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

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

Accredited by NAAC with "A" Grade

2020-2021



DEPARTMENT OF PHYSICS MINUTES OF BOARD OF STUDIES

ODD SEMESTER

08-07-2020

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 08-07-20 in the Department of Physics.

Sri Ch. Vijay Anil Dai Presiding

Members Present:

1) Com steril Dri

(Ch.Vijay Anil Dai)

meen

(Dr. M. Rama Krishna N)

3) T Ham Boloch

(Dr.P. Syam Prasad)

(Dr. K. Suresh)

5).....

(I.Chittibabu)

Industry '

6). J Viley Alumini (J. Dilip)

51 P. Jerh Kamana Member

(P.V. Ramana)

6) A. tapen

(U. Ramprasad)

Member

7) J. Hasseeh cha laMember

(J. Hareeshchandra)

Chairman

University Nominee

Academic Council Nominee

Academic Council Nominee

Representative from

Head, Department of Physics A.G. & S.G.S.Degree College of Arts & Science, Vuyyuru - 521165. Lecturer in Physics, HEAD, DEPT. DE Halles 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.

8) M. Sateerh (M. Sateesh)

Member

9) M. purna Disca presinala (M.P.D.Parimala)

Member

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.

Agenda for B.O.S Meeting

- 1 .To recommend the syllabi and model papers for I semester of I Degree B.Sc., Physics for the Academic year 2020-2021.
- 2. To recommend the syllabi and model papers for III semester of II Degree B.Sc., Physics for the Academic year 2020-2021.
- 3. To recommend the syllabi and model papers for V semester of III Degree B.Sc. Physics for the Academic year 2020-2021.
- 4.To recommend the Blue print of question papers for I, III & V semesters of B.Sc. Physics for the Academic year 2020-2021.
- 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 Aint this

Chairman.

RESOLUTIONS

- It is resolved to change the syllabi and model papers for I semester of I B.Sc. as prescribed by APSCHE for the Academic year 2020-21.
- 2) It is resolved to continue the same syllabi and model papers for III semester of II B.Sc. under Choice Based Credit System (CBCS) for the Academic year 2020-21.
- 3) It is resolved to continue the same syllabi and model papers for V semester of III B.Sc. under Choice Based Credit System (CBCS) for the Academic year 2020-21.
- It is resolved to change the Blue print for I semester of Degree I B.Sc. as prescribed by APSCHE for the Academic year 2020-21.
- 5) It is resolved to continue the same **Blue print** for III & V semesters of Degree II, III B.Sc. for the Academic year 2020-21.
- It is resolved to continue the same Guidelines for III & V semesters of Degree II, III B.Sc. for the Academic year 2020-21.
- It is resolved to continue the following teaching and evolution methods for Academic year 2020-21.

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), II B.SC.(sem III) and III B.Sc (i.e. V semester) 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, III and V Semesters.
- Semester End Examination:
- The maximum marks for I B.Sc , II B.SC and III B.Sc. Semester End examination shall be 70 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.
- 8) Discussed and recommended for organizing seminars, **Guest lecturers**, workshops to upgrade the knowledge of students, for the approval of the academic council.
- 9) Discussed and empowered the Head of the department of Physics to suggest the panel of paper setters and examiners to the controller of examinations.
- 10) Discussed and recommended to incorporate the percentage of the new syllabus, if introduced /reduced/ made by APSCHE/UGC/ Krishna University for the academic year 2020-21. The same syllabus shall be incorporated as per the guidelines of the competent authority.

Cip Aul du Chairman.

DEPARTMENT OF PHYSICS A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE

(AUTONOMOUS), VUYYURU – 521 165 I B.Sc. 1st Semester (2020-2021)

Physics Paper I: Mechanics & Properties of Matter

Work load: 60hrs per semester UNIT-I: 4 hrs/week

1. Mechanics of Particles (5 hrs)

Review of Newton's Laws of Motion, Motion of variable mass system, Motion of a rocket, Multistage rocket, Concept of impact parameter, scattering cross-section, Rutherford scattering-concept only.

2. Mechanics of Rigid bodies (7 hrs)

Rigid body, rotational kinematic relations, Equation of motion for a rotating body, Angular momentum and Moment of inertia tensor, Euler equations, Precession of a spinning top, Gyroscope, Precession of atom and nucleus in magnetic field, Precession of the equinoxes

Unit-II:

3. Motion in a Central Force Field (12hrs)

Central forces, definition and examples, characteristics of central forces, conservative nature of central forces, Equation of motion under a central force, Kepler's laws of planetary motion- Proofs, Kepler's third law from inverse-square law of Gravitation. Motion of satellites, Basic idea of Global Positioning System (GPS).

UNIT-III:

4. Relativistic Mechanics (12hrs)

Introduction to relativity, Frames of reference, Galilean transformations, absolute frames, Michelson-Morley experiment, Postulates of Special theory of relativity, Lorentz transformation, time dilation, length contraction, variation of mass with velocity, Einstein's mass-energy relation

Unit-IV:

5. Undamped, Damped and Forced oscillations: (07 hrs)

Simple harmonic oscillator and solution of the differential equation, Damped harmonic oscillator, Forced harmonic oscillator – Their differential equations and solutions, Resonance, Logarithmic decrement, Relaxation time and Quality factor.

6. Coupled oscillations: (05 hrs)

Coupled oscillators-Introduction, Two coupled oscillators, N-coupled oscillators and wave equation.

Unit-V:

7. Vibrating Strings: (07 hrs)

Transverse wave propagation along a stretched string, General solution of wave equation and its significance, Modes of vibration of stretched string clamped at ends, Overtones and Harmonics, Melde's strings.

8. Ultrasonics: (05 hrs)

Ultrasonics, General Properties of ultrasonic waves, Production of ultrasonics by piezoelectric and magnetostriction methods, Detection of ultrasonics, Applications of ultrasonic waves, Ultrasonic interferometer.

REFERENCE BOOKS:

✤ B. Sc. Physics, Vol.1, Telugu Academy, Hyderabad

Fundamentals of Physics Vol. I - Resnick, Halliday, Krane , Wiley India
 2007

College Physics-I. T. Bhimasankaram and G. Prasad. Himalaya Publishing House.

 University Physics-FW Sears, MW Zemansky& HD Young, Narosa Publications, Delhi

- Mechanics, S.G.Venkatachalapathy, Margham Publication, 2003.
- ↔ Waves and Oscillations. N. Subramanyam and Brijlal, VikasPulications.
- Unified Physics Waves and Oscillations, Jai PrakashNath&Co.Ltd.

✤ Waves & Oscillations. S.Badami, V. Balasubramanian and K.R. Reddy, Orient Longman.

- * The Physics of Waves and Oscillations, N.K.Bajaj, Tata McGraw Hill
- Science and Technology of Ultrasonics- Baldevraj, Narosa, New

Delhi,2004

The Guidelines to be followed by the question paper setters in Physics for the First semester - end exams (2020-2021)

PAPER TITLE: Mechanics, waves & Oscillations

Paper- I Semester – IMaximum marks: 70 Duration: 3Hours Weightage for the question paper

Syllabus	Section-A (Short answer questions)	Section-B (Essay questions)
Unit-1 (30 Marks)	T+P	2
Unit-2 (20 Marks)	T+P	1
Unit-3 (25 Marks)	Т	2
Unit-4 (25 Marks)	Т	2
Unit-5 (20 Marks)	T+P	1

Note: T means one theory question, P means one problem

Section-A contains 5 short questions and 3 problems out of these

8 questions, the student has to answer any **4**, each question carries **5** marks.

- Section –B contains 8 essay questions, the student has to answer any 5 questions, each question carries 10 marks
- The Question papers setters are requested to cover all the topics in the syllabus as per the weightage given by us.

MODEL PAPER

PAPER TITLE : <u>Mechanics, waves & Oscillations</u>

Duration : 3Hours	Maximum marks : 70 mark	Pass marks : 28 marks
	Section – A	

Answer any Four of the following questions

4x5=20m

1. Write a note on impact parameter.

2 .A car develop 75KW power when rotating at a speed of 100 rpm what is the torque acting?

3. What is Central Force? Give to Two examples.

4 . Explain length contraction.

5. If the earth be one - half of its present distance From the sun, What will be the number of days in a year.

6.Explian logarithmic decrement & Quality factor.

7. Explain fundamental frequency, overtone and harmonics.

8. Calculate the fundamental frequency of a quartz crystal of thickness 0.001m. Given $y=7.9x10^{10}$ n/m² p=2650kg/m³

<u>Section – B</u>

Answer any FIVE of the following questions 5X10=50M

9. Derive an expression for the velocity of a variable mass System.

- 10.Derive the Eluer equations of rotational motion for a rigidi body fixed at one end.
- 11. State kepler's laws of planetary motion. Derive kepler's first laws of planetary motion.
- 12. State the postulates of special theory of relativity. Derive the Lorentz transformation equation
- 13. Describe the Michelson Morley Experiment with relevant theory and discuss the importance of its result.

14. What is the simple harmonic oscillator? Derive equation of motion of the simple harmonic oscillator and its solution.

15. What is forced oscillation? Derive the differential equation of forced oscillation. Obtain its solution .

16. Explain the production of ultrasonic by magnetostriction method.

Practical paper 1: Mechanics Waves and Oscillations

Exam duration : 3Hours Maximum marks : 50 marks

Minimum of 6 experiments to be done and recorded

1. Young's modulus material a rod by uniform bending

2. Young's modulus material a rod by non- uniform bending

3. Surface tension of a liquid by capillary rise method

4.Fly-wheel- Determination of moment of inertia.

5. Determination of 'g' by compound/bar pendulum

6. Determination of the elastic constants of the material of a flat spiral spring.

7. Determination of the frequency of a bar- Melde's experiment.

8. Study of a damped oscillation using the torsional pendulum immersed in liquid-decay constant and damping correction of the amplitude.

DEPARTMENT OF PHYSICS

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU – 521 165 II B.Sc. 3rd Semester (2020-2021)

III SEMESTERPaper III: Wave OpticsWork load: 60 hrs per semester4 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.

<u>UNIT-V</u> 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, Ruby 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

The Guidelines to be followed by the question paper setters in Physics for the III Semester - end exams

PAPER TITLE: Wave Optics

Paper- III Semester – III Maximum marks: 70 marks Duration: 3Hours

Weightage for the question paper

Syllabus	Section-A (Short answer questions)	Section-B (essay questions)
Unit-1(20 Marks)	T+P	1
Unit-2(15 Marks)	Т	1
Unit-3(30 Marks)	T+P	2
Unit-4(25 Marks)	Т	2
Unit-5(30 Marks)	T+P	2

Note: T means one theory question, P means one problem

- <u>Section-A</u> contains 5 short questions and 3 problems out of these 8 questions, the student has to answer any 4, each question carries 5 marks.
- \blacktriangleright <u>Section B</u> contains 8 essay questions, the student has to answer any 5 questions, each question carries 10 marks.
- The Question papers setters are requested to cover all the topics in the syllabus as per the weightage given by us.

SEMESTER – III COURSE CODE : PHY-301C PAPER TITLE : Wave Optics MODEL PAPER Duration : 3Hours Maximum marks : 70 marks Pass marks : 28 marks **II B.Sc (PHYSICS) - III SEMESTER - WAVE OPTICS PHY – 301 C** MAX MARKS: 70 **TIME: 3 HRS** SECTION - A **ANSWER ANY FOUR OF THE FOLLOWING** (4 X 5 = 20 M)1)Explain coma in lenses with a neat diagram 2)Derive condition for change of phase of reflection by stokes law 3) Explain the formation of colours in thin films 4) Explain the difference between interference and diffraction

5) State and explain Malus law

6) Two thin convex lenses of focal length 0.25 m and 0.20 m are placed coaxially 10 cm apart. Find the focal length of combination.

7) In Newton's ring experiment, the diameter of the 10th dark ring is 0.433 cm. Find the wavelength of light, if the radius of curvature of the lens is 70 cm 8) A half wave plate is constructed for a wavelength of 6000 Å, for what wave length does it work as a quarter wave plate.

<u>SECTION – B</u>

ANSWER ANY FIVE OF THE FOLLOWING

(5 X 10 = 50 M)

9) What is chromatic aberration . obtain an expression for the chromatic aberration of a lens .Derive the condition for achromatism when the lens are in contact and seperated by a distance .

10)Describe Fresel's biprism method to determine the wavelenghth of light by forming interference fringes.

11) Describe the experimental arrangement to observe Newton's rings by reflected light. Obtain an expressions for the diameter of nth bright and dark rings

12) Describe the principle, construction and working of Michelsons interferometer with a sketch .

13) What is diffraction. Describe Fraunhoffer's diffraction due to single slit.

14) Describe the construction and working of a zone plate with necessary theory

15) Describe the construction and working of Nicol prism. Explain how it is used as polarizer and analyser.

16) Write a note on spontaneous emission and stimulated emission. Explain the construction and working of ruby laser.

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)

DEPARTMENT OF PHYSICS A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU – 521 165 III B.Sc. 5th Semester (2020-2021) Paper V: Electricity, Magnetism and Electronics

Work load:60 hrs per semester 4 hrs/week 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 α β and Γ 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.

The Guidelines to be followed by the question paper setters in Physics for the V Semester - end exams

PAPER TITLE: Electricity, Magnetism and Electronics

Paper- V Semester – V Maximum marks: 70 marks Duration: 3Hours Weightage for the question paper

Syllabus	Section-A (Short answer questions)	Section-B
		(cssay questions)
Unit-1 (25 Marks)	Т	2
Unit-2 (20 Marks)	T+P	1
Unit-3 (30Marks)	T+P	2
Unit-4 (20 Marks)	T+T	1
Unit-5 (25 Marks)	Т	2

Note: T means one theory question, P means one problem

- Section-A contains 6 short questions and 2 problems out of these
 8 questions, the student has to answer any 4, each question carries
 5 marks.
- Section –B contains 8 essay questions, the student has to answer any 5 questions, each question carries 10 marks.
- The Question papers setters are requested to cover all the topics in the syllabus as per the weightage given by us.

SEMESTER – V

COURSE CODE : PHY-501 C

PAPER TITLE : Electricity, Magnetism and Electronics

Duration : 3Hours Maximum marks : 70 Pass marks : 28 marks

MODEL PAPER

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE (AUTONOMOUS), VUYYURU – 521 165 III B.Sc. (PHYSICS)- V SEMESTER ELECTRICITY, MAGNETISM AND ELECTRONICS

TIME: 3 Hrs PHY – 501 C MAX MARKS: 70 PASS MARK : 28

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<u>SECTION – A</u>

ANSWER ANY FOUR OF THE FOLLOWING

(4 X 5 = 25 M)

- 1) Write a short note on equi potential surfaces
- 2) obtain an expression for energy stored in a magnetic field
- 3) Derive expression for power in ac circuit
- 4) Explain CE configuration of a transisitor
- 5) Explain briefly how a transisitor works as an amplifier
- 6) Explain about half adder circuit with truth table.
- 7) Calculate the intensity of the magnetic field at the center of a circular coil of radius 20 cm and 40 turns having a current of 2A in it.
- 8) In a series RLC circuit R = 100 ohm, L = 0.5H and C = 0.4 μ F. calculate resonant frequency

$\underline{SECTION - B}$

ANSWER ANY FIVE OF THE FOLLOWING QUESTIONS (5 X 10 = 50 M)

9) Derive an expression for the electric field due to uniformly charged sphere using Gauss law?

10) Define D, E and P derive the relation between them

11) Calculate the magnetic induction due to a long straight wire using Biot- savart's law

- 12) State and prove pointing theorem
- 13) Explain the growth and decay of charge in LR- circuit
- 14) Describe the construction and working of Zener diode.
- 15) State and prove De Morgan's theorem with examples.
- 16) Explain about basic logic gates with truth tables.

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.

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 (2020 – 2021)

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 orbitsrelativistic 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, uses of electron diffraction-Phase velocity and Group velocity (definitions only)- relation between phase velocity and Group velocity–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 α – decay processes. Range of α -particles , Geiger"s Law,Geiger- Nuttal law. β – decay, β 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.

The Guidelines to be followed by the question paper setters in Physics for the V Semester - end exams

PAPER TITLE: Modern Physics

Paper- VI Semester – V Maximum marks: 70 marks Duration: 3Hours Weightage for the question paper

Syllabus	Section-A (Short answer questions)	Section-B (Essay questions)
Unit-1 (25 Marks)	Т	2
Unit-2 (20 Marks)	T+P	1
Unit-3 (25Marks)	Т	2
Unit-4 (20 Marks)	T+T	1
Unit-5 (30 Marks)	T+P	2

Note: T means one theory question, P means one problem

- <u>Section-A</u> contains 6 short questions and 2 problems out of these
 8 questions, the student has to answer any 4, each question carries
 5 marks.
- \geq <u>Section B</u> contains 8 essay questions; the student has to answer any 5 questions. Each question carries 10 marks.

The Question papers setters are requested to cover all the topics in the syllabus as per the weightage given by us.

SEMESTER – V	COURSE CODE : PHY-502

PAPER TITLE : Modern Physics (Model Paper)

Duration : 3Hours

<u>III B.Sc. Physics – V Semester – Paper –VI (2020 – 2021)</u> <u>Modern Physics</u>

Paper Code : PHY 502C <u>SECTION-A</u>

Answer any FOUR questions

- 1. Write the Draw backs of Bohr's atomic model.
- 2. Explain deBroglie concept of matter waves.
- 3. Explain Geiger-Nuttal law.
- 4 Write a note on liquid drop model.
- 5. Explain Meissner effect in super conductivity.
- 6. State postulates of Quantum Mechanics.

7. In a crystal lattice plane cuts intercepts 2a, 3b and 6c along the three axes where a,b and c are primitive vectors of the unit cell. Determine the miller indices of the given plane.

8. If the uncertainty in position of an electron is $4x10^{-10}$ m and uncertainty in its momentum is $1.65x10^{-24}$ kg m/sec.

SECTION-B

Answer any **FIVE** questions :

9. Describe Stern and Gerlach experiment and discuss the importance of the results obtained

10. What is Raman Effect? Write the Experimental setup to study Raman Effect.

11. Describe Davisson and Germer Experiment on electron diffraction. Discuss the results of the Experiment.

12. Derive Time independent Schrodinger wave equation.

13. Calculate the energy of a particle in one dimensional box using Schrodinger equation.

14. Mention the Basic Properties of Nucleus with reference to Size, Charge, Mass, Nuclear spin and Electric Quadra pole Moment.

15. Describe X-Ray diffraction by Laue's method.

16. Explain Type-I and Type-II Superconductors.

(4x5=20M)

(5x10=50M)

Maximum marks : 70

Pass marks : 28 marks

Work load : 30 hrs

Minimum of 6 experiments to be done and recorded

- 1. e/m of an electron by Thomson method.
- 2. Determination of Planck's Constant (photocell)
- 3. Verification of inverse square law of light using photovoltaic cell.
- 4. Study of absorption of α rays.
- 5. Study of absorption of . β rays.
- 6. Determination of range of β particles.
- 7. Determination of M & H.

8. Analysis of powder X- ray diffraction pattern to determine properties of crystals.

9. Energy gap of semiconductor using junction diode.

10. Energy gap of a semiconductor using Thermistor.

3 hrs.