

**GOVERNMENT COLLEGE [A]::RAJAHMUNDRY**

**DEPARTMENT OF PHYSICS**

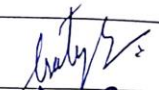


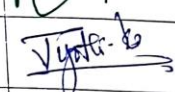
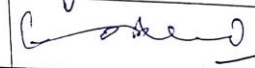
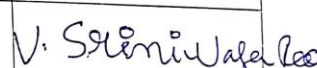
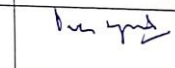
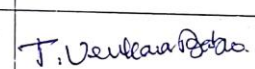
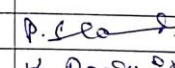
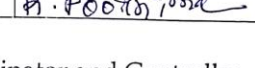
**BOARD OF STUDIES MEETING  
12 MAY 2014**

**GOVERNMENT COLLEGE (AUTONOMOUS); RAJAHMUNDRY**  
( Re-Accredited by NAAC with grade "A" )  
**DEPARTMENT OF PHYSICS**

BOARD OF STUDIES MEETING: 12 MAY 2014

**BOS MEMBERS: 2014-15**

The Board of Studies of Department of PHYSICS was convened on 12.05.2014 at 10-30 A.M. under the chairmanship of Sri B.V.Tirupanyam. The following members were present.

S.No	Name	Designation	Signature
1	Sri C.Satyanarayana	University Nominee	
2	Dr.M.V.K.Meher	Subject expert	
3	Sri. M.V.S.Krishna Prasad, AEE, Irrigation Dept. Rajahmundry	Subject expert (Industry)	
4	Dr.K.Jyothi	Staff member	
5	Sri Valluru Srinivasa Rao	Staff member	
6	Sri Vobhilineni Srinivasa Rao	Staff member	
	Sri P.V.L.N Narayana	Staff member	
7	T.Venkanna Babu, I B.Sc	Student	
8	P.Siva Kumar, I B.Sc.	Student	
9	K.Poornima, I B.Sc	Student	

The following documents are submitted to the Academic Coordinator and Controller of Examinations.

1. Resolutions of Board of Studies Meeting
2. Syllabi of I,II,III,IV,V,VI semesters
3. Model question papers of all semesters
4. Examiners list (Revised)
5. Any other new proposals

Date:12 May 2014

  
Chairman

**GOVERNMENT COLLEGE (AUTONOMOUS): RAJAHMUNDRY**  
*(Re-Accredited by NAAC with grade "A")*

**DEPARTMENT OF PHYSICS**

**BOARD OF STUDIES MEETING ON 12 May 2014**

**RESOLUTIONS:**

1. It is resolved to approve the introduction of Choice Based Credit System [CBCS] in from the academic year 2014-15 and I B.Sc course modular syllabus for I year B.Sc course and books prescribed for it.
2. It is resolved to introduce the General elective -namely "**Electrical technician course**" for II B.Sc students from the academic year 2015-16.
3. It is resolved to offer two advanced elective papers in semester V for III B.Sc students in place of paper IV from the academic year 2016-17 so as to enable the student to choose one of the two. The electives are 1. Modern Physics and Quantum Mechanics 2. Nanomaterials: Properties and Synthesis.
4. It is further resolved to offer two applied (Skill based) elective papers in semester VI for III B.Sc students in place of paper IV from the academic year 2016-17 so as to enable the student to choose one of the two. The elective papers are 1. Solid State Physics & Material Characterization techniques 2. Nuclear Physics and its medical applications.
5. It is resolved to approve the syllabi for II and III B.Sc course for all semesters and related prescribed books
6. It is resolved to approve the additional inputs for intelligent students of II and III B.Sc sstudents on non-creditable basis, for all the Semesters.
7. It is resolved to approve the model question papers for all semesters for a maximum of 75 marks and remaining 25 marks for internal assessment.
8. It is resolved to approve the list of examiners and paper setters for the academic year 2014-'15
9. It is resolved to approve the scheme of valuation for practical examination for all year- End practical examination for a maximum of 75 marks external, and 25 marks internal

**GOVERNMENT COLLEGE (AUTONOMOUS): RAJAHMUNDRY**  
(Re-Accredited by NAAC with grade "A")

**DEPARTMENT OF PHYSICS**

BOARD OF STUDIES MEETING ON 12 May 2014

**YEAR END PRACTICAL EXAMINATIONS**  
**B.Sc., PHYSICS**  
**SCHEME OF VALUATION**

S.No	Description	Marks
1	FORMULA	10
2	TABULAR FORM & READINGS	20
3	CALCULATIONS & RESULT (Including Graph)	20
4	PRECAUTIONS & UNITS	05
5	VIVA VOCE	10
6	RECORD**	10
	<b>TOTAL</b>	<b>75</b>
7	<b>Internal Practical Exam</b>	<b>25</b>
	<b>GRAND TOTAL</b>	<b>100</b>

**\*\*Award of marks for number of practicals recorded in the Record**

- 10 PRACTICALS and above - 10
- 8 PRACTICALS - 08
- 6 PRACTICALS - 06
- 5 PRACTICALS - 05
- LESS THAN 5 - 00

# SYLLABI

**GOVERNMENT COLLEGE (AUTONOMOUS): RAJAHMUNDRY**  
**I B.Sc., PHYSICS NEW SYLLABUS**  
**(NEW MODULAR SYLLABUS W.E.F 2014-15)**  
**SEMESTER -I**

**Module I: Mechanics**

S.No	Month and Week	No. of hours	Topic	Curricular activity	Co-curricular activity	Remarks
1.	June III	04	VECTOR ANALYSIS Scalar and vector fields. <ul style="list-style-type: none"> <li>• Divergence and curl of a vector field and related problems.</li> </ul>			
2.	June IV	04	<ul style="list-style-type: none"> <li>• <b>Vector integration:</b> Line, Surface and Volume integrals.</li> <li>•</li> </ul>	Assignment	Quiz	
3.	July I	04	<ul style="list-style-type: none"> <li>• Stokes theorem</li> <li>• Gauss theorem</li> <li>• Greens theorems</li> </ul>			
4.	July II	04	<ul style="list-style-type: none"> <li>• simple applications for the above theorems</li> </ul>	Student seminar		
5.	July III	04	<b>Chapter II: Mechanics of Particles</b> <ul style="list-style-type: none"> <li>• Laws of motion,</li> <li>• Motion of variable mass system,</li> </ul>		Student project	
6.	July IV	04	motion of a rocket Multi-stage rocket	Assignment	Quiz	
7.	August I	04	<b>Chapter II: Mechanics of Particles continued</b>			

			<ul style="list-style-type: none"> <li>• Conservation of energy</li> <li>• Conservation of momentum</li> <li>• Collisions in two dimensions</li> <li>• Collisions in three dimensions</li> </ul>			
8.	August II	04	<ul style="list-style-type: none"> <li>• <b><i>Rutherford scattering.</i></b> Concept of impact parameter</li> <li>Scattering cross-section</li> </ul>	Student seminar		
9.	August III	04	<p><b><i>Chapter III: Mechanics of rigid bodies</i></b></p> <ul style="list-style-type: none"> <li>• Definition of Rigid body</li> <li>• Rotational kinematics relations</li> </ul> <p>Equation of motion for a rotating body</p>		Student project	
10.	August IV	04	<ul style="list-style-type: none"> <li>• Angular momentum</li> <li>• Inertial tensor.</li> <li>• Euler's equation, Precession of a top</li> <li>• Gyroscope precession of the equinoxes</li> </ul>	Assignment	Quiz	
11.	September I	04	<p><b><i>Chapter IV: Mechanics of continuous media</i></b></p> <ul style="list-style-type: none"> <li>• Classification of beams</li> <li>• Types of bending</li> <li>• Point load</li> <li>• Distributed load</li> <li>• Shearing force and bending moment</li> </ul>		Guest lecture	

			<ul style="list-style-type: none"> <li>• Sign conventions</li> <li>• Simple supported beam carrying a concentrated load at mid span</li> <li>• Cantilever with an end load</li> </ul>			
12.	September II	04	<p><b>Chapter V: Central forces</b></p> <ul style="list-style-type: none"> <li>• Central forces - definition and examples</li> <li>• Conservative nature of central forces</li> <li>• Conservative force as a negative gradient of potential energy</li> </ul>	Student seminar		
13.	September III	04	<ul style="list-style-type: none"> <li>• Equation of motion under a central force</li> <li>• gravitational potential and gravitational field</li> <li>• Motion under inverse square law</li> <li>• Derivation of Kepler's laws</li> </ul> <p>Coriolis force and its expressions</p>		Field work	



14.	September IV	04	<b><i>Chapter VI: Special theory of relativity</i></b> <ul style="list-style-type: none"><li>• Galilean relativity</li><li>• Absolute frames</li><li>• Michelson-Morley experiment</li><li>• Postulates of special theory of relativity</li> <li>• Lorentz transformation</li><li>• Time dilation</li></ul>	Assignment	Quiz	
15.	October I	04	<ul style="list-style-type: none"><li>• Length contraction</li><li>• Addition of velocities</li><li>• Mass-energy relation</li><li>• Concept of four vector formalism</li></ul>			

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

**CLASS** : I B.Sc

**SEMESTER** : I

**PAPER** : I

**TITLE OF THE PAPER** : MECHANICS

TOPICS IN THE UNIVERSITY SYLLABUS	ADDITIONAL TOPICS INCLUDED UNDER AUTONOMOUS SETUP
1. Vector analysis 2. Mechanics of particles 3. Mechanics of rigid bodies 4. Mechanics of continuous media 5. Central forces 6. Special theory of relativity	7. Fluid motion : Viscosity of fluids – Poiseuille’s equation.  8. Lagrange’s equation – its simple applications. 1. Single particle in space a. Cartesian coordinates. B. Plane polar coordinates. 2. Atwood’s machine. 3 Bead sliding on rotating wire

**Text Books**

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 (AUTONOMOUS): RAJAHMUNDRY**  
**I B.Sc., PHYSICS NEW SYLLABUS**  
**(NEW MODULAR SYLLABUS W.E.F 2014-15)**  
**SEMESTER -II**

**Module II: Waves and Oscillations**

S.No	Month & Week	No.of hours per week	TOPICS	Curricular activities	Co-curricular activities	Remarks
1	November I	4	<p><b>Chapter I:</b>  <b>Fundamentals of vibrations</b></p> <ul style="list-style-type: none"> <li>• Simple harmonic</li> </ul>			
		4	<ul style="list-style-type: none"> <li>• oscillator and solution of the differential equation</li> <li>• Physical characteristics of SHM</li> </ul>			
2	November II	4	<ul style="list-style-type: none"> <li>• Torsion pendulum, measurements of rigidity modulus</li> <li>• Compound pendulum, measurement of 'g'.</li> </ul>	Student seminar		
3	November III	4	<ul style="list-style-type: none"> <li>• combination of two mutually perpendicular simple harmonic vibrations of same frequency</li> <li>• combination of two mutually perpendicular</li> </ul>		Student project	

			<p>simple harmonic vibrations with different frequencies</p> <ul style="list-style-type: none"> <li>• Lissajous figures</li> </ul>			
4	November IV	4	<p><b><i>Chapter II: Damped and forced oscillations</i></b></p> <ul style="list-style-type: none"> <li>• Damped harmonic oscillator</li> <li>• Solution of the differential equation of damped oscillator.</li> </ul> <p>Energy considerations</p>	Assignment	Quiz	
5	December I	4	<ul style="list-style-type: none"> <li>• Comparison with un damped harmonic oscillator,</li> <li>• Logarithmic decrement,</li> <li>• relaxation time</li> <li>• quality factor</li> </ul>			
6	December II	4	<p><b><i>Chapter II: Damped and forced oscillations contd.....</i></b></p> <ul style="list-style-type: none"> <li>• Differential equation of forced oscillator and its solution</li> <li>• Amplitude resonance</li> <li>• Velocity resonance</li> </ul>	Student seminar		
7	December III	4	<p><b><i>Chapter III: Complex vibrations</i></b></p> <ul style="list-style-type: none"> <li>• Fourier theorem</li> </ul>		Student project	

			Evaluation of the Fourier Coefficients.			
8	December IV		<ul style="list-style-type: none"> <li>Analysis of periodic wave functions- Square wave Triangular wave Saw-tooth wave</li> </ul>	Assignment	Quiz	
9	January15 I	4	<p><b>Chapter IV: Vibrating Strings</b></p> <ul style="list-style-type: none"> <li>Transverse wave propagation along a stretched string, General solution of wave equation for a stretched string and its significance</li> </ul>			
10	January15 II	4	<ul style="list-style-type: none"> <li>Modes of vibration of stretched string clamped at ends,</li> </ul>	Student seminar	Field work	
11	January15 III	4	<ul style="list-style-type: none"> <li>Overtones,</li> <li>Energy transport in strings</li> <li>Transverse impedance in strings</li> </ul>		Guest lecture	
12	January15 IV	4	<p><b>Chapter V: Ultrasonics</b></p> <p>Properties of ultrasonic waves</p>	Assignment	Quiz	
13	February I	4	<ul style="list-style-type: none"> <li>Production of ultrasonic by piezoelectric method</li> <li>Production of ultrasonics by magnetostriction method</li> </ul>			
14	February II	4	<p>Detection of ultrasonic waves</p> <ul style="list-style-type: none"> <li>Determination</li> </ul>	Student seminar		

			of wavelength of ultrasonic waves			
15	February III	4	<ul style="list-style-type: none"> <li>• Measurement of Velocity of ultrasonic waves in liquids by Sear's method.</li> </ul> Applications of ultrasonic waves			
16	February IV	4	<b>Chapter V/:</b> Gravitation .variation of gravitational potential. Different cases.	Assignment	Quiz	
17	March I	4	Revision			

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

**CLASS** : I B.Sc.,  
**SEMESTER** : II  
**PAPER** : I  
**TITLE OF THE PAPER** : WAVES AND OSCILLATIONS

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. Ultrasonic	6. Seismology - Seismographs - vertical pendulum, horizontal pendulum, determination of epi centre and the focus - Modern Applications of seismograph

**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**  
**SYLLABUS FOR II YEAR B.Sc., PHYSICS (w.e.f.2009-10)**  
**Semester - III**  
**MODULE III: OPTICS**

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**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. 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 by a separated doublet.

**3. 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  $D_1, D_2$  lines and thickness of a thin transparent plate.

**4. 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.

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

**6. 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.

**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.*

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

**CLASS** : II B.Sc  
**SEMESTER** : III  
**PAPER** : II  
**TITLE OF THE PAPER** : OPTICS

TOPICS IN THE UNIVERSITY SYLLABUS	ADDITIONAL TOPICS INCLUDED UNDER AUTONOMOUS SETUP
1. Matrix optics 2. Lens aberration 3. Interference 1 4. Interference 2 5. Diffraction 6. Fresnel's class 7. Polarization	Resolving power of telescope Doppler effect in light Applications of thin film interference Fiber Optics and optical communication- Its principle .Structure of optical fiber. Types of optical fiber. Acceptance angle and numerical aperture. V number. Collection of light from diffused source by fiber. Attenuation or transmission loss. Dispersion and Dispersion losses. Advantages of communication with optical fiber. Applications and uses.

**GOVERNMENT COLLEGE (A): RAJAHMUNDRY**  
**DEPARTMENT OF PHYSICS**  
**SYLLABUS FOR II YEAR B.Sc., PHYSICS (w.e.f.2009 -10)**  
**4<sup>th</sup> semester**  
**MODULE IV: THERMODYNAMICS**

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**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, 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.

**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. Effects of Chloro and Fluro Carbons on Ozone layer; applications of substances at low- temperature.

**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. Application of Fermi-Dirac statistics to white dwarfs and Neutron stars.

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

**Textbook**

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.*

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

**CLASS** : II B.Sc  
**SEMESTER** : IV/ MODULE IV  
**PAPER** : II  
**TITLE OF THE PAPER** : THERMODYNAMICS

<b>TOPICS IN THE UNIVERSITY SYLLABUS</b>	<b>ADDITIONAL TOPICS INCLUDED UNDER AUTONOMOUS SETUP</b>
1. Thermodynamics 2. Thermodynamic potentials 3. Low temperature physics 4. Thermal radiation 5. Quantum theory of radiation 6. Thermo electricity 7. Kinetic theory of gases	Heat engines, Diesel engine, Auto engine and calculation of their efficiency. Internal combustion engines - Working and principle. Ideal, Air, Air-fuse and actual cycles. Engine systems - Fuel ignition, cooling and lubrication.

**GOVERNMENT COLLEGE (A): RAJAHMUNDRY  
DEPARTMENT OF PHYSICS**

**GENERAL ELECTIVE (from 2015-16)  
ELECTRICAL TECHNICIAN COURSE  
For II B.Sc students  
SYLLABUS**

S.No	Chapter	No.of hours
1	Electrical current- Ohms and Kirchoffs laws	5
2	Units- work-Power and enrgy	5
3	Heating effects of electric current	5
4	Electromagnetic Induction	5
5	Cells and Batteries	2
6	Insulating materials	5
7	Wiring accessories	10
8	Wiring tool and wire joints	10
9	Wiring systems and Types of house wiring	10
10	Wiring circuits	10
11	Earthing	3
12	Safety precautions and IE rules for wiring	4
13	Indicating instruments	5
14	Digital Instruments	3
15	Power supplies	3
16	Optical Fibre cables	5
	<b>TOTAL</b>	<b>90</b>

**GOVERNMENT COLLEGE (AUTONOMOUS):: RAJAHMUNDRY**

Accredited by NAAC grade "A"

(Revised Syllabus W.E.F 2010-11)

III B.Sc., V Semester, paper III

**CORE III, MODULE V- Electricity & Electromagnetism****1. Electrostatics (10 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 (6 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

**4. Magnetostatics (7 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 (8 Periods)**

Hall effect – cyclotron, synchrocyclotron and synchrotron – force on a current carrying conductor – force and torque on current loop – Biot – Savart's Law and calculation of B due to long straight wire, circular current loop and solenoid.

**6. Electromagnetic Induction (10 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 inductance – coefficient of coupling – calculation self inductance of a long solenoid – toroid – energy stored in magnet field

**7. Network theorems**

Superposition theorem- Thevenins theorem – Norton's theorem – Maximum power transfer theorem – Millman theorem – Reciprocity theorem – application to simple networks.

**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<br>With Electronics | K. K. Tewari (R. Chand)   |
| 8. Third year Physics                            | Telugu Academy            |

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY  
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
1. Electrostatics 2. Dielectrics 3. Capacitance 4. Magnetostatics 5. Moving charge in electric and magnetic fields 6. Electromagnetic induction	4. Magnetostatics Determination of constant of BG condenser method 5.C language programming – Constants variables, syntax, for loop, while – do loop and simple programming

**GOVERNMENT COLLEGE (AUTONOMOUS):: RAJAHMUNDRY**  
**Accredited by NAAC with grade "A"**  
**(Revised Syllabus W.E.F 2010-11)**  
**III B.Sc., V Semester, paper IV**

**Paper IV:: Modern Physics and Quantum Mechanics**

**Unit - I****25 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. 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).

**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.

**Unit - II:****25 hrs****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.

**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 Guru deep 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 Company.
- 3 **Quantum Mechanics** by Mahesh C Jain Eastern Economy Edition Prentice Hall of India.

**GOVERNMENT COLLEGE (A): RAJAHMUNDRY**  
**PHYSICS SYLLABUS (W E F ACADEMIC YEAR 2016-17)**  
**III B.Sc. (Physics) : SEMESTER V**

**ADVANCED ELECTIVE [1]: : Modern Physics, Quantum Mechanics**

**Unit - I****25 hrs****Atomic Spectra**

Introduction - Drawbacks of Bohr's atomic model - Somerfield'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).

**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.

**Unit - II:****25 hrs****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.

**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 Guru deep R Chatwal and Shyam Anand- Himalaya Publishing House.
6. **Third Year Physics** – Telugu Academy.

**Reference Books:**

2. **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 Company.
- 4 **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
<ol style="list-style-type: none"><li>1. Atomic Physics</li><li>2. Molecular Physics</li><li>3. Solid State Physics</li><li>4. Modern Magnetism</li></ol>	<ol style="list-style-type: none"><li>2. Molecular quantum numbers - Molecular orbitals - ground states of Hydrogen, Nitrogen and Oxygen.</li><li>5. Microwave Spectrum of Diatomic molecules.</li></ol>

**GOVERNMENT COLLEGE (A): RAJAHMUNDRY**  
**PHYSICS SYLLABUS (W E F ACADEMIC YEAR 2016-17)**  
**III B.Sc. (Physics) : SEMESTER V**

**ADVANCED ELECTIVE [2]:: Nano materials. Properties & Synthesis techniques**

Atoms, clusters and Nano materials Introduction, Melting point of Gold Nano crystal, Vapour pressure of Nano crystals.

Synthesis and Processing, Methods for creating Nanostructures; Processes for producing ultrafine powders- Mechanical grinding; Wet Chemical Synthesis of nanomaterials- sol-gel process, Liquid solid reactions; Gas Phase synthesis of nanomaterials-Furnace, Flame assisted ultrasonic spray pyrolysis; Gas Condensation Processing(GPC),Chemical Vapour Condensation(CVC)- Cold Plasma Methods, Laser ablation, Vapour -liquid -solid growth, particle precipitation aided CVD, summary of Gas Condensation Processing(GPC).

Nano composites Synthesis and Processing, Introduction, Historical perspective, Different Synthesis methods of Nano composites- self Assembly or Bio-Mimetic processes, Film; Processing of Nano particles- Binding mechanisms in Nano particles, Dispersion of Nano particles, Stabilization of Nano particles; Special nano structured materials- Fullerenes-Magnetism and tunneling, Fullerenes films, other applications; Nano tubes- carbon Nano tubes; Onions-carbon onions, Porous silicon-Preparation methods.

Synthesis of , Zirconia and SiC, Microwave Sintering of Nano particles Preparation of Nano particles , Nano particles of SiC, Optimization of the Attritors Work,Purification of ; Sintering Of SiC- Role of Dopants, Role of carbon, Role of Sintering Atmosphere; Sintering of Nano Particles - Preparation of materials , Sintering of Nanoparticles of SiC.

Microwave Sintering of Nano particles, Microwave Sintering route, Sample preparation from Nano particles, Sintering produces of Nano particles, Sintering data of Nanoparticles of Alumina, Nano particles of Zirconia - Synthesis of Nano particles-Sol-Emulsion-Gel Technique, The sol-gel Technique, Sintering of Nano particles of Zirconia.



**References:**

1. Nanomaterials – AK Bandyopadhyay, Newage International (p) limited publishers.
2. Nanomaterials- J Dutta and H Hofmann
3. Nanostructured materials processing, properties and applications- Carl C Koch, Jaico publishing house.
4. Nanotechnology- William Illsey Atkinson, Jaico publishing house

**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY**  
Accredited by NAAC Grade "A"  
(Revised Syllabus W.E.F.2006-07)  
III B.Sc., VI Semester  
Paper-III: **ELECTROMAGNETIC WAVE THEORY & ELECTRONICS**

**1. Varying and Alternating currents (15 Periods):**

CR circuits -LR circuits - Growth and decay of currents. LCR circuit - critical damping- 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. AC & DC motors-single phase, three phase (basics only)

**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. Maxwells wave equation. Plane electromagnetic waves- Transverse nature of electromagnetic waves, Poynting theorem, production of electromagnetic waves(Hertz experiment)

**3. Semi-Conductor devices(17 Periods)**

Band theory of solids (qualitative) - Intrinsic and extrinsic semiconductors-continuity equation-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. Parallel adder circuits.

**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 | K.K. Tewari(R.Chand) |
| 6.Third year physics                     | 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
1. Varying and alternating currents 2. Maxwell' equations and Electromagnetic waves 3. Semi - conductor devices 4. Digital principles	5. Alternating currents: Principles of AC and DC generators and motors 6. 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

**GOVERNMENT COLLEGE (A): RAJAHMUNDRY  
PHYSICS SYLLABUS (W E F ACADEMIC YEAR 2010-11)**

**B.Sc. (Physics) SEMESTER VI**

**Paper IV-(Nuclear Physics, Solid State Physics)**

**Unit - III**

**15 hrs**

**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 – Nuttall law. Gamow's theory of alpha decay. Geiger – Nuttall law from Gamow's theory. Beta spectrum – neutrino hypothesis, Fermi's theory of  $\beta$ -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.

**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 – experimental verification – 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

**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 with Grade "A")

(Revised modular Syllabus W.E.F.2016-17)

III B.Sc., VI Semester

**CORE III: ELECTROMAGNETIC WAVE THEORY & ELECTRONICS****1. Varying and Alternating currents (15 Periods):**

CR circuits -LR circuits - Growth and decay of currents. LCR circuit - critical damping- 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. AC & DC motors-single phase, three phase (basics only)

**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. Maxwells wave equation. Plane electromagnetic waves- Transverse nature of electromagnetic waves, Poynting theorem, production of electromagnetic waves(Hertz experiment)

**3. Semi-Conductor devices(17 Periods)**

Band theory of solids (qualitative) - Intrinsic and extrinsic semiconductors-continuity equation-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. Parallel adder circuits.

**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	K.K. Tewari(R.Chand)
6.Third year physics	Telugu Academi



**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY**

(Accredited by NAAC with Grade "A")

(Revised modular Syllabus W.E.F.2016-17)

III B.Sc., VI Semester

**APPLIED/SKILLED BASED ELECTIVE [1]: Solid State Physics & Material Characterization techniques****I: 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.

**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

**II: Material Characterization Techniques**

Introduction and Preliminary Concepts: Macro-, Meso, Micro and Nanostructure of Materials, Fundamentals of crystallography and Crystal structures.

X-Ray Diffraction Methods: X-ray production, Bragg's Law, Laue's Equation, Diffraction Methods, Single Phase analysis, Multi-Phase Analysis, Particle size and strain, Orientation and Texture, Residual Stress.

Optical Microscopy: Geometry of Optics, Resolution, Construction of a Microscope, Image Contrast, Phase Contrast.

Electron Microscopy - SEM: Electron Optics - Cathodes, Electron Lenses, Aberrations, Resolution, Interaction of Electrons and Matter - Elastic and Inelastic Scattering, Backscattered Electrons, Secondary Electrons, Scanning Electron Microscopy - Image Formation, EPMA, Magnification, Depth of Field, Distortion, Detectors, Contrast, and Resolution.

TEM: Electron diffraction, reciprocal lattice, analysis of SAD patterns; different electron diffraction techniques.

EDS: X-ray microanalysis: Energy dispersive X-ray spectroscopy (EDS) and Quantitative microanalysis using EDS.

## Text Books:

1. Microstructural Characterization of Materials - David Brandon and Wayne Kaplan, John Wiley and Sons, New York, NY, 1999.
2. Elements of X-ray Diffraction – BD Cullity and SR Stock, Prentice Hall, New Jersey, 2001.
3. Scanning Electron Microscopy and X-Ray Microanalysis - Joseph I Goldstein, 3rd ed., Dale E. Newbury Academic / Plenum Publishers, New York, 2003 .
4. Transmission Electron Microscopy - David B Williams and Barry Carter, Plenum Press, NY. London 1996 (or a newer edition).
5. Principles of Instrumental Analysis - Douglas A Skoog, F. James Holler and Timothy A. Nieman, 4th Edition ©1998.

**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY**

(Accredited by NAAC with Grade "A")

(Revised Modular Syllabus W.E.F.2016-17)

III B.Sc., VI Semester

**APPLIED/SKILLED BASED ELECTIVE [2]: Nuclear Physics and its diagnostic applications in Medicine****I. Nuclear Physics:****a) 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.

**b) 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  $\beta$ -decay (qualitative).

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

**d) Nuclear Detectors** – GM counter, proportional counter, scintillation counter, Wilson cloud chamber and solid state detector

**II. Medical Imaging and Radiation therapy**

- a) Diagnostic radiology
- b) Nuclear medicine
- c) Radiotherapy
- d) Radioactive tracers
- e) Radiation for sterilization
- f) Radiation oncology
- g) Interaction of X-rays with matter (Photoelectric, Compton, Pair Production)
- h) X-ray imaging (scintillation and diode detection) and Computed Tomography
- i) Magnetic resonance fundamentals, basic imaging & slice selection, functional
- j) Imaging (MRI, DW-MRI, DCE-MRI, MRSI). □ Use of radioisotopes: Gamma cameras, SPECT, PET & radionuclide therapy
- k) Radiotherapy: microwave linacs, bremsstrahlung, beam collimation

- l) Introduction to radiotherapy planning: CT simulation, conformal therapy, IMRT, charged particle therapy.
- m) Radiation Dosimetry (ionisation chambers, film, diodes, TLDs)
- n) Radiation doses
- o) Radiation safety.

# PRACTICAL PAPERS

**GOVERNMENT COLLEGE, (AUTONOMOUS), RAJAHMUNDRY**  
**B.Sc.,(PHYSICS)**  
**Module : I (P)**

1. Compound Pendulum – determination of 'G' and 'K'.
2. Damping of an oscillating disc – Logarithmic decrement.
3. Oscillations under bifilar suspension – Moment of Inertia
4. Combinations of springs – verification of equations (Series & parallel)
5. Young's Modulus – Uniform (or) non uniform bending
6. Sonometer – Verification of laws of stretched string
7. Sonometer – velocity of transverse wave along a stretched string
8. Simple pendulum – Estimation of standard error.
9. Melde's experiment – Determination of frequency.
10. Fly Wheel – Moment of Inertia.
11. Study of flow of liquids through Capillaries.
12. Viscosity of a fluid by any one method.
13. Surface tension of liquid by any one method
14. Rigidity Modulus – Torsion pendulum
15. Volume resonator - Frequency of tuning fork using  $V-1/n^2$  graph.
16. Lissajous figures using CRO (demonstration expt.)

\* One has to complete minimum of 10 experiments.

**GOVERNMENT COLLEGE, (AUTONOMOUS), RAJAHMUNDRY**  
**PHYSICS PRACTICALS**  
**PAPER II: MODULE II (P)**

1. 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

\* One has to complete a minimum of 10 experiments

**GOVERNMENT COLLEGE, (AUTONOMOUS), RAJAHMUNDRY**  
**PHYSICS PRACTICALS**  
**PAPER III: MODULE III (P)**

1. Carry Foster's Bridge-comparison of resistance.
2. Internal resistance of a cell by potentiometer.
3. Figure merit of moving coil galvanometer.
4. Voltage sensitivity of a moving coil galvanometer.
5. RC Circuit (Frequency response).
6. LR Circuit (Frequency response)
7. LCR Circuit series and parallel resonance Q-factor.
8. Power factor of an AC Circuit.
9. Determination of AC frequency-Sonometer.
10. Design and construction of multimeter.
11. Construction of a model DC power supply.
12. Characteristics of a Junction Diode.
13. Characteristics of Transistor.
14. Characteristics of Zener Diode.
15. Verification of Kirchhoff's Laws.
16. Network theorems

\* One has to complete a minimum of 10 experiments



**GOVERNMENT COLLEGE, (AUTONOMOUS), RAJAHMUNDRY**  
**PHYSICS PRACTICALS**  
**PAPER IV: MODULE IV(P)**

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  $\alpha$  and  $\beta$  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  $\Pi$  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

# MODEL PAPERS

**GOVERNMENT COLLEGE (AUTONOMOUS): RAJAHMUNDRY**  
**I SEMESTER END EXAMINATIONS**  
**I B.Sc. PHYSICS :MODULE :I**  
**MECHANICS**

Time: 3 hrs

Max Marks: 75

**Section - A**

Answer all questions (4x10=40)

1. a) What is the divergence of a vector? Give its physical significance. Obtain an expression for the divergence of a vector.

OR

- b) Derive the equation of motion of a system of variable mass.

2. a) State postulates of special theory of relativity and obtain Lorentz transformations.

OR

- b) Derive the Euler's equations of rotational motion for a rigid body fixed at one end.

3. a) State and prove Kepler's laws of planetary motion.

OR

- b). What is symmetric top and precessional motion? Derive an equation for the angular speed in the case of symmetric top rotating with angular velocity and making an angle ' $\theta$ ' with the vertical.

4. a) Derive Rutherford scattering formula.

OR

- b) Describe Gyroscope.

**Section - B**

Answer any five questions (5x3=15)

5. What is Lorentz contraction? Write an expression for it.
6. Define gravitational potential and derive an expression for gravitational potential due to point mass.
7. What is reduced mass?
8. State the principle of working of a Rocket.
9. Obtain the scalar product of the vectors  $\mathbf{A}=6\mathbf{i}+2\mathbf{j}+3\mathbf{k}$ ,  $\mathbf{B}=2\mathbf{i}-9\mathbf{j}+6\mathbf{k}$ . Find the angle between them.

10. Two steel spheres of radii 2cm and 3cm move with velocities of 24cm/sec in opposite directions and collide head on. If the collision is elastic, calculate the velocity after impact.
11. One end of wire 2m long and  $0.2\text{cm}^2$  in cross section is fixed in a ceiling and a load of 4.8kg is attached to the free end. Find the extension of the wire. ( $Y=2.0 \times 10^{11}\text{N/m}^2$ ,  $g=10\text{m/s}^2$ )
12. If the earth be one half of its present distance from the sun what will be the number of days in a year?

### Section - C

Answer all questions (10x2=20)

13. What is the physical significance of curl?
14. What is scattering? When is it elastic and inelastic?
15. A clock showing correct time when at rest loses one hour in a day when it is moving. What is the velocity?
16. At what speed the mass of an object will be double of its value at rest?
17. If  $O$  is a scalar quantity show that  $\text{curl}(\text{grad } O) = 0$ .
18. A car engine develops 75 KW power when rotating at a speed of 1000rpm. What is the torque acting?
19. Write down the postulates of special theory of relativity.
20. State the types of bending.
21. Define central force and give an example.
22. Explain shearing force.

**GOVERNMENT COLLEGE (AUTONOMOUS): RAJAHMUNDRY**  
**II SEMESTER END EXAMINATIONS**  
**I B.Sc. PHYSICS : MODULE II**  
**WAVES AND OSCILLATIONS**

Time: 3 hrs  
75

Max Marks:

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**Section - A**

Answer all questions (4 x 10 = 40)

1.a) Derive an expression for the speed of propagation of a transverse wave on a stretched string. How are standing waves produced in stretched strings?

OR

b) Discuss the energy transport in strings

2. a) What are forced oscillations? Obtain expression for the amplitude of forced vibrations and deduce the condition for resonance.

OR

b) Write about simple harmonic oscillator. Derive its equation of motion and obtain the solution for it. Give the characteristics of SHM.

3. a) State Fourier theorem. Analyze a square wave using Fourier theorem.

OR

c) What are damped oscillations? Solve the differential equation of a damped harmonic oscillator and discuss specially the case when it is under damped.

4. a) Derive the equation for the velocity of longitudinal waves in bars?

OR

b) Discuss any two methods of producing Ultrasonic waves. Write the applications of Ultrasonic's.

**Section: B**Answer any **Five** questions ( $5 \times 3 = 15$ )

5. Explain the physical characteristics of SHM.
6. Explain the phenomenon of resonance.
7. Explain Lissajous figures.
8. Obtain the differential equation for simple harmonic oscillator.
9. Piezo electric crystal has thickness 0.002m, the velocity of sound wave is 5750m/s. Calculate fundamental frequency of the crystal.
10. A string of length 0.5m, linear density 0.001kg/m under tension 1N find the first overtone of the string.
11. The Q value of spring loaded with 0.3Kg is 60 of vibration with frequency of 2Hz. Calculate force constant and mechanical resistance.
12. A particle performing S.H.M. has a maximum velocity of 0.4m/s and a maximum acceleration  $0.8\text{m/s}^2$ . Calculate the amplitude and time period of the oscillator.

**Section: C**Answer **all** questions ( $10 \times 2 = 20$ )

13. Draw the energy curve against the displacement for the case of simple harmonic oscillator.
14. Define logarithmic decrement.
15. Explain amplitude resonance.
16. State the differential equation of a wave in continuous media.
17. Find the amplitude, wavelength, frequency and period of a wave propagating according to the equation  $y = 18 \sin(6x-4t)$ .
18. What is Q - factor?
19. Explain the format imaginary waves in strings.
20. What are the laws of transverse vibrations of strings?
21. Explain the term magnetostriction.
22. Explain the term phase of a simple harmonic oscillator

**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY**  
**(Accredited by NAAC with "A" Grade)**  
**III SEMESTER END EXAMINATIONS**  
**II B.Sc., PHYSICS-PAPER 2: MODULE III**  
**OPTICS (MODEL PAPER)**

Date

Max Marks: 75

Time: 3 Hours

**SECTION A**

ANSWER ALL QUESTIONS

4 x 10 = 40 M

1. (a) What is system matrix? Obtain it in the case of a system of two lenses separated by a distance and hence find the formula for its focal length.

**OR**

- (b) What is chromatic aberration? Derive the condition for achromatism when two lenses are (i) in contact and (ii) separated by a distance

2. (a) Describe an Experiment to determine the wavelength of monochromatic light using Fresnel's Biprism. Give necessary theory.

**OR**

- (b) Describe the arrangement to observe Newton's rings by reflected light and transmitted light. Obtain an expression for the wavelength of light.

- 3.(a) Give the Theory of Fresnel's diffraction of light at a straight edge and explain the intensity distribution in the diffraction pattern.

**OR**

- (b) Discuss Fraunhofer diffraction due to a single slit illuminated by monochromatic light

5. (a) Describe the construction and working of Nicol prism. Explain how it is used as polarizer and analyzer

**OR**

- (b) What is a laser? Describe the construction and working of Helium-Neon gas laser

**SECTION B**

ANSWER ANY **FIVE** OF THE FOLLOWING

5 X 3 = 15

4. Write a note on astigmatism.
5. Describe the construction and working of Michelson interferometer
6. Write a short note on zone plate
7. Explain the principle and applications of Holography
8. In Newton's rings experiment the diameter of 4<sup>th</sup> dark ring is 0.4 cm Find the diameter of 20<sup>th</sup> dark ring.
9. Two thin converging lenses of power 5 diapters and 4 diapters are placed coaxially 10cm apart. Find the focal length of this combination.

10. A parallel beam of sodium light is allowed to be incident normally on a plane grating having 4250 lines/cm and a second order spectral line is observed to be deviated through  $30^\circ$  calculate the wavelength of spectral line.
11. Calculate the specific rotation if the plane of polarization is turned through  $26.4^\circ$  traversing 20 cm length of 20% sugar solution?

### SECTION-C

**ANSWER ALL QUESTIONS**

**10 X 2 = 20**

12. Write translation and refraction matrices?
13. What is an achromatic doublet?
14. What are coherent sources?
15. Find the thickness of a soap film  $\mu = 1.33$  which gives constructive second order interference of red light of  $\lambda = 700\text{m}$  (milli microns)?  $\mu = 1.33$  )
16. Mention the types of diffraction?
17. A zone plate has a focal length of 60 cm for wavelength of  $5893\text{A}^\circ$  find the radius of  $100^{\text{th}}$  circle of the zone plate ?
18. The radius of curvature of the surfaces of a double convex lens are  $R_1=R_2=0.5\text{m}$ . The refractive index of the material of the lens is 1.5 find the focal length of the lens?
19. State Brewster's law?
20. What is population inversion?
21. What is graded index fiber?

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**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY**  
**(Accredited by NAAC with "A" Grade)**  
**IV SEMESTER END EXAMINATIONS**  
**II B.Sc., PHYSICS-PAPER 2**  
**THERMODYNAMICS (MODEL PAPER)**

Date

Max Marks :75

Time : 3 Hours

## SECTION A

ANSWER **ALL** QUESTIONS

4 x 10 = 40 M

1.a) Deduce Maxwell's law of distribution of molecular speeds?

OR

b) Describe the working of Carnot's engine and derive expression for its efficiency?

2. a) Define the four thermodynamic potentials, obtain Maxwell's thermodynamic equations using these potentials?

OR

b) How are the low temperatures produced by adiabatic demagnetization? Give theory?

3. a) Give the assumptions and hence deduce the Plank's formula. Derive Wein's formula and Rayleigh-jeans formula from it?

OR

b) Explain Fermi Dirac distribution law. Apply this to electron gas and calculate energy distribution of electron?

4 (a) State and deduce Wien's displacement law.

(OR)

(b) What are radiation pyrometers? Describe the disappearing filament optical pyrometer.

## SECTION-B

ANSWER ANY **FIVE** QUESTIONS

5 X 3 = 15M

4. What do you mean by T-S diagram? Write any four uses.

5. Derive Stefan-Boltzmann's law using Maxwell's equations?

6. Define solar constant and explain how it can be determined experimentally?

7. Give a comparison of M-B, B-E, &amp; F-D statistics ?

8. Find the RMS velocity of Hydrogen at NTP and 127°C?

9. A Carnot engine operates between 227°C and 127°C it absorbs  $6.0 \times 10^4$  cal at the higher temperature. How much work per cycle is this engine capable of doing? What is the efficiency of the engine ?10. The van der Waals constant a and b for one mole of a gas are  $0.145 \text{ atm-lit}^2/\text{mole}^2$  and  $3.15 \times 10^{-2} \text{ lit /mole}$  respectively calculate the temperature of inversion

11. A body radiates maximum energy of wavelength  $20,000\text{\AA}$  at 1500 K temperature. Calculate the temperature of the sun. if the wavelength of maximum energy emitted

**SECTION-C**

ANSWER ALL QUESTIONS

10 X 2 = 20

12. Define coefficient of viscosity and give the expression
13. State the first law of thermodynamics
14. Define reversible and irreversible processes
15. State Joule-Kelvin effect
16. What is a refrigerator?
17. Distinguish between Joule's expansion and adiabatic expansion
18. Define emissive power and absorptive power
19. What is pyrometer?
20. Define phase space
21. State theorem of probability

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**GOVERNMENT COLLEGE (AUTONOMOUS) : : RAJAHMUNDRY**  
**DEPARTMENT OF PHYSICS**  
 V SEMESTER End Examinations  
 III B. Sc PHYSICS PAPER – III  
 MODEL PAPER

**ELECTRICITY AND MAGNETISM**

Date:

Max Marks : 75

Time : 3 Hrs

SECTION – A

Answer ALL Questions

(4 X 10 =

40)

- 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.

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

OR

Derive an expression for the capacity of a spherical condenser.

- 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.

- 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

- Discuss the atomic view dielectrics.
- What is hysteresis? Explain the terms residual magnetism and coercive force
- Describe the working of a synchrocyclotron.
- Explain the Principle of a Transformer.
- 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  $\epsilon_0 = 8.92 \times 10^{-12} \text{ c}^2 / \text{N} - \text{m}^2$ .
- 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  $25 \times 10^{-4} \text{ m}$  and The area of each plate =  $10^{-3} \text{ m}^2$
- If the frequency of one oscillator potential applied to the dees of acyclotron is 9 MHz. What must be the magnetic flux density B to accelerate  $\alpha$  - particles (Mass of  $\alpha$  - particles =  $6 \times 643 \times 10^{-27} \text{ kg}$  charge of  $\alpha$  - particles =  $2 \times 1.6 \times 10^{-19} \text{ c}$ .

12. Calculate the self inductance of an air cored toroid of mean radius 20 cm and a circular cross section of area  $5 \text{ cm}^2$ . 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.

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GOVERNMENT COLLEGE (A): RAJAHMUNDRY  
(NAAC accredited at 'A' grade)  
B.Sc., DEGREE EXAMINATIONS AT THE END OF V SEMESTER  
PHYSICS PAPER IV (MODEL PAPER)

TIME: 3 Hrs

MAX MARKS: 75

## SECTION I

Answer **ALL** questions

4 X 10 = 40

1 a) Describe the Stern and Gerlach experiment and indicate the importance of the results obtained

OR

b) Describe the vector atom model and explain the different quantum numbers associated with it

2. a) What is Raman effect? Describe the experimental setup used in the study of Raman effect in liquids

OR

b) Explain the rotational spectra of Diatomic molecule

3. a) Explain Bohr's theory of Hydrogen atom and deduce expressions for i) Radii of orbits ii) velocity of electrons iii) orbital frequency iv) electron energy and v) frequency of emitted radiation

OR

b) Describe the Davison and Germour experiment to demonstrate the wave character of electron

4. a) Explain any two consequences of Heisenberg's uncertainty relation

OR

b) Apply the Schrödinger wave equation to a particle in one dimensional box.

## SECTION II

Answer any **FIVE** questions

5 X 3 = 15

5. Explain the various coupling schemes

6. Explain singlet and triplet fine structure of alkaline earth spectra

7. What is photoelectric effect? Derive Einstein's photoelectric equation

8. What are the properties of matter waves

9. Calculate the wave lengths of the first line of the Balmer series (Rydberg constant  $R=1.097 \times 10^7/m$ )

10. Calculate the work function of sodium if its threshold wavelength is  $5040 \text{ \AA}$

11. If the uncertainty in the position of an electron is  $4 \times 10^{-10}m$ . Calculate the uncertainty in its momentum

12. Calculate the de-Broglie wavelength associated with a proton moving with a velocity equal to  $1/20^{\text{th}}$  of the velocity of light

## SECTION III

Answer **ALL** questions

10 X 2 =20

13. What are the drawbacks of Bohr's atomic model
14. Define Zeeman Effect and Stark effect
15. What is Compton Effect?
16. Write the applications of Raman Effect
17. State Heisenberg's uncertainty principle
18. What is the difference between phase velocity and group velocity?
19. What is Bohr's complementary principle?
20. What is an operator?
21. What is the significance of a wave function?
22. What is the importance of Heisenberg's uncertainty principle?

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**BLUE PRINT FOR II B.Sc (SEMESTER III)**

CHAPTER	ESSAY	SHORT ANSWER TYPE		VERY SHORT ANSWER TYPE	TOTAL MARKS
		THEORY	NUMERICAL PROBLEM		
1. MATRIX METHODS	1 (10)		1 (3)	1(2)	15
2.ABERRATIONS	1(10)	1(3)		1(2)	15
3 INTERFERENCE	1(10) +1(10)	1(3)	1(3)	2(2)	30
4.DIFFRACTION	1(10) +1(10)	1(3)	1(3)	2(2)	30
5. POLARIZATION	1(10)		1(3)	2(2)	17
6. LASERS.OPTICAL FIBERS, HOLOGRAPHY	1(10)	1(3)		2(2)	17
TOTAL	8(10)	4(3)	4(3)	10(2)	26(124)

# LIST OF EXAMINERS



## LIST OF EXAMINERS

GOVERNMENT COLLEGE (AUTONOMOUS ) RAJAHMUNDRY DEPARTMENT OF PHYSICS							
EXAMINERS LIST							SUB:PHYSICS
S.NO	CODE	EXAMINER NAME	PAPERS	D.O.B	SERVICE	COLLEGE	
1	202081	DR K BALARAJU	3,4		27	GOVT.CITY COLLEGE	HYDERAB.
2	202084	P.VENKATESWARAREDDY	2		21	GOVT.CITY COLLEGE	HYDERAB.
3	202041	N RANGAJI	2	27/9/1956	20	AMAL COLLEGE	ANAKAPAI
4	202069	U.DHANAPATHI VARMA	1,3	28/2/1956	20	D.N.R.COLLEGE	BHIMAVAR
5	202040	M.R.L.GOPAL	1,2	26/4/1957	19	AMAL COLLEGE	ANAKAPAI
6	202013	A.S.N.MURTHY	2,4	15/9/1957	19	GBR COLLEGE	ANAPARTH
7	202073	K.S.R.P.KUMAR JOHN	3,2	8/9/1958	16	SVKP COLLEGE	PENUGON
8	202091	S.VENKATARAJU	1,3	12/3/1961	15	D.N.R.COLLEGE	BHIMAVAR
9	202111	P.V.SRINIVASARAO	1,2,3	1/7/1967	14	S.S.N.COLLEGE	NARSARAO
10	202112	B.VENKATESWARARAO	ALL	15/8/1966	14	S.S.N.COLLEGE	NARSARAO
11	202074	S.SRINIVASARAO	2,4	29/11/1962	13	SVKP COLLEGE	PENUGON
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	VISAKHAP
14	302055	DR.S.SRINIVASARAO	ALL	4/8/1967	11	MRS.A.V.N.COLLEGE	VISAKHAP
15	202096	C.J.SOMARAJU	2	10/7/1967	10	D.N.R.COLLEGE	BHIMAVAR
16	202022	N.VEERA KUMAR	2	5/3/1969	9	SRVBSJV MAHARANI	PEDDAPUR
17	202107	P.SUBRAHMANYAM NAIDU	ALL	5/7/1964	8	JBD COLLEGE	KAVALI
18	202047	DR.SANTHA DEVI	ALL	1/8/1959	8	GOVT.DEGREE COLLEGE	ANANTHAP
19	202057	DR.B.V.H.N.SAINATH	1,2,3	15/5/1965	8	MRS.A.V.N.COLLEGE	VISAKHAP
20	202108	D.RAMAKRISHNA REDDY	3	1/9/1962	7	GOVT DEGREE COLLEGE	KARNOOL
21	202023	S.RAMARAO	4	5/8/1972	7	SRVBSJV MAHARANI	PEDDAPUR
22	202097	K.RAMAKRISHNA	ALL	30/8/1975	6	M.G.COLLEGE	ATREYAPU
23	202105	P.S.S.SRINIVAS	ALL	26/8/1973	6	GBR COLLEGE	ANAPARTH
24	302046	M.RAVIKUMAR	ALL	7/3/1965	6	GOVT DEGREE COLLEGE	ANANTHAP
25	202092	M.SATYAVANI	1,2	9/6/1966	6	D.N.R.COLLEGE	BHIMAVAR
26	302058	P.PRAMEELA	ALL	7/6/1972	5	MRS.A.V.N.COLLEGE	VISAKHAP
27	202101	B.V.R.K.MURTHY	ALL	31/8/1964	5	MAHARAJA'S	VIZIANAGA
28	202082	DR.I.H.PRASAD	3		4	GOVT.CITY COLLEGE	HYDERAB.
29	202083	DR.B.KRISHNA SENKAR	1,2		4	GOVT.CITY COLLEGE	HYDERAB.

30	302041	R.CHANDRA SEKHAR	ALL	1/6/1970	4	SRVBSJV MAHARANI	PEDDAPU
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	KARNOOL
33	202113	CH.VIJAYA KUMARI	1,2,4	14/3/1975	3	SSN COLLEGE	NARSARAO
34	202106	SURIBABU	ALL	11/5/1976	3	GBR COLLEGE	ANAPARTH
35	202114	A.SUBBARAO	1,2,3	23/5/1975	3	SSN COLLEGE	NARSARAO
36	202093	M.V.S.PRASAD	1,2	14/8/1977	2	D.N.R.COLLEGE	BHIMAVAR
37	202094	N.UDAYASRI	1,2	4/6/1977	2	D.N.R.COLLEGE	BHIMAVAR
38	202102	G.V.S.JAYAPALRAO	ALL	1/8/1966	2	MAHARAJA'S	VIZIANAGA
39	202095	A.VEERAYYA	3	8/3/1976	2	D.N.R.COLLEGE	BHIMAVAR
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	RAMACHA
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	MACHERL
51		SYAMALA	ALL			ASDW COLLEGE	KAKINADA
52		P.V.RAMANA	ALL			P.R.G.COLLEGE	KAKINADA
53		MEHAR	ALL			P.R.G.COLLEGE	KAKINADA
54		D.GANGADHARUDU	ALL			SRVBSJV MAHARANI	PEDDAPU
55		DR.GS.NARAYANARAO	ALL			VS KRISHNA COLLEGE	VISAKHAP
56		BHASKARAPRASAD	ALL			SRR COLLEGE	VIJAYAWA
57		A.V.RAMANAMURTHY	ALL			GOVT DEGREE COLLEGE	TANUKU
58		A.K.SURYANARAYANA	ALL			IDEAL COLLEGE	KAKINADA
59		SUBBARAJU	ALL			KGRL COLLEGE	BHIMAVAR
60		SATYANARAYANA RAJU	ALL			KGRL COLLEGE	BHIMAVAR
61		VENKATESWARA RAO	ALL			CRR COLLEGE	ELURU
62		DR A.R.S.KUMAR	ALL			Y.N.COLLEGE	NARASAPU
63		K.LAKSHMINARAYANA	ALL			Y.N.COLLEGE	NARASAPU