# A.G& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

# VUYYURU-521165, KRISHNA Dt., A.P.(Autonomous)

# Accredited by NAAC with "A" Grade

# 2019-2020



# DEPARTMENT OF PHYSICS MINUTES OF BOARD OF STUDIES

**ODD SEMESTER** 

24-04-2019

Minutes of the meeting of Board of studies in Physics for the Autonomous course of A.G. & S.G.Siddhartha Degree College of Arts & Science, Vuyyuru held at 10.30 A.M on 20-04-2019 in the Department of Physics.

Sri Ch. Vijay Anil Dai Presiding

Members Present:

**University Nominee** 

Academic Council

**Academic Council** 

**Representative from** 

Nominee

Nominee

Industry

1) Cin duel An Chairman

(Ch.Vijay Anil Dai)

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(Dr. M. Rama Krishna) NANCHADA NOO

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(Dr.P. Syam Prasad)

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(Dr. K. Suresh)

(I.Chittibabu)

6). Deer. Alumini (J. Dilip)

51 P. Dechate Lamara Member

(P.V. Ramana)

6) 1/ Mary Member (U. Ramprasad)

7) I. Horseehchandha Member (J. Hareeshchandra)

Head, Department of Physics

A.G. & S.G.S.Degree College of Arts &

Science, Vuyyuru - 521165.

Lecturer in Physics,

The Hindu College,

Machilipatnam.

Asst. Professor,

Dept. of Physics, NIT,

Warangal.

Lecturer in Physics,

VSR & NVR College for Arts & Sciences Tenali.

Sub Divisional Engineer, BSNL,

Vijayawada.

Lecturer in Physics, Srinivasa College, Gannavaram.

Lecturer in Physics, A.G. & S.G.S.Degree College of Arts & Science, Vuyyuru - 521165. Lecturer in Physics, A.G. & S.G.S.Degree College of Arts & Science, Vuyyuru - 521165. Lecturer in Physics, A.G. & S.G.S.Degree College of Arts & Science, Vuyyuru - 521165.

Contol :-

8) M. Satrery

(M. Sateesh)

9) Cet . Jayaser

(Ch. Jayasri)

Member

Member

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Lecturer in Physics, A.G. & S.G.S.Degree College of Arts & Science, Vuyyuru - 521165. Lecturer in Physics, A.G. & S.G.S.Degree College of Arts & Science, Vuyyuru - 521165.

- 1 .To recommend the syllabi and model papers for I semester of I Degree B.Sc., Physics for the Academic year 2019-2020.
- 2. To recommend the syllabi and model papers for III semester of II Degree B.Sc., Physics for the Academic year 2019-2020.
- 3. To recommend the syllabi and model papers for V semester of III Degree B.Sc. Physics for the Academic year 2019-2020.
- 4.To recommend the Blue print of question papers for I, III & V semesters of B.Sc. Physics for the Academic year 2019-2020.
- 5. To recommend the Guidelines to be followed by the question paper setters in Physics for I, III & V

Semester - end exams.

- 6. To recommend the teaching and evaluation methods to be followed under Autonomous status.
- 7. Any suggestions regarding seminars, workshops, Guest lecture to be organized.
- 8. Recommend the panel of paper setters and Examiners to the controller of Examinations of autonomous

Courses of A.G. & S.G.S.Degree colleges of Arts & Science, Vuyyuru.

9. Any other matter.

Cipy still this Chairman.

#### **RESOLUTIONS**

1) It is resolved to continue the same **syllabi and model papers for I semester of I B.Sc.** under Choice Based Credit System (CBCS) for the Academic year 2019-20 also.

2) It is resolved to change the **syllabi** for **III semester of II B.Sc.** under Choice Based Credit System (CBCS) for the Academic year 2019-20.

3) It is resolved to follow the same **syllabi and model papers** under Choice Based Credit System (CBCS) prescribed by Krishna University for **V semester of III B.Sc.** 

4) It is resolved to change the **Blue print** of III semester of Degree II B.Sc. for the Academic year 2019-20.

• It is resolved to continue the same **Blue prints** of I & V semesters of Degree B.Sc. for the Academic year 2019-20 also.

5) It is resolved to change the **Guidelines** of III semester of Degree II B.Sc. for the Academic year 2019-20.

• It is resolved to continue the same **Guidelines** of I & V semesters of Degree B.Sc. for the Academic year 2019-20.

6) It is resolved to continue the following teaching and evolution methods for Academic year 2019-20.

#### **Teaching Methods:**

Besides the conventional methods of teaching, we use modern technology i.e. using of LCD projector, U boards, virtual lab etc, for better understanding of concepts.

Evaluation of a student is done by the following procedure:

- > Internal Assessment Examinations:
- For I B.SC.(sem I) and II B.SC.(sem III) out of 100 marks in each paper, 30 marks shall be allocated for internal assessment
- Out of these 30 marks, 20 marks are allocated for announced tests (i.e.IA-1 & IA-2). Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks are allocated on the basis of candidate's percentage of attendance, 5 marks are allocated for assignment / class room seminars for I and III SEmesters.
- For III B.Sc (i.e. V semester) out of 100 marks in each paper, 25 marks shall be allocated for internal assessment. Out of these 25 marks, 15 marks are allocated for announced tests (i.e.IA-1 & IA-2). Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks are allocated on the basis of candidate's percentage of attendance and remaining 5 marks are allocated for the assignment.
- Semester End Examination:
- The maximum marks for I B.Sc and II B.SC. Semester End examination shall be 70 marks and duration of the examination shall be 3 hours.
- The maximum marks for III B.Sc Semester End examination shall be 75 marks and duration of the examination shall be 3 hours.
- Semester End examinations in theory papers and practical Examinations shall be conducted at the end of every semester I, III & V for I, II & III B.Sc.
- 7) Discussed and recommended for organizing seminars, **Guest lecturers**, workshops to upgrade the knowledge of students, for the approval of the academic council.

8) Discussed and empowered the Head of the department of Physics to suggest the panel of paper setters and examiners to the controller of examinations.

9) Proposed to conduct add on Programme /Certificate course.

Cipy And the Chairman.

# **DEPARTMENT OF PHYSICS**

# A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU – 521 165 I B.Sc. 1st Semester (2019-2020) Physics Paper I: <u>Mechanics & Properties of Matter</u>

Work load: 60Hrs per semester

4 hrs/week

UNIT I (14 hrs)

1. Vector Analysis : Scalar and vector fields, gradient of a scalar field and its physical significance. Divergence and curl of a vector field with derivations and physical interpretation. Vector integration (line, surface and volume), State and proof of Gauss Divergence and Stokes theorem. UNIT II : (10hrs)

#### 2. Mechanics of particles:

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

#### UNIT III (16 hrs)

3. Mechanics of Rigid bodies : 10 hrs

Definition of rigid body, rotational kinematic relations, equation of motion for a rotating body, angular momentum. Euler equation, applications, precession of a top.Gyroscope, precession of the equinoxes.

4. Mechanics of continuous media : 6hrs

Elastic constants of isotropic solids and their relation, Poisson's ratio and expression for Poisson's ratio in terms of y, n, k. Classification of beams, types of bending, point load, distributed load, shearing force and bending moment, sign conventions.

#### UNIT IV (10Hrs)

#### 5. Central forces :

Central forces, definition and examples, conservative nature of central forces, conservative force as a negative gradient of potential energy, equation of motion under a central force.Statement and Derivation of Kepler's laws. Motion of satellites.

#### UNIT V (10 hrs)

#### 6. Special theory of relativity :

Galilean relativity, absolute frames. Michelson-Morley experiment, negative result. Postulates of special theory of relativity. Lorentz transformation, time dilation, length contraction, addition of velocities, mass-energy relation. (amu=931Mev)

#### **Reference Books:**

- 1. BSc Physics -Telugu Akademy, Hyderabad
- 2. Mechanics D.S. Mathur, Sulthan Chand & Co, New Delhi
- 3. Mechanics J.C. Upadhyaya, Ramprasad& Co., Agra
- 4. Properties of Matter D.S. Mathur, S. Chand& Co, New Delhi, 11th Edn., 2000
- 5. Physics Vol. I Resnick-Halliday-Krane, Wiley, 2001
- 6. Properties of Matter Brijlal&Subrmanyam, S. Chand&Co. 1982
- 7. Dynamics of Particles and Rigid bodies- Anil Rao, Cambridge Univ Press, 2006
- 8. Mechanics-EM Purcell, McGraw Hill

# DEPARTMENT OF PHYSICS A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU – 521 165 II B.Sc. 3<sup>rd</sup> Semester (2019-2020) Paper III: Wave Optics

# Work load: 60 hrs per semester III SEMESTER

4 hrs/week

### <u>UNIT-I</u> .. (7 hrs)

#### 1. Aberrations:

Introduction – monochromatic aberrations, spherical aberration, methods of minimizing spherical aberration, coma, astigmatism and curvature of field, distortion. Chromatic aberration-the achromatic doublet. Achromatism for two lenses (i) in contact and (ii) separated by a distance.

#### <u>UNIT –II</u> .. (9 hrs )

#### 2. Interference :

#### **Division of wavefront:**

Principle of superposition-coherence-conditions for interference of light..Fresnel's biprism-determination of wavelength of light. Determination of thickness of a transparent material using biprism –Determination of the thickness of a thin sheet of transparent material. Change of phase on reflection – Stoke's Law.

#### <u>UNIT –III</u> .. (10 hrs ) 3. Division of Amplitude:

Oblique incidence of a plane wave on a thin film due to reflected and transmitted light (cosine law) –colors 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- Determination of wavelength of monochromatic light. Michelson interferometer- Determination of wavelength of monochromatic light.

# <u>UNIT- IV</u> .. (12 hrs )

#### 4. Diffraction:

Introduction, distinction between Fresnel and Fraunhoffer diffraction, Fraunhoffer diffraction –Diffraction due to single slit and circular aperture-Limit of resolution-Fraunhoffer diffraction due to double slit-Fraunhoffer diffraction pattern with N slits (diffraction grating). Resolving power of grating-Determination of wavelength of light in normal and oblique incidence methods using diffraction grating.

Fresnel's half period zones-area of the half period zones-zone plate-comparison of zone plate with convex lens-difference between interference and diffraction.

#### UNIT-V

5.Polarisation (12 hrs) : Polarized light: methods of polarization polarization by reflection, refraction, double refraction, scattering of light-Brewster's law-Mauls law-Nicol prism polarizer and analyzer-Quarter wave plate, Half wave plate-optical activity, analysis of light by Laurent's half shade polarimeter-Babinet's compensator.

#### 6. Lasers and Holography: (10 hrs)

Lasers: introduction.spontaneous emission, stimulated emission. Population Inversion, Laser principle-Einstein coefficients-Types of lasers-He-Ne laser, Rubv laser- Applications of lasers. Holography: Basic principle of holography-Gabor hologram and its limitations, Applications of holography.

#### **TEXT BOOKS:**

- 1. BSc Physics, Vol.2, Telugu Akademy, Hyderabad
- 2. A Text Book of Optics-N Subramanyam, L Brijlal, S. Chand& Co.
- 3. Unified Physics Vol.II Optics & Thermodynamics Jai Prakash Nath&Co.Ltd., Meerut
- 4. Second Year Physics, K. Ramakrishna, D.V. Brahmaji, A. Sreenivasa Rao & S.L.V. Mallikarjun, VikasPublications, Guntur.

#### **REFERENCE BOOKS:**

- 1. Optics, F..A. Jenkins and H.G. White, Mc Graw-Hill
- 2. Optics, AjoyGhatak, Tata Mc Graw-Hill.
- 3. Fundamentals of Physics. Halliday/Resnick/Walker.C. Wiley India Edition 2007
- 4. Introduction of Lasers Avadhanulu, S. Chand& Co.
- 5. Fundamentals of Optics, H.R. Gulati and D.R. Khanna, 1991, R. Chand Publication
- 6. Principles of Optics- BK Mathur, Gopala Printing Press, 1995

#### DEPARTMENT OF PHYSICS

# A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU - 521 165 III B.Sc. 5th Semester (2019-2020)

#### Paper V: Electricity, Magnetism and Electronics

# Work load:60 hrs per semester

4 hrs/week

V SEMESTER Course Code : PHY 501C

# Unit – I(12hrs)

#### **1.Electrostatics**

Gauss's law Statement and its proof-Electric field intensity due to (1) Uniformly charged sphere and (2) an infinite conducting sheet of charge. Electric potential-Equipotential surface -potential due to i) a point charge ii)charged spherical shell . 2.Dielectrics

Electric dipolement and molecular polarizability- Electric displacement D, electric polarization P - relation between D, E, and P- Dielectric constant, susceptibility.

#### Unit – II(12hrs)

**3. Electric and magnetic field** Biot – Savart's law and calculation of B due to long straight wire, a circular current loop and solenoid. Hall effect-determination of Hall coefficient and applications.

#### 4. Electromagnetic induction

Faraday's law – Lenz's law self and mutual inductance, coefficient of coupling, calculation of self inductance of a long solenoid, energy stored in magnetic field. Tansformer- energy losses and efficiency.

#### Unit-III(12hrs)

#### 5. Alternating current and electro magnetic waves

Alternating current –Relation between current and voltage in LR and CR circuits, vector diagrams, LCR series and parallel resonant circuit, Q- factor, power in AC circuits.

#### 6.Maxwell's equations

Idea of displacement current- Maxwell's equations (integral and differential forms) (no derivation) Maxwell's wave equation(with derivation), Transverse nature of electromagnetic wave. Pointing Vector (statement and proof) production of electromagnetic wave Hertz experiment.

#### Unit-IV(12hrs)

#### 7.Basic electronics:

PN junction diode Zener diode ,I-V characteristics, PNP and NPN Transistors, CB,CE and CC configuration Relation between  $\alpha$   $\beta$  and  $\Gamma$  transistors (CE) characteristics,Transistor as an amplifier.

#### Unit-V(12hrs)

#### **Digital electronics:**

Number systems-conversion of binary to decimal system and vice versa. Binary addition and subtraction (1's and 2's complement methods) laws of Boolean algebra-De Morgan's laws- statement and proof basic logic gates, NAND and NOR as universal gates Half adder and FULL adder.

#### **REFERENCE BOOKS**

- **1)** BSC Physics vol.3 Telugu Akademy, Hyderabad.
- 2) Electricity, Magnetism D,N Vasudeva. S.chand & co.,
- 3) Electricity, Magnetism and Electronics, K.K.Tewai, R.Chand &co.,
- 4) Principles of electronics, V.K.Mehta, S.Chand &co.,
- 5) Digital principles and applications A.P Malvino and D.P.Leach, Mc GrawHILL Edition.

#### **DEPARTMENT OF PHYSICS**

# A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU – 521 165

#### III B.Sc. Physics – V Semester – Paper –VI (2019 – 2020)

#### **Modern Physics**

Course Code : PHY 502C Work Load : 60 hrs per semester 4 hrs/week Unit – I (12 hrs)

#### 1. Atomic and molecular physics

Introduction – Drawbacks of Bohr's atomic model – Sommerfeld's elliptical orbits- relativistic correction (no derivation). Vector atom model and Stern & Gerlach experiment - quantum numbers associated with it. L-S and j-j coupling schemes. Zeeman Effect and its experimental study.

Raman effect, stokes and Anti stokes lines . Quamtum theory of Raman effect. Experimental arrangement – Applications of Raman effect.

#### UNIT – II (12 hrs)

#### 2. Matter waves & Uncertainty Principle

Matter waves, de Broglie's hypothesis – wavelength of matter waves, Properties of matter waves – Davisson and Germer experiment–Heisenberg's uncertainty principle for position and momentum (x and p) & energy and time (E and t). Experiment verification.

#### UNIT - III (12 hrs)

#### 3. Quantum (wave) mechanics

Basic postulates of quantum mechanics – Schrodinger time independent and time dependent wave equation – derivations. Physical interpretation of wave function. Applications of Schrodinger wave equation to particle in one dimensional infinite box. Harmonic oscillator.

#### UNIT – IV (12 hrs)

#### 4. General properties of Nuclei

Basic ideas of nucleus – size,mass,charge density(matter energy), binding energy,angular momentum, parity, magnetic moment, electric quadrupole moments.Liquid drop model and shell model (qualitative aspects only)- Magic numbers.

#### 5. Radioactivity decay

Alpha decay : basis of  $\alpha$  – decay processes. Range of  $\alpha$ -particles , Geiger"s Law,Geiger- Nuttal law.  $\beta$  – decay,  $\beta$  ray continuous and discrete spectrum, neutrino hypothesis.

#### UNIT – V (12 hrs) 6.Crystal structure

Amorphous and crystalline materials, unit cell, Miller indices, reciprocal lattice, types of lattices, diffraction of X- rays by crystals, Bragg's law, experimental techniques, Laue's method and powder diffraction method.

### 7. Superconductivity:

Introduction – experimental facts, critical temperature – critical field – Meissner effect – isotope effect – Type I and Type II superconductors – BCS theory (elementary ideas only) – applications of superconductors.

# **REFERENCE BOOKS :**

1.B.Sc physics, VOL .4, Telugu academy , Hyderabad.

- 2. Molecular structure and spectroscopy by G.Aruldas. prentice Hall of india , New Delhi.
- 3. Modern physics by R.Murugeshan and Kiruthiga siva prasanth. S. Chand & co.
- 4. Modern physics by G.Aruldhas & p. Rajagopal. Eastren economy edition.
- 5. Concepts of Modern physics by Arthur Beiser. Tata Mcgrew Hill Edition.
- 6. Quantum Mechanics, Mahesh c Jain , Eastern Economy EDITION
- 7. Nuclear Physics , Irving Kaplan, Narosa Publishing House.
- 8. Nuclear physics , D.C Tayal, Himalaya publishing house.
- 9. Elements of solid state physics, J.P srivastava, Prentice Hall of india pvt. Ltd.
- 10. Solid state physics, A.J.Dekkar, McMillan India.

# Practical paper 1: Mechanics

Exam duration : 3Hours Maximum marks : 50 marks

# Work load: 30 hrs per semester

# Minimum of 6 experiments to be done and recorded

- 1. Volume resonator
- 2. Viscosity of liquid by the flow method (Poiseuille's method)
- 3. Young's modulus material a rod by uniform bending
- 4. Young's modulus material a rod by non- uniform bending
- 5. Surface tension of a liquid by the method of drops
- 6. Surface tension of a liquid by capillary rise method
- 7. Determination of radius of capillary tube by Hg thread method **8**.Viscosity of liquid by logarithmic decrement method
- 9. Bifilar suspension –moment of inertia.
- 10. Rigidity modulus of material of a wire-dynamic method (torsional pendulum)
- 11. Fly-wheel
- 12. Determination of Y of bar -cantilever.

# **Practical Paper III: Wave Optics**

Exam duration : 3Hours Maximum marks : 50 marks

#### Work load:30 hrs

#### Minimum of 6 experiments to be done and recorded

- 1. Determination of radius of curvature of a given convex lens-Newton's rings.
- 2. Resolving power of grating.
- 3. Study of optical rotation –polarimeter.
- 4. Dispersive power of a prism.
- 5. Determination of wavelength of light using diffraction grating- minimum deviation method.
- 6. Wavelength of light using diffraction grating-normal incidence method.

- 7. Resolving power of a telescope.
- 8. Refractive index of a liquid-hallow prism
- 9. Determination of thickness of a thin fiber by wedge method
- 10. Spectrometer- i-d curve.
- 11. Determination of refractive index of liquid-Boy's method.
- 12. Determination of wavelength-Hartmann formula (prism)

# Practical paper V: Electricity, Magnetism and Electronics

Exam duration : 3Hours Maximum marks : 50 marks Work load: 30hrs

# Minimum of 6 experiments to be done and recorded

- 1. Figure of merit of a moving coil galvanometer.
- 2. LCR circuit series/parallel resonance, Q-factor
- 3. Determination of Ac-frequency-sonometer
- 4. Verification of Kirchoff's laws
- 5. Field along the axis of a circular coil carrying current.
- 6. PN Junction diode Characteristics
- 7. characteristics of Zener diode
- 8. Transistor CE Characteristics.
- 9. Logic Gates –OR ,AND, NOT, and NAND gates verification of truth tables.
- 10. Verification of De Morgan's theorems.

**Practical Paper VI : Modern Physics** Exam duration : 3Hours Maximum marks : 50 marks

Work load : 30 hrs

# Minimum of 6 experiments to be done and recorded

- 11. 1. e/m of an electron by Thomson method.
- 12. 2. Determination of Planck's Constant (photocell)
- 13. 3. Verification of inverse square law of light using photovoltaic cell.
- 14. 4. Study of absorption of  $\alpha$  rays.
- 15. 5. Study of absorption of .  $\beta$  rays.
- 16. 6. Determination of range of  $\beta$  particles.
- 17. 7. Determination of M & H.
- 18. 8. Analysis of powder X- ray diffraction pattern to determine properties of crystals.
- 19. 9. Energy gap of semiconductor using junction diode.
- 20. 10. Energy gap of a semiconductor using Thermistor.