Dr V S Krishna Government Degree College(A), Visakhapatnam

## UG PROGRAMMES IN PHYSICS

### Learning Outcomes Based Curriculum Framework for Under Graduate Programs in Physics

The LOCF for UG programs in Physics is designed to develop knowledge, Reasoning, Understanding and Experimental Skills of the learners in the field of Physics. It is designed to improve rational thinking of the learner and to develop into a skilled communicator and practical utilizer and demonstrator of complex theoretical knowledge and experimental skills in day to day life of himself and his environment. The Curriculum is developed ensure that the learner understand the importance of physics in biological system of animate world.

1.  The following undergraduate programs are offered at Present
    a.  B.Sc., Mathematics, Physics and Chemistry (English Medium)
    b.  B.Sc., Mathematics, Physics and Chemistry (Telugu Medium)
    c.  B.Sc., Mathematics, Physics and Computer Science (English Medium)
    d.  B.Sc., Mathematics, Physics and Computer Science (Telugu Medium)
    e.  **B.Sc.,Physics(Honors)**
2.  Graduate Attributes in Physics
    a.  Knowledge and Skills related to the Basic Physics Discipline
    b.  Problem Solving Skills
    c.  Rational and Critical Thinking Skills
    d.  Project Management Skillls
    e.  Leadership Skills( Team player/ Team worker)
    f.  Skills related to application of Information Technology
    g.  Inquiring Skills
    h.  Research Skills
    i.  Interest in lifelong learning of knowledge of Physics
3.  Program Learning outcomes relating to B.Sc. Course in Physics
    a.  Sound knowledge of Various branches of Physics such as Mathematical Physics, Mechanics, Properties of Matter, Waves and Oscillations, Optics, Thermodyanamics and Radiation Physics, Electricity, Magnetism and Electronics, Atomic Physics, Nuclear Physics, solid State Physics, Electives such as Renewable Energy and Cluster Electives
    b.  Practical and experimental skills for demonstrating and understanding advanced theoretical concepts of Physics.
    c.  Problem solving and Reasoning Skills.
    d.  Project Management
    e.  Communication Skills
    f.  Research and Developmental Skills
    g.  ICT Skills

4. UG Physics Course Structure

| Year | Semester | Course | Title of the Course | Marks | No.ofHrs /Week | No.of Credits |
|---|---|---|---|---|---|---|
| I | I | I | Mechanics, Waves and Oscillations | 100 | 4 | 04 |
| | | | Practical Course- I | 50 | 3 | 01 |
| | II | II | Wave Optics | 100 | 4 | 04 |
| | | | Practical Course – II | 50 | 3 | 01 |
| II | III | III | Heat and Thermodynamics | 100 | 4 | 04 |
| | | | Practical Course – III | 50 | 3 | 01 |
| | IV | IV | Electricity, Magnetism and Electronics | 100 | 4 | 04 |
| | | | Practical Course – IV | 50 | 3 | 01 |
| | | V | Modern Physics | 100 | 4 | 04 |
| | | | Practical Course –V | 50 | 3 | 01 |
| Total No. of Courses : **05 (Five)** | | | | | | |

Course Learning Outcomes
COURSE-1 MECHANICS, WAVES AND OSCILLATIONS

1. To understand the concepts of particle mechanics and basic concepts of scattering

2. To understand the concepts of rotational motion of rigid bodies

3. To understand the motion of particle under central force field

4. To understand the relativistic mechanics. To understand the consequences of special relativity.

5.To the understand the nature of simple, damped, forced and coupled oscillations

6.To understand the Galilean relativity and special relativity. To understand the consequences of special relativity.

7. To study the vibrations of strings.

8. To understand the production, properties and applications of ultrasonics

COURSE-2 WAVE OPTICS
1.To understand the Interference phenomenon and to study interference by division of amplitude and division of wave front
2. To understand the concept Fresnel and Fraunhofer diffraction
3.To understand the concept of polarization and optical activity

4. To understand various defects in images and their elimination
5. To understand Elementary concepts of fiber optic communications
6. To understand the concept of laser and holography

COURSE-3 HEAT AND THERMODYNAMICS

1. To understand the concepts of kinetic theory of gases and to study the transport phenomena in ideal gases
2. To understand laws of thermodynamics with special focus on entropy
3. To understand the importance of thermodynamic potentials and their applicatons
4. To understand the importance of low temperature physics
5. To understand quantum theory of radiation

COURSE-4 ELECTRICITY, MAGNETISM AND ELECTONICS

1. To study electrostatic situations using the concepts of field intensity and potential
2. To study the properties of dielectrics
3. To understand the magnetism as direct consequence of flow of charges
4. to understand the concept of electromagnetic induction and its effects
5. To understand the response of basic LCR circuits to alternating stimulations
6. To understand the importance of Maxwell's electromagnetic equations
7. To understand the basics of discrete electronics and digital electronics

COURSE-5 MODERN PHYSICS

1. To understand the basics of vector atom model and molecular spectra
2. To understand the concept of matter waves and uncertainty principle
3. To understand the fundamentals of wave mechanics
4. To study the nature of atomic nucleus
5. To understand the physics of nanomaterials and the phenomenon of superconductivity

# B.Sc. PHYSICSSYLLABUS UNDER CBCS
## [For Mathematics combinations]
### w.e.f. 2020-21

**First Semester**
*Course I*: Mechanics, Waves and Oscillations
Practical Course I (Lab-1)

**Second Semester**
*Course II*: Wave Optics
Practical Course II (Lab-2)

**Third Semester**
*Course III*: Heat and Thermodynamics
Practical Course III (Lab-3)

**Fourth Semester**
*Course IV*: Electricity, Magnetism and Electronics
Practical Course IV (Lab- 4)

*Course V*:Modern Physics
Practical Course V (Lab-V)

## B.Sc. PHYSICS COURSE STRUCTURE UNDER CBCS

| Year | Semester | Course | Title of the Course | Marks | No.ofHrs /Week | No.of Credits |
|---|---|---|---|---|---|---|
| I | I | I | Mechanics, Waves and Oscillations | 100 | 4 | 04 |
| | | | Practical Course- I | 50 | 3 | 01 |
| | II | II | Wave Optics | 100 | 4 | 04 |
| | | | Practical Course – II | 50 | 3 | 01 |
| II | III | III | Heat and Thermodynamics | 100 | 4 | 04 |
| | | | Practical Course – III | 50 | 3 | 01 |
| | IV | IV | Electricity, Magnetism and Electronics | 100 | 4 | 04 |
| | | | Practical Course – IV | 50 | 3 | 01 |
| | | V | Modern Physics | 100 | 4 | 04 |
| | | | Practical Course –V | 50 | 3 | 01 |
| Total No. of Courses : 05 (Five) | | | | | | |

DR V S KRISHNA GOVERNMENT DEGREE COLLEGE, VISAKHAPATNAM

**B.Sc. PHYSICS SYLLABUS UNDER CBCS**

**For Mathematics Combinations**

**[2020-21 Batch onwards]**

**I Year B.Sc.- Physics: I Semester**

**Course I: MECHANICS, WAVES AND OSCILLATIONS**

Work load:60 hrs per semester                                         4 hrs/week

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**Course outcomes:**

On successful completion of this course, the students will be able to:

Understand Newton's laws of motion and motion of variable mass system and its application to rocket motion and the concepts of impact parameter, scattering cross section.

Apply the rotational kinematic relations, the principle and working of gyroscope and its applications and the precessional motion of a freely rotating symmetric top.

Comprehend the general characteristics of central forces and the application of Kepler's laws to describe the motion of planets and satellite in circular orbit through the study of law of Gravitation.

Understand postulates of Special theory of relativity and its consequences such as length contraction, time dilation, relativistic mass and mass-energy equivalence.

Examine phenomena of simple harmonic motion and the distinction between undamped, damped and forced oscillations and the concepts of resonance and quality factor with reference to damped harmonic oscillator.

Appreciate the formulation of the problem of coupled oscillations and solve them to obtain normal modes of oscillation and their frequencies in simple mechanical systems.

Figure out the formation of harmonics and overtones in a stretched string and acquire the knowledge on Ultrasonic waves, their production and detection and their applications in different fields.

## UNIT-I:

### 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-Derivation.

### 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, Motion of satellites, Basic idea of Global Positioning System (GPS), weightlessness, Physiological effects of astronauts

## UNIT-III:

### 4. Relativistic Mechanics (12hrs)

Introduction to relativity, Frames of reference, Galilean transformations, absolute frames, Michelson-Morley experiment, negative result, 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, Normal coordinates and Normal modes- 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, SONAR

**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 Prakash Nath & 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

Work load: 45 hrs per semester                                    3 hrs/week

## Course outcomes (Practicals):

On successful completion of this practical course, the student will be able to;

Perform experiments on Properties of matter such as the determination of moduli of elasticity viz., Young's modulus, Rigidity modulus of certain materials; Surface tension of water , Coefficient of viscosity of a liquid , Moment of inertia of some regular bodies by different methods and compare the experimental values with the standard values.

Know how to determine the acceleration due to gravity at a place using Compound pendulum and Simple pendulum.

Notice the difference between flat resonance and sharp resonance in case of volume resonator and sonometer experiments respectively.

Verify the laws of transverse vibrations in a stretched string using sonometer and comment on the relation between frequency, length and tension of a stretched string under vibration.

Demonstrate the formation of stationary waves on a string in Melde's string experiment.

Observe the motion of coupled oscillators and normal modes.

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

1. Young's modulus of the material of a bar (scale) by uniform bending
2. Young's modulus of the material a bar (scale) by non- uniform bending
3. Surface tension of a liquid by capillary rise method
4. Viscosity of liquid by the flow method (Poiseuille's method)
5. Bifilar suspension –Moment of inertia of a regular rectangular body.
6. Fly-wheel -Determination of moment of inertia
7. Rigidity modulus of material of a wire-Dynamic method (Torsional pendulum)
8. Volume resonator experiment
9. Determination of 'g' by compound/bar pendulum
10. Simple pendulum- normal distribution of errors-estimation of time period and the error of the mean by statistical analysis
11. Determination of the force constant of a spring by static and dynamic method.

12. Coupled oscillators

13. Verification of laws of vibrations of stretched string –Sonometer

14. Determination of frequency of a bar –Melde's experiment.

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

## RECOMMENDED CO-CURRICULAR ACTIVITIES:

*MEASURABLE*

Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)

Student seminars (on topics of the syllabus and related aspects (individual activity)
Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams)

Field studies (individual observations and recordings as per syllabus content and related areas (Individual or team activity)

Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity)

*GENERAL*

Group Discussion
Visit to Research Stations, Science Museum Centres to understand the basic principles of mechanics with live examples and related industries

Visit to Satellite launching station at Sriharikota.

## RECOMMENDED ASSESSMENT METHODS

Some of the following suggested assessment methodologies could be adopted;
The oral and written examinations (Scheduled and surprise tests)

Problem-solving exercises

Practical assignments and Observation of practical skills

Individual and group project reports

Efficient delivery using seminar presentations

Viva voce interviews.

Dr VS Krishna Govt. Degree College(A), Visakhapatnam 2020-21

BLUE PRINT( Mechanics, Waves and Oscillations)

I B.Sc. (Physics)- SEM-I/Course1  Max Marks-75 Time-3Hrs. Credits:4

| UNIT | S.NO. | Topic | Section-A Essay(10 marks) | Section-B Short Answer ( 5 marks) | Total marks |
|------|-------|-------|------|------|------|
| I | 1 | Mechanics of Particles | 1 | 1 | |
| | 2 | Mechanics of Rigid bodies | 1 | 1 | 30 |
| II | 3 | Motion in a Cental Force Field | 2 | 2 | 30 |
| III | 4 | Relativistic Mechanics | 2 | 2 | 30 |
| IV | 5 | Undamped, Damped and Forced Oscillations | 1 | 1 | |
| | 6 | Coupled Oscillations | 1 | 1 | 30 |
| V | 7 | Vibrating Strings | 1 | 1 | |
| | 8 | Ultrasonics | 1 | 1 | 30 |
| | | Total Questions | 10 | 10 | 150 |

[Note:Question Paper setters are instructed to add Numerical Problems (each of 4 marks) with a maximum weightage of 16 marks either in Section-A or Section-B covering all the five units in the syllabus ]

Dr VS Krishna Govt. Degree College(A), Visakhapatnam 2020-21

MODEL QUESTION PAPER ( Mechanics, Waves and Oscillations)

I B.Sc. (Physics)- SEM-I/Course1  Max Marks-75 Time-3Hrs. Credits:4

## Section –A

Answer ALL the following questions                     (5X10=50 Marks)

1.a)Derive Rutherford's Scattering formula?

రూథర్ఫర్డ్ పరిక్షేపణ సూత్రమును రాబట్టండి

or

b)Derive the Euler's Equations of motion of a rigid body fixed at one point?

దృఢ వస్తువు యూలర్ చలన సమీకరణములను ఉత్పాదించుము.

2. a)State Kepler's laws of planetary motion and deduce the 1st Law?

కెప్లర్ గ్రహ గమన నియమాలు వ్రాసి,మొదటి నియమాన్ని రాబట్టండి.

or

b)Define central forces.Obtain the equation of motion of a body under central forces.

కేంద్రీయ బలాలను నిర్వచింపుము. కేంద్రీయ బల ప్రభావంలో  చలించే కణం యొక్క చలన సమీకరణమును

ఉత్పాదించుము.

3.a)Describe Michelson –Morley experiment and write its importance?

మైకెల్సన్-మొర్లె ప్రయోగమును వర్ణించి,దాని ప్రాముఖ్యతను వ్రాయండి.

or

b)State basic postulates of Einstein's special theory of relativity and derive the equation $E=MC^2$

ఐనస్టీన్ ప్రత్యేక సాపేక్షతా సిద్ధాంతం ప్రతిపాదనలు వ్రాసి,$E=MC^2$అనే సమీకరణమును ఉత్పాదించండి

4.a)Find the equation of damped harmonic motion and obtain its solution.

అవరుద్ధ హరాత్మక చలనము సమీకరణమును కనుగొని, దాని పరిష్కారమును రాబట్టండి.

Or

 b) Discuss the theory of system of two coupled oscillators. Explain normal modes.

రెండుయుగ్మిత డోలకముల వ్యవస్థ సిద్ధాంతమును చర్చించుము.  సాధారణ కంపన రీతులను వివరించుము

5. a)Obtain an expression for the velocity of a transverse wave on a stretched string.
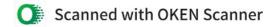
సాగదీసిన తీగపై తిర్యక్ తరంగ వేగమునకు సమీకరణము రాబట్టుము.

or

b)Explain Piezo electric method for producing ultrasonics?

పీడన విద్యుత్ పద్ధతిన అతిధ్వనులను ఉత్పత్తి చేసే విధానాన్ని వివరించుము.

## Section –B

Answer any Five of the following questions                     (5X5=25 Marks)

6. Derive an expression for precessional velocity of a top.

బొంగరము పురస్సరణ వేగమునకు సమీకరణమును రాబట్టండి

7. Show that central force is a conservative.

కేంద్రియ బలము నిత్యత్వము అని చూపండి.

8. A rocket of mass 40 kg has got a fuel of mass 360 kg inside it. The exhaust velocity of the fuel is 2 km/s. The fuel is burning at the rate of 4 kg/s. Find the final velocity of rocket.

40 kg ద్రవ్యరాశిగల రాకెట్ లో 360 kg ద్రవ్యరాశిగల ఇంధనం ఉన్నది. బహిర్గత వాయువుల వేగం 2 km / s

ఇంధనం 4 kg / s రేటున మండుచున్నపుడు రాకెట్ పొందే వేగాన్ని లెక్కించండి.

9. Explain length contraction and time dilation.

దైర్ఘ్య సంకోచం మరియు కాల వృద్ధి లను వివరించండి

10. A clock showing correct time when at rest, loses one hour in a day when it is moving. What is its velocity ?

ఒక గడియారం విరామ స్థితిలో ఉన్నపుడు సరియైన కాలాన్ని చూపుతుంది. అది ఏ వేగముతో ప్రయాణిస్తే రోజుకు ఒక

గంట కాలాన్ని కోల్పోతుంది.

11. Define Simple harmonic motion and give three examples.

సరళ హరాత్మక చలనమును నిర్వచించి మూడు ఉదాహరణలను తెలపండి

12. A steel wire 50cm long has mass of 5 grams is stretched with a tension of 400N. Find the frequency of the wire in fundamental mode of vibration?

50cm పొడవు మరియు 5grams ద్రవ్యరాశి గల స్టీల్ తీగ 400N. తన్యతా బలమును కలిగి ఉన్నది. ప్రాధమిక కంపన

రీతిలో ఉన్న తీగ పౌనఃపున్యమును కనుగొనండి .

13. Write a short note on Global Positioning System.

GPS వ్యవస్థ పై లఘు వ్యాఖ్యను వ్రాయుము.

14. Thickness of a piezo-electric quartz crystal is 0.002m. Velocity of sound waves in that crystal is 5750m/s. Calculate the fundamental frequcy of that crystal.

ఒక పిజో విద్యుత్ క్వార్ట్జ్ స్పటికము మందము 0.002m. ఆస్పటికములో ధ్వనితరంగములవేగము 5750m/s. ఆస్పటికము యొక్క ప్రాధమిక పౌనఃపున్యమును లెక్కించుము.

15. Explain normal coordinates.

సాధారణ నిరూపకములను వివరించుము.

## B.Sc. PHYSICS SYLLABUS UNDER CBCS

### For Mathematics Combinations

[2020-21 Batch onwards]

### I Year B.Sc.-Physics: II Semester

### Course-II: WAVE OPTICS

**Work load:60 hrs per semester**                                   **4 hrs/week**

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**Course outcomes:**

On successful completion of this course, the student will be able to:

Understand the phenomenon of interference of light and its formation in (i) Lloyd's single mirror due to division of wave front and (ii) Thin films, Newton's rings and Michelson interferometer due to division of amplitude.

Distinguish between Fresnel's diffraction and Fraunhoffer diffraction and observe the diffraction patterns in the case of single slit and the diffraction grating.

Describe the construction and working of zone plate and make the comparison of zone plate with convex lens.

Explain the various methods of production of plane, circularly and polarized light and their detection and the concept of optical activity..

Comprehend the basic principle of laser, the working of He-Ne laser and Ruby lasers and their applications in different fields.

Explain about the different aberrations in lenses and discuss the methods of minimizing them.

Understand the basic principles of fibre optic communication and explore the field of Holography and Nonlinear optics and their applications.

**UNIT-I Interference of light: (12hrs)**Introduction, Conditions for interference of light, Interference of light by division of wave front and division of amplitude.,Phase change on reflection-Stokes' treatment, Lloyd's single mirror,Interference in thin films: Plane parallel and wedge-shaped films, colours in thin films, Newton's rings in reflected light-Theory and experiment,Determination of wavelength of monochromatic light, Michelson interferometer and determination of wavelength.

**UNIT-II Diffraction of light:(12hrs)**

Introduction, Types of diffraction: Fresnel and Fraunhoffer diffractions, Distinction between Fresnel and Fraunhoffer diffraction,Fraunhoffer diffraction at a single slit, Plane diffraction Grating,Determination of wavelength of light using diffraction grating, Resolving power of grating, Fresnel's half period zones, Explanation of rectilinear propagation of light, Zone plate, comparison of zone plate with convex lens.

**UNIT-III Polarisation of light:(12hrs)**

Polarized light: Methods of production of plane polarized light, Double refraction, Brewster's law, Malus law, Nicol prism, Nicol prism as polarizer and analyzer, Quarter wave plate, Half wave plate, Plane, Circularly and Elliptically polarized light-Production and detection, Optical activity, Laurent's half shade polarimeter: determination of specific rotation, Basic principle of LCDs

**UNIT-IV Aberrations and Fibre Optics:**                                         **(12hrs)**

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.

Fibre optics: Introduction to Fibers, different types of fibers, rays and modes in an optical fiber, Principles of fiber communication (qualitative treatment only), Advantages of fiber optic communication.

**UNIT-V Lasers and Holography:(12hrs)**

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, Applications of holography

**REFERENCE BOOKS:**

BSc Physics, Vol.2, Telugu Akademy, Hyderabad

A Text Book of Optics-N Subramanyam, L Brijlal, S.Chand& Co.

Optics-Murugeshan, S.Chand& Co.

Unified Physics Vol.IIOptics, Jai PrakashNath&Co.Ltd., Meerut

Optics,F.A. Jenkins and H.G.White, McGraw-Hill

Optics, Ajoy Ghatak,TataMcGraw-Hill.

Introduction of Lasers – Avadhanulu, S.Chand& Co.

Principles    of    Optics-    BK    Mathur,    Gopala    Printing    Press,    1995

**Work load:45hrs**                                                                  **3 hrs/week**

**Course outcomes (Practicals):**

On successful completion of this practical course the student will be able to,

1. Gain hands-on experience of using various optical instruments like spectrometer, polarimeter and making finer measurements of wavelength of light using Newton Rings experiment, diffraction grating etc.

2. Understand the principle of working of polarimeter and the measurement of specific rotatory power of sugar solution

3. Know the techniques involved in measuring the resolving power of telescope and dispersive power of the material of the prism.

4. Be familiar with the determination of refractive index of liquid by Boy's method and the determination of thickness of a thin wire by wedge method.

**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. Determination of 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 wire by wedge method
10. Determination of refractive index of liquid-Boy's method.

## RECOMMENDED CO-CURRICULAR ACTIVITIES:

### MEASURABLE

Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)

Student seminars (on topics of the syllabus and related aspects (individual activity)

Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams)

Study projects (by very small groups of students on selected local real-time problems

pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity)

### GENERAL

Group Discussion

Visit to Research Stations/laboratories and related industries

## RECOMMENDED ASSESSMENT METHODS

Some of the following suggested assessment methodologies could be adopted;

The oral and written examinations (Scheduled and surprise tests),

Practical assignments and laboratory reports,

Efficient delivery using seminar presentations,

Viva voce interviews.

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# Dr VS Krishna Govt. Degree College(A), Visakhapatnam 2020-21

## BLUE PRINT( Wave Optics)

### I B.Sc. (Physics)- SEM-II/Course 2  Max Marks-75 Time-3Hrs. Credits:4

| | | | Section-A | Section-B | |
| | | | Essay(10 marks) | Short Answer ( 5 marks) | Total marks |
| UNIT | S.NO. | Topic | | | |
| I | 1 | Interference of Light | 2 | 2 | 30 |
| II | 2 | Diffraction of Light | 2 | 2 | 30 |
| III | 3 | Polarisation of Light | 2 | 2 | 30 |
| IV | 4 | Aberrations and Fibre Optics | 2 | 2 | 30 |
| V | 5 | Lasers and Holography | 2 | 2 | 30 |
| | | Total Questions | 10 | 10 | 150 |

[**Note:**Question Paper setters are instructed to add Numerical Problems (each of 4 marks) with a maximum weightage of 16 marks either in Section-A or Section-B covering all the five units in the syllabus ]

MODEL QUESTION PAPER ( Mechanics, Waves and Oscillations)

I B.Sc. (Physics)- SEM-II/Course2  Max Marks-75 Time-3Hrs. Credits:4

Section –A

(5X10=50 Marks)

Answer ALL the following questions

1. a) What is a Bi-prism? Describe an experiment to determine the wavelength of monochromatic light using Bi-prism?

ద్విపట్టకము అనగానేమి? ద్విపట్టకమునుపయోగించి ఏకవర్ణ కాంతి తరంగ దైర్ఘ్యమును కనుగొను ప్రయోగమును వర్ణించుము.

Or

b) Describe the principal, construction and working of a Michelson interferometer. What are various fringes that can be obtained with it.

మైకెల్ సన్ వ్యతికరణ మాపకము సూత్రము, నిర్మాణము మరియు పనిచేయు పద్ధతినివర్ణించుము. ఈ వ్యతికరణ మాపకములో ఏర్పడు వివిదరకాల పట్టికలను తెలుపుము

2. a) Discuss Fraunhofer diffraction at single slit for normal incidence?

కాంతి అభిలంబ పతనమునకు ఫ్రోన్ హోఫర్ తరగతి ఒంటి చీలిక వివర్తనమును వివరించుము.

Or

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

మండల ఫలకము నిర్మాణము మరియు పనిచేయువిధమును తగు సిద్ధాంతములతో వివరించుము.

3. a)With a neat diagram describe the construction and working of Nicol prism. What are its uses?

చక్కని పటము సహాయముతో నికాల్ పట్టకము నిర్మాణమును మరియు పనిచేయువిధమును వివరించుము.

Or

b) What is optical activity? Describe how the specific rotation of sugar solution is determined using Laurent's Half Shade Polarimeter.

ధ్రువణ ప్రమాణత అనగానేమి? లారెంట్ అర్ధచాయా ధ్రువణమాపకమునుపయోగించి చక్కర ద్రావణము యొక్క విశిష్టప్రమాణ సామర్థ్యమునెట్లు నిర్ణయించెదరు?

4. a) What is chromatic aberration? Derive the conditions for achromatism when two Lense are (1) in contact (2) separated by a distance?

వర్ణవిపథనము అనగా ఏమి? రెండు కటకములు (1) ఒకదానినొకటి తాకుతున్నప్పుడు (2) కొంతదూరములో ఉన్నప్పుడు అవర్ణతకు నిబంధనలను ఉత్పాదించుము.

Or

b)What is spherical aberration? Describe various methods for minimisation of spherical aberration.

గోళీయవిపథనము అనగా ఏమి? గోళీయవిపథనము నివారించు వివిధ పద్ధతులను వర్ణించుము.

5. a) Explain the principal and working of Ruby Laser.

రూబీ లేజర్ సూత్రమును పనిచేయువిధమును వివరించుము.

Or

b) Explain the principle and applications of holography.

హోలోగ్రఫీ సూత్రమును అనువర్తనములను వివరించుము.

**Answer any Five of the following questions**                    (5X5=25 Marks)

6. Sodium light of wavelength 5890 A⁰ passes through narrow slits 2mm apart. The interference pattern is seen at a distance of 1.25 m away from the centre of the slits. Determine the fringe width.

రెండు సన్నని చీలికల మధ్య దూరము 2mm. ఈచీలికలపై 5890 A⁰ తరంగదైర్ఘ్యముగల నోడియం ఆవిరి దీపము యొక్క కాంతి పతనమగుచున్నది. చీలికలనుండి దూరములో వ్యతికరణవ్యూహమును పరిశీలించినప్పుడు వ్యతికరణ పట్టికల మందమును కనుగొనుము.

7. Explain colours in thin films?

పలుచనిపొరలలో రంగులను వివరించుము.

8. Calculate the resolving power of a grating in second order given that the number of lines on the grating is 15000.

ఒక వివర్తన జాలకము పై గల గీతల(చీలికల) సంఖ్య 15000. రెండవకోటిలో దాని పృధక్కరణ సామర్థ్యమును లెక్కించుము.

9. Differentiate between Fresnel and Fraunhofer diffraction.

ఫ్రెనెల్ మరియు ఫ్రౌన్ హోఫర్ తరగతి వివర్తనములకు గల తేడాలను వ్రాయుము.

10. Write a short note on double refraction.

ద్వివక్రీభవనముపై లఘువ్యాఖ్య వ్రాయుము

11. For a slab of flint glass the angle of polarization is found to be 62⁰ 24¹. Calculate the refractive index of the flint glass?

ఒక ఫ్లింట్ గాజుఫలకము యొక్క ధ్రువణకోణము 62⁰ 24¹. ఫ్లింట్ గాజు వక్రీభవన గుణకమును లెక్కించుము

12. Explain step-index and graded index optical fibres.

స్టెప్ - ఇండెక్స్ మరియు గ్రేడెడ్ - ఇండెక్స్ దృశాతంతువులను వివరించుము.

13. Write a short note on Coma.

కేంద్రకావరణము(కోమా) పై లఘువ్యాఖ్య వ్రాయుము.

14. Explain the terms Spontaneous Emission and Stimulated Emission

స్వచ్ఛంద ఉద్గారము మరియు ఉత్తేజిత ఉద్గారములను వివరించుము.

15. Obtain the relation between Einstein coefficients.

ఐన్ స్టీన్ గుణకముల మధ్య సంబంధమును రాబట్టుము.

DR V S KRISHNA GOVERNMENT DEGREE COLLEGE, VISAKHAPATNAM
## B.Sc. PHYSICS SYLLABUS UNDER CBCS
### For Mathematics Combinations
[2020-21 Batch onwards]
### II Year B.Sc.-Physics: III Semester
### Course-III: HEAT AND THERMODYNAMICS

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

**Course outcomes:**

On successful completion of this course, the student will be able to:

Understand the basic aspects of kinetic theory of gases, Maxwell-Boltzman distribution law, equipartition of energies, mean free path of molecular collisions and the transport phenomenon in ideal gases

Gain knowledge on the basic concepts of thermodynamics, the first and the second law of thermodynamics, the basic principles of refrigeration,the concept of entropy, thermodynamic potentials and their physical interpretations.

Understand the working of Carnot's ideal heat engine, Carnot cycle and its efficiency

Develop critical understanding of concept of Thermodynamic potentials,the formulation of Maxwell's equations and its applications.

Differentiate between principles and methods to produce low temperature and liquefy air and also understand the practical applications of substances at low temperatures.

Examine the nature of black body radiations and the basic theories.

**UNIT-I: Kinetic Theory of gases:** (12 hrs)

Kinetic Theory of gases-Introduction, Maxwell's law of distribution of molecular velocities (qualitative treatment only) and its experimental verification, Mean free path, Degrees of freedom, Principle of equipartition of energy (Qualitative ideas only), Transport phenomenon in ideal gases: viscosity, Thermal conductivity and diffusion of gases.

**UNIT-II: Thermodynamics:** (12hrs)

Introduction- Isothermal and Adiabatic processes, Reversible and irreversible processes, Carnot's engine and its efficiency, Carnot's theorem, Thermodynamic scale of temperature and its identity with perfect gas scale, Second law of thermodynamics: Kelvin's and Clausius statements, Principle of refrigeration, Entropy, Physical significance, Change in entropy in reversible and irreversible processes; Entropy and disorder-Entropy of Universe; Temperature-Entropy (T-S) diagram and its uses ; change of entropy when ice changes into steam.

**UNIT-III: Thermodynamic Potentials and Maxwell's equations:** (12hrs)

Thermodynamic potentials-Internal Energy, Enthalpy, Helmholtz Free Energy, Gibb's Free Energy and their significance, Derivation of Maxwell's thermodynamic relations from thermodynamic potentials, Applications to (i) Clausius-Clayperon's equation (ii) Value of $C_P$-$C_V$ (iii) Value of $C_P/C_V$ (iv) Joule-Kelvin coefficient for ideal and Van der Waals' gases

**UNIT-IV: Low temperature Physics:** (12hrs)

Methods for producing very low temperatures, Joule Kelvin effect, Porous plug experiment , Joule expansion, Distinction between adiabatic and Joule Thomson expansion, Expression for Joule Thomson cooling, Liquefaction of air by Linde's method, Production of low temperatures by adiabatic demagnetization (qualitative), Practical applications of substances at low temperatures.

**UNIT-V: Quantum theory of radiation:** (12 hrs)

Blackbody and its spectral energy distribution of black body radiation, Kirchoff's law, Wein's displacement law, Stefan-Boltzmann's law and Rayleigh-Jean's law (No derivations), Planck's law of black body radiation-Derivation, Deduction of Wein's law and Rayleigh-Jean's law from Planck's law, Solar constant and its determination using Angstrom pyroheliometer, Estimation of surface temperature of Sun.

**REFERENCE BOOKS:**

BSc Physics, Vol.2, Telugu Akademy, Hyderabad

Thermodynamics, R.C.Srivastava, S.K.Saha&AbhayK.Jain, Eastern Economy Edition.

Unified Physics Vol.2, Optics & Thermodynamics, Jai PrakashNath&Co.Ltd., Meerut

Fundamentals of Physics. Halliday/Resnick/Walker.C. Wiley India Edition 2007

Heat and Thermodynamics -N BrijLal, P Subrahmanyam, S.Chand& Co.,2012

Heat and Thermodynamics- MS Yadav, Anmol Publications Pvt. Ltd, 2000

University Physics, HD Young, MW Zemansky,FW Sears, Narosa Publishers, New Delhi

## Practical Course-III: Heat and Thermodynamics

**Work load: 45 hrs**

**3 hrs/week**

On successful completion of this practical course, the student will be able to;

Perform some basic experiments in thermal Physics, viz., determinations of Stefan's constant, coefficient of thermal conductivity, variation of thermo-emf of a thermocouple with temperature difference at its two junctions, calibration of a thermocouple and Specific heat of a liquid.

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

1. Specific heat of a liquid –Joule's calorimeter –Barton's radiation correction
2. Thermal conductivity of bad conductor-Lee's method
3. Thermal conductivity of rubber.
4. Measurement of Stefan's constant.
5. Specific heat of a liquid by applying Newton's law of cooling correction.
6. Heating efficiency of electrical kettle with varying voltages.
7. Thermoemf- thermo couple - Potentiometer
8. Thermal behavior of an electric bulb (filament/torch light bulb)
9. Measurement of Stefan's constant- emissive method
10. Study of variation of resistance with temperature - Thermistor.

### RECOMMENDED CO-CURRICULAR ACTIVITIES:

MEASURABLE

Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)

Student seminars (on topics of the syllabus and related aspects (individual activity))

Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams)

Field studies (individual observations and recordings as per syllabus content and related areas (Individual or team activity)

**Work load: 45 hrs**                                                      **3 hrs/week**

On successful completion of this practical course, the student will be able to;

Perform some basic experiments in thermal Physics, viz., determinations of Stefan's constant, coefficient of thermal conductivity, variation of thermo-emf of a thermocouple with temperature difference at its two junctions, calibration of a thermocouple and Specific heat of a liquid.

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

1. Specific heat of a liquid –Joule's calorimeter –Barton's radiation correction
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7. Thermoemf- thermo couple - Potentiometer
8. Thermal behavior of an electric bulb (filament/torch light bulb)
9. Measurement of Stefan's constant- emissive method
10. Study of variation of resistance with temperature - Thermistor.

## RECOMMENDED CO-CURRICULAR ACTIVITIES:

MEASURABLE

Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)

Student seminars (on topics of the syllabus and related aspects (individual activity))

Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams)

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Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity)

GENERAL

Group Discussion

Visit to Research Stations/laboratories and related industries

Others

## RECOMMENDED ASSESSMENT METHODS

Some of the following suggested assessment methodologies could be adopted;
The oral and written examinations (Scheduled and surprise tests),

Problem-solving exercises,

Efficient delivery using seminar presentations,

Viva voce interviews.

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Dr VS Krishna Govt. Degree College(A), Visakhapatnam 2020-21

BLUE PRINT( HEAT AND THERMODYNAMICS)

IIB.Sc. (Physics)- SEM-II/Course 3  Max Marks-75 Time-3Hrs. Credits:4

| UNIT | S.NO. | Topic | Section-A Essay(10 marks) | Section-B Short Answer ( 5 marks) | Total marks |
|------|-------|-------|------|------|------|
| I | 1 | Kinetic Theory of Gases | 2 | 2 | 30 |
| II | 2 | Thermodynamics | 2 | 2 | 30 |
| III | 3 | Thermodynamic Potentials and Maxwells Equations | 2 | 2 | 30 |
| IV | 4 | Low Temperature Physics | 2 | 2 | 30 |
| V | 5 | Quantum Theory of Radiation | 2 | 2 | 30 |
| | | **Total Questions** | **10** | **10** | **150** |

[**Note:**Question Paper setters are instructed to add Numerical Problems (each of 4 marks) with a maximum weightage of 16 marks either in Section-A or Section-B covering all the five units of the syllabus]

#### Section –A

Answer ALL the following questions                                          (5X10=50 Marks)

1a) Derive an expression for Maxwell's Law of distributions of Molecular speeds in a gas?

మాక్స్ వెల్ అణువేగ వితరణ సమీకరణాన్ని ఉత్పాదించండి .

<div align="center">OR</div>

b) Derive the expression for the coefficient of viscosity of gases

వాయువుల స్నిగ్ధతాగుణకమునకు సమీకరణమును ఉత్పాదించుము.

2 a) State and explain the second law of Thermodynamics. Derive an expression for the efficiency of Carnot's Engine?

ఉష్ణగతిక శాస్త్ర గతిక రెండవ నియమాన్ని నిర్వచించండి.కార్నో యంత్రము యొక్క దషత కు సమీకరణాన్ని ఉత్పాదించండి.

<div align="center">OR</div>

b) Derive an expression for change in entropy when ice changes into water.

మంచు ఆవిరిగా మారు ప్రక్రియలో ఎంట్రోపీలో మార్పునకు సమాసమును ఉత్పాదించుము.

3 a)  Define the four Thermodynamics potentials. Obtain Maxwell's Thermodynamic equations using these potentials?

నాలుగు ఉష్ణ గతిక శక్మలను నిర్వచించి , వాటినుపయోగించి మాక్స్ వెల్ ఉష్ణ గతికసమీకరణాలను రాబట్టండి.

<div align="center">OR</div>

b) Derive the equation for ratio of specific heats ($C_P/C_V$).

వాయు విశిష్టోష్ణముల నిష్పత్తికి ($C_P/C_V$) సమీకరణమును రాబట్టుము.

4 a)Derive an expression for Joule-Thomson cooling.

జౌల్ థామ్సన్ శీతలీకరణానికి సమాసాన్ని ఉత్పదించండి.

<div align="center">OR</div>

b) What is adiabatic demagnetization? How is this principal used in producing law temperature?

స్థిరోష్ణక నిరయస్కాంతీకరణం అనగానేమి? దీనిని ఉపయోగించి అల్ప ఉష్ణోగ్రతలను ఎలా పొందవచ్చునో వివరించండి.

5a) Derive Planck's law of black body radiation. Deduce Wein's and Raleigh-jeans law from it.

కృష్ణవస్తువు వికిరణమునకు ప్లాన్క్ సూత్రమును ఉత్పాదించుము. దాని నుండి వీన మరియు రేలీ-జీన్స్ సూత్రములను రాబట్టుము.

<div align="center">or</div>

b) Define solar constant. Describe how it is determined using Angstrom Pyrheliometer.

సౌర స్థిరాంకమును నిర్వచించుము. ఆంగ్ స్ట్రాం పైర్ హీలియోమీటరుతో సౌర స్థిరాంకమును నిర్ణయించు ప్రయోగమును వర్ణించుము.

<center>Section –B</center>

(5X5=25 Marks)

6. Write a short note on "Mean free path" of a molecule in a gas?

వాయు అణువుల స్వేచ్ఛాపథమధ్యమం గురించి వివరించండి.

7. Calculate the rms velocity of hydrogen at STP.

STP వద్ద హైడ్రోజన్ యొక్క RMS పేగమును లెక్కించుము.

8. Calculate the efficiency of a Carnot engine working between the temperatures 150° C and 30°C.

150°C మరియు 30 °C ల మధ్య పని చేసే కార్నోయంత్రం యొక్క దక్షతను లెక్కించండి.

9. Define Entropy. Show that in a reversible process entropy remains constant.

ఎంట్రోపిని నిర్వచించండి.ద్విగతీతప్రక్రియలోని ఎంట్రోపి స్థిరంగా ఉంటుందనిచూపండి

10. Derive Clausius and Clapeyron equation.

క్లాపియస్ – క్లపెరాన్ సమీకరణమును రాబట్టుము.

11. Calculate the temperature of inversion of $H_2$ given that Tc for $H_2$ is -239.9°C .

ఇచ్చిన దత్తాంశం నుండి $H_2$ విలోమన ఉష్ణగ్రతను లెక్కించండి. $H_2$ యొక్క Tc = -239.9°C

12. Explain Joule Thomson effect.

జౌల్ దామ్సన్ ప్రభావమును వివరించండి

13. Write short notes on the applications of substances at low temperatures.

అల్ప ఉష్ణోగ్రతలవద్ద ఉన్న పదార్థముల అనువర్తనములపై లఘువ్యాఖ్య ప్రాయుము.

14. Explain how temperature of Sun is determined?

సూర్యుని ఉష్ణోగ్రతను యెట్లు నిర్ధయించెదరు?

15. If $\lambda_m$ for solar radiation is $4573A^0$ and Wien's constant = $2.89 \times 10^{-3}$ mK$^{-1}$, calculate the temperature of Sun's photosphere.

సౌర వికిరణమునకు $\lambda_m$ విలువ $4573A^0$ మరియు వీన్ స్థిరాంకము $2.89 \times 10^{-3}$ mK$^{-1}$ అయితే, సూర్యుని ఉష్ణోగ్రతను లెక్కించుము.

## B.Sc. PHYSICS SYLLABUS UNDER CBCS

### For Mathematics Combinations

[2020-21 Batch onwards]

### II Year B.Sc.-Physics: IV Semester

### Course-IV: ELECTRICITY, MAGNETISM AND ELECTRONICS

**Work load:60 hrs per semester**                                    **4 hrs/week**

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**Course outcomes:**

On successful completion of this course, the students will be able to:

Understand the Gauss law and its application to obtain electric field in different cases and formulate the relationship between electric displacement vector, electric polarization, Susceptibility, Permittivity and Dielectric constant.

Distinguish between the magnetic effect of electric current and electromagnetic induction and apply the related laws in appropriate circumstances.

Understand Biot and Savart's law and Ampere's circuital law to describe and explain the generation of magnetic fields by electrical currents.

Develop an understanding on the unification of electric and magnetic fields and Maxwell's equations governing electromagnetic waves.

Phenomenon of resonance in LCR AC-circuits, sharpness of resonance, Q-factor, Power factor and the comparative study of series and parallel resonant circuits.

Describe the operation of p-n junction diodes, zener diodes, light emitting diodes and transistors

Understand the operation of basic logic gates and universal gates and their truth tables.

## UNIT-I

### 1. Electrostatics:  (6hrs)

Gauss's law-Statement and its proof, Electric field intensity due to (i) uniformly charged solid sphere and (ii) an infinite conducting sheet of charge, Deduction of Coulomb's law from Gauss law, Electrical potential–Equipotential surfaces, Potential due to a (i) dipole (ii)uniformly charged sphere

### 2.Dielectrics:                                                                 (6 hrs)

Dielectrics-Polar and Non-polar dielectrics- Effect of electric field on dielectrics,Dielectric strength, Capacitance of a parallel plate condenser with dielectric slab between the plates, Electric displacement D, electric polarization P,Relation between D, E and P, Dielectric constant and electric susceptibility.

## UNIT-II

### 3.Magnetostatics:                                                           (6 hrs)

Biot-Savart's law and its applications: (i) circular loop and (ii) solenoid, Divergence and curl of magnetic field, Ampere's Circuital Law and its application to Solenoid, Hall effect, determination of Hall coefficient and applications.

### 4.Electromagnetic Induction:                                         (6 hrs)

Faraday's laws of electromagnetic induction, Lenz's law,Self induction and Mutual induction, Self inductance of a long solenoid, Mutual inductance of two coils, Energy stored in magnetic field, Eddy currents and Electromagnetic damping

## UNIT-III

### 5.Alternating currents:                                                  (6 hrs)

Alternating current - Relation between current and voltage in LR and CR circuits,Phasor and Vector diagrams, LCR series and parallel resonant circuit, Q –factor, Power in ac circuits, Power factor.

### 6.Electromagnetic waves-Maxwell's equations:           (6 hrs)

Idea of displacement current,Maxwell's equations-Derivation, Maxwell's wave equation (with derivation), Transverse nature of electromagnetic waves, Poynting theorem (Statement and proof)

## UNIT-IV

### 7. Basic Electronic devices: (12 hrs)

PN junction diode, Zenerdiode and Light Emitting Diode (LED) and their I-V characteristics, Zener diode as a regulator- Transistors and its operation, CB, CE and CC configurations, Input and output characteristics of a transistor in CE mode, Relation between alpha, beta and gamma; Hybrid parameters, Determination of hybrid parameters from transistor characteristics; Transistor as an amplifier.

## UNIT-V:

### 8. Digital Electronics: (12 hrs)

Number systems, Conversion of binary to decimal system and vice versa, Binary addition & Binary subtraction (1's and 2's complement methods), Laws of Boolean algebra, DeMorgan's laws-Statements and Proofs, Basic logic gates, NAND and NOR as universal gates, Exclusive-OR gate, Half adder and Full adder circuits.

## REFERENCE BOOKS

BSc Physics, Vol.3, Telugu Akademy, Hyderabad.

Electricity and Magnetism, D.N. Vasudeva. S. Chand & Co.

Electricity and Magnetism, B.D.Duggal and C.L.Chhabra. Shobanlal& Co.

Electricity, Magnetism with Electronics, K.K.Tewari, R.Chand& Co.,

Electricity and Magnetism, R.Murugeshan, S. Chand & Co.

Principles of Electronics, V.K. Mehta, S.Chand& Co.,

Digital Principles and Applications, A.P. Malvino and D.P.Leach, McGrawHill Edition.

## Practical CourseIV:Electricity, Magnetism and Electronics

**Work load: 45 hrs**

**3 hrs/week**

**Course outcomes (Practicals):**

On successful completion of this practical course the student will be able to;

Measure the current sensitivity and figure of merit of a moving coil galvanometer.

Observe the resonance condition in LCR series and parallel circuit

Learn how a sonometer can be used to determine the frequency of AC-supply.

Observe the variation of magnetic field along the axis of a circular coil carrying current using Stewart and Gee's apparatus.

Understand the operation of PN junction diode, Zener diode and a transistor and their V-I characteristics.

Construct the basic logic gates, half adder and full adder and verify their truth tables. Further, the student will understand how NAND and NOR gates can be used as universal building blocks.

**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 and Maximum Power Transfer theorem.
5. Field along the axis of a circular coil carrying current-Stewart & Gee's apparatus.
6. PN Junction Diode Characteristics
7. Zener Diode –V-I Characteristics
8. Zener Diode as a voltage regulator
9. Transistor CE Characteristics- Determination of hybrid parameters
10. Logic Gates- OR,AND,NOT and NAND gates. Verification of Truth Tables.
11. Verification of De Morgan's Theorems.
12. Construction of Half adder and Full adders-Verification of truth tables

## RECOMMENDED CO-CURRICULAR ACTIVITIES:

MEASURABLE

Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)

Student seminars (on topics of the syllabus and related aspects (individual activity))

Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams)

Field studies (individual observations and recordings as per syllabus content and related areas (Individual or team activity)

Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity)

GENERAL

Group Discussion

Visit to Research Stations/laboratories and related industries

Others

## RECOMMENDED ASSESSMENT METHODS

Some of the following suggested assessment methodologies could be adopted;
The oral and written examinations (Scheduled and surprise tests),

Practical assignments and laboratory reports,

Observation of practical skills,

Efficient delivery using seminar presentations,

Viva voce interviews.

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Dr VS Krishna Govt. Degree College(A), Visakhapatnam 2020-21

BLUE PRINT( Electricity, Magnetism and Electronics)

IIB.Sc. (Physics)- SEM-II/Course 4  Max Marks-75 Time-3Hrs. Credits:4

| UNIT | S.NO. | Topic | Section-A Essay(10 marks) | Section-B Short Answer ( 5 marks) | Total marks |
|------|-------|-------|------|------|------|
| I | 1 | Electrostatics | 1 | 1 | |
| | 2 | Dilectrics | 1 | 1 | 30 |
| II | 3 | Magnetostatics | 1 | 1 | |
| | 4 | Electomagnetic Induction | 1 | 1 | 30 |
| III | 5 | Alternating Currents | 1 | 1 | |
| | 6 | Electromagnetic waves – Maxwells equations | 1 | 1 | 30 |
| IV | 7 | Basic Electronic Devices | 2 | 2 | 30 |
| V | 8 | Digital Electronics | 2 | 2 | 30 |
| | | Total Questions | 10 | 10 | 150 |

[**Note:**Question Paper setters are instructed to add Numerical Problems (each of 4 marks) with a maximum weightage of 16 marks either in Section-A or Section-B covering all the five units of the syllabus]

## Section –A

**Answer ALL the following questions**                                    (5X10=50 Marks)

1.Derive electric field due to uniformly charged sphere.

ఏకరీతిగా ఆవేశపరచబడిన గోళము వలన ఏర్పడే విద్యుత్ క్షేత్ర తీవ్రతకు సమీకరణమును ఉత్పాదించుము.

Or

Derive an equation for capacitance of a parallel plate condenser with dielectric slab between the plates

పలకల మధ్య రోధకము గల సమాంతరపలకల కెపాసిటర్ యొక్క కెపాసిటీక(క్షమతకు) సమీకరణము రాబట్టుము.

2.Explain Biot – Savart law. Derive the expression for magnetic filed to due to circular current carrying loop.

బయాట్ – సవర్ట్ నియమమును వివరించుము. విద్యుత్ ప్రవహించుచున్న వృత్తాకార తీగవలన ఏర్పడే అయస్కాంత క్షేత్రమునకు

సమీకరణము రాబట్టుము.

Or

Define coefficient of self inductance. Calculate the coefficient of self inductance due to a long solenoid.

స్వయం ప్రేరణ గుణకమును నిర్వచించుము. పొడవైన సొలెనోయిడ యొక్క స్వయం ప్రేరణ గుణమును లెక్కించుము.

3.Explain LCR parallel resonance circuit with necessary theory.

LCR శ్రేణి వలయము యొక్క అనునాదమును తగు సిద్ధాంతముతో వివరించుము.

Or

Derive equation for Poynting theorem

పాయింటింగ్ సదిశకు సమీకరణము రాబట్టుము.

4.What is a Zener Diode? Explain V-I characteristics of Zener Diode.

జనర్ డయోడ్ అనగానేమి? జనర్ డయోడ్ యొక్క V -I అభిలక్షణములను వివరించుము.

Or

Explain the working of a Transistor as an amplifier. Derive the relation between alpha, beta and gamma of a transistor.

ట్రాన్సిస్టర్ వర్ధకముగా పనిచేయుటను వర్ణించుము. ట్రాన్సిస్టర్ $\alpha$, $\beta$ మరియు $\gamma$ ల మధ్య సంబంధమును ఉత్పాదించుము.

5.State and prove DeMorgan theorems.

డిమోర్గాన్ సిద్ధాంతములను వ్రాసి నిరూపించుము.

Or

Explain the working of full adder

పూర్ణ సంకలని పనిచేయు పద్ధతిని వివరింపుము.

## Section – B

**Answer any FIVE of the following.**                                    (5X5=25Marks)

6. State end explain Gauss theorem.

గాస్ సిద్ధాంతమును వ్రాసి వివరించుము.

7.Define D,E and P and derive the relation between them.

D,E మరియు P లను నిర్వచించి, వాటిమధ్య సంబంధమును ఉత్పాదించుము.

8. Write a short note on Hall effect

హాల్ పరితముపై లఘు వ్యాఖ్య ప్రాయుము.

9. State and explain Faraday's laws of electromagnetic induction

ఫారడే నియమములను వ్రాసి వివరించుము.

10. Calculate the resonance frequency of LCR series circuit given that L = 0.2025 H and C= 50 x 10⁻⁶F.

ఒక LCR శ్రేణి వలయములో L = 0.2025 H and C= 50 x 10⁻⁶F. ఆ వలయము యొక్క అనునాద పౌనఃపున్యమును లెక్కించుము.

11. What are eddy currents? Explain.

ఎడ్డి ప్రవాహములు అనగా నేమి? వివరించుము.

12. Prove that electromagnetic waves are transverse in nature.
విద్యుదయస్కాంత తరంగములు తిర్యక్ తరంగములని నిరూపించుము.

13. What are hybrid parameters? Define them for a transistor in CE configuration.

సంకర పరమితులు అనగానేమి? CE విన్యాసములోనున్న ట్రాన్సిస్టర్ సంకర పరామితులను నిర్వచించుము.

14. In a given transistor base current and emitter current are 0.08mA and 9.6mA. Calculate collector current, α and β of the transistor.

ఒక ట్రాన్సిస్టర్ లో ఆధార మరియు ఉద్గార విద్యుత్ ప్రవాహములు 0.08mA మరియు 9.8 mA. కలెక్టర్ విద్యుత్ ప్రవాహమును, α

మరియు β లను లెక్కించుము.

15. Convert the following decimal numbers into binary numbers a)15 b) 56

క్రింది దశాంశ సంఖ్యలను ద్విసంఖ్యామానములోనికి మార్చుము a)15 b)56

DR V S KRISHNA GOVERNMENT DEGREE COLLEGE, VISAKHAPATNAM
**B.Sc. PHYSICS SYLLABUS UNDER CBCS**

**For Mathematics Combinations**

[2020-21 Batch onwards]

**II Year B.Sc.-Physics: IV Semester**

**Course V: MODERN PHYSICS**

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Work load:60hrs per semester                                        4 hrs/week

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Course outcomes:

On successful completion of this course, the students will be able to:

Develop an understanding on the concepts of Atomic and Modern Physics, basic elementary quantum mechanics and nuclear physics.

Develop critical understanding of concept of Matter waves and Uncertainty principle.

Get familiarized with the principles of quantum mechanics and the formulation of Schrodinger wave equation and its applications.

Examine the basic properties of nuclei, characteristics of Nuclear forces, salient features of Nuclear models and different nuclear radiation detectors.

Classify Elementary particles based on their mass, charge, spin, half life and interaction.

Get familiarized with the nano materials, their unique properties and applications.

Increase the awareness and appreciation of superconductors and their practical applications.

UNIT-I :

**1. Atomic and Molecular Physics:**                                        **(12 hrs)**

Vector atom model and Stern-Gerlach experiment, Quantum numbers associated with it, Angular momentum of the atom, Coupling schemes, Spectral terms and spectral notations, Selection rules, Intensity rules, Fine structure of Sodium D-lines, Zeeman effect,Experimental arrangement to study Zeeman effect; Raman effect, Characteristics of Raman effect,

Experimental arrangement to study Raman effect, Quantum theory of Raman effect, Applications of Raman effect.

## UNIT-II:

### 2. Matter waves & Uncertainty Principle: (12 hrs)

Matter waves, de Broglie's hypothesis, Wave length of matter waves, Properties of matter waves, Davisson and Germer's experiment, Phase and group velocities, Heisenberg's uncertainty principle for position and momentum& energy and time, Illustration of uncertainty principle using diffraction of beam of electrons (Diffraction by a single slit)and photons(Gamma ray microscope),Bohr's principle of complementarity.

## UNIT-III:

### 3. Quantum (Wave) Mechanics: (12 hrs)

Basic postulates of quantum mechanics, Schrodinger time independent and time dependent wave equations-Derivations, Physical interpretation of wave function, Eigen functions, Eigen values, Application of Schrodinger wave equation to (i) one dimensional potential box of infinite height (InfinitePotential Well) and (ii) one dimensional harmonic oscillator

## UNIT-IV:

### 4. Nuclear Physics: (12 hrs)

Nuclear Structure:General Properties of Nuclei, Mass defect, Binding energy; Nuclear forces: Characteristics of nuclear forces- Yukawa's meson theory; Nuclear Models: Liquid drop model, The Shell model, Magic numbers; Nuclear Radiation detectors: G.M. Counter, Cloud chamber, Solid State detector; Elementary Particles: Elementary Particles and their classification

## UNIT-V:

### 5. Nano materials: (7hrs)

Nanomaterials – Introduction, Electron confinement, Size effect, Surface to volume ratio, Classification of nano materials– (0D, 1D, 2D); Quantum dots, Nano wires, Fullerene, CNT, Graphene(Mention of structures and properties),Distinct properties of nano materials (Mention-mechanical,optical, electrical, and magnetic properties); Mention of applications of

nano materials: (Fuel cells,Phosphors for HD TV, Next Generation Computer chips, elimination of pollutants, sensors)

## 6. Superconductivity: (5 hrs)

Introduction to Superconductivity, Experimental results-critical temperature, critical magnetic field, Meissner effect , Isotope effect,Type I and Type II superconductors, BCS theory (elementary ideas only),Applications of superconductors

**REFERENCE BOOKS**
BSc Physics, Vol.4, Telugu Akademy, Hyderabad

Atomic Physics by J.B. Rajam; S.Chand& Co.,

Modern Physics by R. Murugeshan and Kiruthiga Siva Prasath. S. Chand & Co.

Concepts of Modern Physics by Arthur Beiser. Tata McGraw-Hill Edition.

Nuclear Physics, D.C.Tayal, Himalaya Publishing House.

S.K. Kulkarni, Nanotechnology: Principles & Practices (Capital Publ.Co.)

K.K.Chattopadhyay&A.N.Banerjee, Introd.to Nanoscience and Technology(PHI LearningPriv.Limited).

Nano materials, A K Bandopadhyay. New Age International Pvt Ltd (2007)

Textbook of Nanoscience and Nanotechnology, BS Murthy, P Shankar, Baldev Raj,BB Rath

and J Murday-Universities Press-IIM

## Practical Course V: Modern Physics

**Work load: 45 hrs**                                           **3 hrs/week**

On successful completion of this practical course, the student will be able to;

Measure charge of an electron and e/m value of an electron by Thomson method.
Understand how the Planck's constant can be determined using Photocell and LEDs.

Study the absorption of α-rays and β-rays, Range of β-particles and the characteristics of GM counter

Determine the Energy gap of a semiconductor using thermistor and junction diode.
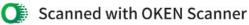
### Minimum of 6 experiments to be done and recorded

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. Determination of the Planck's constant using LEDs of at least 4 different colours.
5. Determination of work function of material of filament of directly heated vacuum diode.
6. Study of absorption of α-rays.
7. Study of absorption of β-rays.
8. Determination of Range of β-particles.
9. Determination of M & H.
10. Analysis of powder X-ray diffraction pattern to determine properties of crystals.
11. Energy gap of a semiconductor using junction diode.
12. Energy gap of a semiconductor using thermistor
13. GM counter characteristics

## RECOMMENDED CO-CURRICULAR ACTIVITIES:

MEASURABLE

Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)

Student seminars (on topics of the syllabus and related aspects (individual activity)

Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams))

Field studies (individual observations and recordings as per syllabus content and related areas (Individual or team activity)

Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity)

GENERAL

Group Discussion

Visit to Research Stations/laboratories and related industries

Others

## RECOMMENDED ASSESSMENT METHODS

Some of the following suggested assessment methodologies could be adopted;

The oral and written examinations (Scheduled and surprise tests),

Practical assignments and laboratory reports,

Efficient delivery using seminar presentations,

Viva voce interviews.

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Dr VS Krishna Govt. Degree College(A), Visakhapatnam 2020-21

BLUE PRINT( Modern Physics)

IIB.Sc. (Physics)- SEM-IV/Course 5  Max Marks-75 Time-3Hrs. Credits:4

| UNIT | S.NO. | Topic | Section-A Essay(10 marks) | Section-B Short Answer ( 5 marks) | Total marks |
|------|-------|-------|------|------|------|
| I | 1 | Atomic and Molecular Physics | 2 | 2 | 30 |
| II | 2 | Matter Waves and Uncertainty Principle | 2 | 2 | 30 |
| III | 3 | Quantum (Wave) Mechanics | 2 | 2 | 30 |
| IV | 4 | Nuclear Physics | 2 | 2 | 30 |
| V | 5 | Nano Materials | 1 | 1 | |
| | 6 | Superconductivity | 1 | 1 | 30 |
| | | Total Questions | 10 | 10 | 150 |

[Note:Question Paper setters are instructed to add Numerical Problems (each of 4 marks) with a maximum weightage of 16 marks either in Section-A or Section-B covering all the five units of the syllabus]

Dr VS Krishna Govt. Degree College(A), Visakhapatnam 2020-21
MODEL QUESTION PAPER ( Mechanics, Waves and Oscillations)
II B.Sc. (Physics)- SEM-III/Course4  Max Marks-75 Time-3Hrs. Credits:4

## Section –A

**Answer ALL the following questions**                    **(5X10=50 Marks)**

1. Explain the two main concepts of Vector Atom Model. Explain the Stern- Gerlach experiment.
సదిశ పరమాణునమూనాలోని రెండు ముఖ్యంశాలను వివరించు. స్టెర్న్ - గెర్లాక్ ప్రయోగాన్ని వివరించు.(OR)

What is Raman effect?Describe an experiment to study Raman effect
రామన్ పలితం అనగానేమి? రామన్ పలితాన్ని వివరించే ఒక ప్రయోగాన్ని వర్ణించు.

2. What are Matter waves? Describe Davission - Germer experiment on Electron diffraction
.ద్రవ్య తరంగాలు అనగానేమి ?ఎలక్ట్రాన్ వివర్తనం వివరించే డెవిసన్ – గెర్మర్ ప్రయోగాన్ని వివరించు(OR)

Explain Heigenberg uncertinity principle for (a) Position and Momentum  and (b)Time and Energy
స్థానం,ద్రవ్యవేగంలకు మరియు కాలము, శక్తిలకు  సంబంధించిన హైజెంబర్గ్ అనిశ్చితత్వ నియమాలను వివరించు.

3. Derive the Time Independent Schroedinger wave Equation .
కాలంపై ఆధారపడని ష్రోదింగర్ తరంగ సమీకరణం ఉత్పాదించండి.(OR)

Write the postulates of Quantum Mechanics. Apply Schroedinger wave equation to particle in one dimentional box.
క్వాంటమ్ యాంత్రిక శాస్త్రం యొక్క ఉపపాదనలను రాయండి. ఏకమితీయ పెట్టెలోని కణానికి శ్రోదింగర్ తరంగ సమీకరణాన్ని అనువర్తించు.

4. Explain Liquid drop model and Shell model of nucleus.
పరమాణు కేంద్రకం యొక్క ద్రవ బిందు నమూనా మరియు కర్పర నమూనా లను వివరించు. (OR)

Write an essay on eslementary particles and their classification
ప్రాథమిక కణాలు మరియు వాటి వర్గీకరణపై ఒక వ్యాసమును ప్రాయుము.

5. Describe the  distinct properties of  nano materials.
నానో పదార్థముల విలక్షణ ధర్మములను వివరించుము.(OR)

Explain superconductivity. Give a brief account of BCS theory. Write any two applications of Superconductivity.
అతివాహకత్వ వివరించు.అతివాహకత్వం యొక్క ఏవైనా రెండు అనువర్తనాలను ప్రాయుము.

## Section – B

Answer any **FIVE** of the following.                    (5X5=25)

6. Explain L-S coupling and J-J coupling.

L-S సంధానం, J-J సంధానంలను వివరించు

7. Explain Meissner effect.

మీస్నర్ ఫలితమును వివరింపుము.

8. Derive an equation for the wavelength of matter waves.

ద్రవ్యతరంగాల తరంగ ధైర్ఘ్యానికి సమీకరణాన్ని ఉత్పాదించండి.

9. Uncertainty in the measurement of momentum of an electron is $4.55 \times 10^{-30}$ Kgms$^{-1}$. Calculate the uncertainty in the measurement of its position. $h = 6.63 \times 10^{-34}$ Kgm$^2$s$^{-1}$.

ఎలక్ట్రాన్ యొక్క ద్రవ్యవేగములో అనిశ్చితత్వము $4.55 \times 10^{-30}$ Kgms$^{-1}$ అయితే దాని స్థానములో అనిశ్చితత్వమును లెక్కించుము. $h = 6.63 \times 10^{-34}$ Kgm$^2$s$^{-1}$

10 . Explain eigen vectors and eigen functions.

ఐగెన్ సదిశలు మరియు ఐగెన్ ప్రమేయములను వివరించుము

11. Explain the properties of nuclear forces.

కేంద్రక బలాల ధర్మములను vivarinchumu.

12. Explain Type- I and Type- II Superconductors.
మొదటి రకం మరియు రెండవ రకం అతివాహకాలను వివరించు

13. A sample was excited by the 4358 A line of frequency. A Raman line was observed at 4447 A. Calculate the Raman Shift.
ఒక సాంపెల్ ను 4358 A తో ఉత్తేజితం చేసినప్పుడు 4447A వద్ద రామన్ రేఖ కనిపించిది. రామన్ విస్థాపనాన్ని

లెక్కించుము.

14. Calculate the mass number of a nucleus whose radius is $3.9 \times 10^{-15}$ m. (Given R0 = $1.3 \times 10^{-15}$ m).
$3.9 \times 10^{-15}$ m వ్యాసార్థముగల పరమాణు కేంద్రకం యొక్క ద్రవ్యరాశి సంఖ్యను లెక్కించుము. ( R0 = $1.3 \times 10^{-15}$ m)

15. State and explain the postulates of quantum mechanics.
క్వాంటమ్ యాంత్రిక శాస్త్ర ప్రతిపాదనలను వ్రాసి వివరించుము.

**Note:**

1. The duration of the examination for each theory course is 3.00 hrs.

   The duration of each practical examination is 3 hrs with 50 marks.

2. Each course in theory is of 100 marks and practical course is of 50 marks.

   Semester End University Examination in Theory Course: 75 marks [ External evaluation]

   Mid-Semester Examination in Theory Course at the college level: 25 marks [ Internal evaluation]

3. The University (external) examination for Theory and Practical shall be conducted at the end of each Semester.

4. In each semester the evaluation in Practical courses shall be done by an external examiner appointed by the University.

   There shall not be Internal valuation in any semester end practical examinations.

5. The candidate shall prepare and submit at the time of practical examination a certified Record based on the practical course with a minimum of **6** experiments from each semester.

6. Numerical Problems must be solved at the end of every chapter of all Units.

7. Numerical problems, each having a weightage of 4 marks, should be asked in the Semester end University examinations.

8. The minimum passing marks in each theory course is 40 (External:30 and Internal:10)

   The minimum passing marks in each Practical/Lab course is 20.

9. The teaching work load per week for semesters I to IV is 4 hours for theory course and 3 hours for all laboratory (practical) courses.

10. Visits to industry, national research laboratories, and scientific exhibitions should be encouraged.

11. The syllabus for Practical courses is same for both Mathematics and Non-Mathematics combinations.

12. The marks distribution for the Semester End practical examination is as follows:

|  | Formula/ Principle / Statement with explanation of symbols | |
|---|---|---|
| (i) | and | 05 |
| (ii) | Diagram/Circuit Diagram / Tabular Columns … … … … … | 10 |
| (iii) | Setting up of the experiment and taking readings/Observations | 10 |
| (iv) | Calculations (explicitly shown) + Graph + Result with Units… | 10 |
| (v) | Viva-voce … … … … …  … … … …  … … … … … … … … | 05 |
| (vi) | Class Records ( to be valued at the time of practical | 10 |
|  | **Total Marks :** | **50** |

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## B.Sc. PHYSICS

### [For Mathematics combinations]

w.e.f. 2020-21

## MODEL QUESTION PAPER FOR ALL THE FIVE THEORY PAPERS OF B.Sc. PHYSICS COURSE

Time : 3 hrs

Max marks : 75

## SECTION-A

**(Essay Type Questions)**

Marks : 5x10M = 50M

*Answer All questions with internal choice from each Unit*

1. Essay type question from Unit-I

   Or

   Essay type question from Unit-I

2. Essay type question from Unit-II

   Or

   Essay type question from Unit-II

3. Essay type question from Unit-III

   Or

   Essay type question from Unit-III

4. Essay type question from Unit-IV

   Or

   Essay type question from Unit-IV

5. Essay type question from Unit-V

   Or

   Essay type question from Unit-V

## SECTION-B

*Answer any five out of the following ten questions*

6.     Short answer type question from Unit-I

7.     Short answer type question from Unit-I

8.     Short answer type question from Unit-II

9.     Short answer type question from Unit-II

10.     Short answer type question from Unit-III

11.     Short answer type question from Unit-III

12.     Short answer type question from Unit-IV

13.     Short answer type question from Unit-IV

14.     Short answer type question from Unit-V

15.     Short answer type question from Unit-V

[**Note:** Question Paper setters are instructed to add Numerical Problems (each of 4 marks) with a maximum weightage of 16 marks either in Section-A or Section-B covering all the five units in the syllabus ]

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# PROGRAM OUTCOMES

At the completion of B.Sc., Program (Mathematics, Physics and Chemistry) the students are able to

PO1: Understand and demonstrate major concepts in disciplines of Mathematics, Physics and Chemistry

PO2: Think independently and methodically arrive at logical conclusions

PO3: Create awareness of impact of modern knowledge on the environment and society

PO4: Create Scientific Attitude and Rational Thinking in Students

PO5: Develop the attitude of child of young student into that of a Corporate being

PO6: Improve communication and Soft skills to harness the power of modern advancements in Technology

# PROGRAM SPECIFIC OUTCOMES

At the completion of B.Sc., Program (Mathematics, Physics and Chemistry) the students are able to

PSO1: Get rigorous exposure to research-oriented learning in core subjects Mathematics, Physics and Chemistry

PSO2: Develop aesthetic senses and communication skills through the study of Languages and Literature

PSO3: Develop integrated problem-solving approaches

PSO4: Get proper of understanding of social, psychological, ecological, political, ethical and regulatory aspects of society by studying foundation courses

PSO4: Improve analytical skills, creative skills and to improve level self-confidence by studying foundation and add-on courses

PSO5: Get inculcated social service and social responsibility by joining NCC and NSS

PSO6: Get skills required achieve targets in life by acquiring career development skills through JKC

# COURSE OUTCOMES

At the completion of B.Sc., Physics Course the students are able to

CO1: Understand the fundamental concepts of Mechanics with special reference to rotatory motion and motion at high speeds (special relativity) and properties of matter with special focus on elasticity

CO2: Manifestation of universe as matter and energy and energy transport

CO3: Nature of Light and its propagation with special reference to Interference, Diffraction and Polarization. Understand the modern application of quantum optics.

CO4: Understand the relation between mechanical energy and heat, laws of thermodynamics and radiation physics

CO5: Apply the laws of electricity and magnetism to various applications and the harness the potential of electronic circuitry.

CO6: Clearly grasp the necessity of modern understanding of laws of nature in the light of quantum mechanics and to apply this understanding to the study of Atomic, Nuclear and Solid State Physics .

CO7: Understand the depletion of natural energy sources coal and oil and the importance renewable energy sources as solution of this crisis.

CO8: Harness the potential of Solar Thermal and Photovoltaic aspects

CO9: Harness the potential of Wind, Hydro and Ocean Energies

CO10: Master the fundamental principles of Energy Storage

# Dr V S Krishna Government Degree College, Visakhapatnam

## SKILL DEVELOPMENT COURSE

## ELECTRICAL APPLIANCES

### MODEL QUESTION PAPER

Max. Marks: 50                                     Time: 1½ hrs (90 Minutes)

### SECTION- A                                     (4x5M=20 Marks)

*Answer any four questions. Each answer carries 5 marks*
*(At least 1 question should be given from each Unit)*

1. State and Explain Ohm's law.
2. Define capacitance and inductance.
3. Distinguish between single phase and three phase connections
4. Explain First aid for electric shock.
5. Write a short notes on UPS
6. Explain power factor in an ac circuit.
7. Explain the principle of Refrigerator
8. Explain the working of microwave woven

### SECTION B                                     (3x10M = 30 Marks)

*Answer any three questions. Each answer carries 10 marks*
*(At least 1 question should be given from each Unit)*

9. Obtain expression for equivalent resistance when two resistors are connected in series and parallel
10. What is a transformer. Distinguish between step-up and step-down transformers. Explain the construction, principle and working of a transformer.
11. Explain star and delta connections.
12. Explain the principle of working, parts and servicing of Electrical Fan.
13. Write an essay on energy efficiency of electrical appliances

H. Sudheer

## SKILL DEVELOPMENT COURSE

### SOLAR ENERGY

### MODEL QUESTION PAPER

Max. Marks: 50

Time: 1½ hrs (90 Minutes)

(4x5M=20 Marks)

### SECTION- A

*Answer any four questions. Each answer carries 5 marks*
*(At least 1 question should be given from each Unit)*

1  Explain the importance of solar energy.
2  Write a short note on solar pond.
3  Explain solar hot water systems.
4  Explain the principle of conversion of solar radiation into heat.
5  Explain photo voltaic effect.
6  What are different types of solar cells.
7  Write a short note on solar photovoltaic cell.
8  Describe the working of a sunshine recorder.

### SECTION B                    (3x10M = 30 Marks)

*Answer any three questions. Each answer carries 10 marks*
*(At least 1 question should be given from each Unit)*

9   Describe how solar constant is determined using a Pyrheliometer.
10  Write an essay on storage of solar energy.
11  Describe Flat plate collectors and concentrating collectors.
12  Describe the working of Photovoltaic Battery Chargers and water pumping systems.
13  Explain how solar radiation is measured using Pyranometer.

H. Sudheer

19/02/2024