ALL			P.R.G.COLLEGE	KAKINADA
46		K.SREENIVASARAO	ALL			V.S.M.COLLEGE	RAMACHANDRAMPET
47		KRISHNA	ALL			SCIM GOVT COLLEGE	TANUKU
48		P.S.N.RAJU	ALL			P.R.G.COLLEGE	KAKINADA
49		P.S.BRAHMACHARI	ALL			P.R.G.COLLEGE	KAKINADA
50		D.VIJAYASREE	ALL			GOVT.DEGREE COLLEGE	MACHEERLA
51		SYAMALA	ALL			ASDW COLLEGE	KAKINADA
52		P.V.RAMANA	ALL			P.R.G.COLLEGE	KAKINADA

53	MEHAR	ALL		P.R.G.COLLEGE	KAKIN	DA
54	D.GANGADHARUDU	ALL		SRVBSJV MAHARANI	PEDDA	PURA
55	DR.GS.NARAYANARAO	ALL		VS KRISHNA COLLEGE	VISAKH	PAPAT
56	BHASKARAPRASAD	ALL		SRR COLLEGE	VIJAYA	WAD
57	A.V.RAMANAMURTHY	ALL		GOVT DEGREE COLLEGE	TANUK	J
58	A.K.SURYANARAYANA	ALL		IDEAL COLLEGE	KAKIN	DA
59	SUBBARAJU	ALL		KGRL COLLEGE	BHIMA	VARA
60	SATYANARAYANA RAJU	ALL		KGRL COLLEGE	BHIMA	VARA
61	VENKATESWARA RAO	ALL		CRR COLLEGE	ELURU	
62	DR A.R.S.KUMAR	ALL		Y.N.COLLEGE	NARAS	PUR
63	K.LAKSHMINARAYANA	ALL		Y.N.COLLEGE	NARAS	PUR

THE END
2 APRIL 2015