Radiumgreen   SkillDevelopment

Yellow   Enterprenurship

Pink   Employability

SRI A S N M GOVERNMENT COLLEGE (A)(A), PALAKOL, W.G. DT
(Affiliated to Adikavi Nannaya University, Rajamahendravaram)
(Accredited with NAAC "B" Grade with 2.61 CGPA points)
I B.Sc. Physics Semester-I: Syllabus 2021-2022

Department of Physics
PAPER I: Mechanics, Waves and Oscillations

4 Hours/Week
Total Hours: 60

UNIT I:
Mechanics of Particles: 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.

Mechanics of Rigid bodies: 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 the equinoxes

UNIT II:
Motion in a Central Force Field: 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:
Relativistic Mechanics: 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:
Undamped, Damped and Forced oscillations: Simple harmonic oscillator and solution of the differential equation, Damped harmonicoscillator, Forced harmonic oscillator – Their differential equations and solutions, Resonance,Logarithmic decrement, Relaxation time and Quality factor.

Coupled oscillations: Coupled oscillators - introduction , Two coupled oscillators, Normal coordinates and Normal Modes.

UNIT V:
Vibrating Strings: 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 andHarmonics.

Ultrasonic's: Ultrasonics, General Properties of ultrasonic waves, Production of ultrasonics by piezoelectric and magnetostriction methods, Detection of ultrasonics, Applications of ultrasonic waves, SONAR

Additional Inputs:

Multi Stage Rocket.,Coriolis Force, Cantilever with an end load, Characteristics of gravitational force Concept of General theory of relativity ,Coriolis Force, Cantilever with an end load ,Characteristics of gravitational force ,Concept of Generally theory of relativity ,Wave number , Fourier transformations ,Velocity of transverse wave in stretched string, Laws of transverse vibrations

REFERENCE BOOKS:
1. Sc. Physics, Vol.1, Telugu Academy, Hyderabad
2. Fundamentals of Physics Vol. I - Resnick, Halliday, Krane ,Wiley India 2007
3. College Physics-I. T. Bhimasankaram and G. Prasad. Himalaya Publishing House.
4. University Physics-FW Sears, MW Zemansky& HD Young,Narosa Publications,Delhi
5. Mechanics, S.G.Venkatachalapathy, Margham Publication, 2003.
6. Waves and Oscillations. N. Subramanyam and Brijlal, VikasPulications.
7. Unified Physics - Waves and Oscillations, Jai PrakashNath&Co.Ltd.
8. Waves & Oscillations. S.Badami, V. Balasubramanian and K.R. Reddy, OrientLongman.
9. The Physics of Waves and Oscillations, N.K.Bajaj, Tata McGraw Hill
10. Science and Technology of Ultrasonics- Baldevraj, Narosa, New Delhi,2004

Practical paper 1: Mechanics, Waves and Oscillations   Work load: 45 hrs
                                                                   3 hrs/week

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

    errorof the mean by statistical analysis

11. Determination of the force constant of a spring by static and dynamic method.

Suggested student activities
Student seminars, group discussions, assignments, field trips, study project and experimentation using virtual lab
.
Examples
Seminars - A topic from any of the Units is given to the student and asked to give a
brief seminar presentation.
Group discussion - A topic from one of the units is given to a group of students and asked to
discuss and debate on it.
Assignment - Few problems may be given to the students from different units and ask them to solve.
Field trip - Visit to: Sugar factory, Tanuku, Paper mill,Rajamahendravaram, any other such visits.
Study project - Web based study.

Domain skills:
Logical derivation, experimentation, problem solving, data collection and analysis, measurement Skills

1. Each theory paper is of 100 marks and practical paper is also of 50 marks.
   Each theory paper is 75 marks University Exam (external) + 25 marks mid Semester Exam
   (internal). Each practical paper is 50 marks external

2. The teaching work load per week for semesters I to IV is 4 hours and for V & VI is 3
    Hours per paper for theory and 3hours for all laboratory (practical) work.
3. The duration of the examination for each theory paper is 3.00 hrs.
4. The duration of each practical examination is 3 hrs with 50 marks, which are to be
   Distributed as 30 marks for experiment
   10 marks for viva
   10 marks for record

Practicals   **50 marks**

Formula & Explanation	6
Tabular form +graph +circuit diagram	6
Observations	12
Calculation, graph, precautions & Result	6
Viva-Voce	10
Record	10

TIME: 3Hrs   **Max. Marks: 75**
SECTION-A

Answer All questions   **5x10=50M**

1. Explain briefly about system of variable mass and derive the equation of motion of rocket.
    చర ద్రవ్యరాశి వ్యవస్థ గురించి వివరించి రాకెట్ యొక్క చలనానికి సమీకరణం రాభట్టుము.

                                        (Or)

    Derive Euler equations.
    యూలర్ సమీకరణాలను రాబట్టుము

2. Define Central force and show that central forces are conservative.
    కేంద్రీయ బలాలును నిర్వచించి, అవి నిత్యత్వ బలాలు అని చూపండి.

                                        (Or)

    State Kepler's Laws of planetary motion. Derive Kepler's Laws
    కెప్లర్ గ్రహ గమన నియమాలను నిర్వచించి, కెప్లర్ నియమాలను రాబట్టండి.

3. Describe Michelson Morley experiment and explain the negative result
    మైఖేల్సన్ మోర్లే ప్రయోగంను వివరించి, ఋణాత్మక ఫలితాన్ని వివరించండి.

                                        (or)

    Deduce Lorentz transformation equations
    లోరౌంట్జ్ రూపాంతర సమీకరణాలను రాభట్టండి.

4. What are damped oscillations. Derive the equation of motion of damped harmonic
     oscillator and obtain its solution.
    అవరుద్ద డోలనాలు అనగా నేమి. దాని యొక్క అవకలన సమీకరణాన్ని రాబట్టి పరిష్కారం రాబట్టుము.

                                        (or)

    Derive Euler equations.
    యూలర్ సమీకరణాలను రాబట్టుము

5. Derive an expression for the velocity of transverse wave along stretched string.
    సాగతీసిన తంత్రంలో తిర్యక్ తరంగ వేగానికి సమీకరణం రాబట్టుము.

                                        (or)

    Explain the production of ultrasonic waves using piezoelectric effect.
    పీజో విద్యుత్తు ఫలితాన్ని ఉపయోగించి అతీధ్వనులను ఉత్పత్తి చేసే విధానాన్ని వివరింపుము.

SECTION-B

Answer any Five questions   **5x5=25M**

6. Define Impact parameter and Scattering cross section.
    అభిఘాత పరామితి మరియు పరిక్షేపణ మధ్యచ్ఛేదం ను నిర్వచించండి

7. Explain the working of gyroscope. What are its applications.
    గైరోస్కోప్ పనిచేసే విధానము మరియు దాని అనువర్తనాలను తెల్పుము.

8. Explain the conservative nature of central forces.

   కేంద్రీయ బలాలు నిత్యత్వ బలాలు ను వివరింపుము.

9. Derive Einstein's mass-energy relation.

   ఐన్ స్టీన్ ద్రవ్యరాశి శక్తి తో సమీకరణము రాబట్టుము..

10. Calculate the velocity of the rod when its length will appear 90% of its proper length

    ఒక కడ్డీ యొక్క సాపేక్ష పొడవు దాని యొక్క సర్వైన పొడవులలో **90%** ఉంటే కడ్డీ యొక్క వేగము ఎంత?

11. Define Logarithmic decrement, relaxation time and write the expressions.

    సంవర్గమాన తరుగుదలన, రిలాక్షేషన్ కాలము లను నిర్వచించి, వాటి సమీకరణాలను వ్రాయండి

12. A flexible spring of length 1m and mass 1gm is stretched by a tension T . The string vibrates in three segments at a of frequency of 512 Hz. Calculate the tension T.

    1m పొడవు, మరియు 1gm ద్రవ్యరాశి గల ఒక తీగ T తన్యతతో బంధింపబడి ఉంది. అపుడు తీగ 512Hz పౌనఃపున్యం వద్ద మూడు భాగాలుగా కంపిస్తుంది. అయిన తీగలో తన్యతను గణించుము.

13. Explain applications of ultrasonics?

    అతిధ్వనుల యొక్క అనువర్తనాలను వివరింపుము.

Paper-I: – MECHANICS, WAVES AND OSCILLATIONS

Blue Print Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
1. Unit - I	2	1+1Problem	30
2. Unit - II	2	1	25
3.Unit - III	2	1+1Problem	30
4.Unit -IV	2	1	25
5.Unit - V	2	1+1Problem	30
Total			140

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I B. Sc. Physics Semester-II: Syllabus 2021-2022

Department of Physics

PAPER II : Wave Optics

4 Hour/Week
Total Hours: 60

UNIT I: Interference of light: (12hrs)

Introduction, Conditions for interference of light, Interference of light by division of wave front and 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 anddetermination 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.

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

Additional Inputs:

Dispersion through a prism, <mark>Young's double slit experiment</mark>, Lens makers formula derivation, Polaroid's, Structure of Calcite Crystal ,Absorption coefficient 'α', Gain coefficient 'β' Numerical Aperture Fraunhoffer diffraction due to double slit Semi conductor lasers

REFERENCE BOOKS:

1. BSc Physics, Vol.2, Telugu Akademy, Hyderabad
2. A Text Book of Optics-N Subramanyam, L Brijlal, S.Chand& Co.
3. Optics-Murugeshan, S.Chand& Co.
4. Unified Physics Vol.IIOptics, Jai PrakashNath&Co.Ltd., Meerut
5. Optics,F.A. Jenkins and H.G.White, McGraw-Hill
6. Optics, AjoyGhatak,TataMcGraw-Hill.
7. Introduction of Lasers – Avadhanulu, S.Chand& Co.
8. Principles of Optics- BK Mathur, Gopala Printing Press, 1995

Practical Paper II: Wave Optics

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

   deviationmethod.

6. Determination of wavelength of light using diffraction grating-

   normalincidencemethod.

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.

11. Determination of cauchy's constants (Using prisim A and B).

Suggested student activities
Student seminars, group discussions, assignments, field trips, study project and experimentation using virtual lab
.
Examples
Seminars - A topic from any of the Units is given to the student and asked to give a
brief seminar presentation.
Group discussion - A topic from one of the units is given to a group of students and asked to
discuss and debate on it.
Assignment - Few problems may be given to the students from the different units and
asked them to solve.
Field trip:Visit to Vijjeswaram Barrage, kovvur, paper mill,Rajamahendravaram etc
Study project - Web based study .

Domain skills:
Logical derivation, experimentation, problem solving, data collection and analysis,
 measurement skills

1. Each theory paper is of 100 marks and practical paper is also of 50 marks.
   Each theory paper is 75 marks University Exam (external) + 25 marks mid Semester Exam
   (internal). Each practical paper is 50 marks external
2. The teaching work load per week for semesters I to IV is 4 hours and for V & VI is 3
    Hours per paper for theory and 3hours for all laboratory (practical) work.
3. The duration of the examination for each theory paper is 3.00 hrs.
4. The duration of each practical examination is 3 hrs with 50 marks, which are to be
    Distributed as 30 marks for experiment
   10 marks for viva
   10 marks for record

Practicals	**50 marks**
Formula & Explanation	6
Tabular form +graph +circuit diagram	6
Observations	12
Calculation, graph, precautions & Result	6
Viva-Voce	10
Record	10

I Year B.Sc.-Physics: II Semester (Model Paper)- (2020-21 Admitted Batch) w.e.f. 2020-21
Paper II – WAVE OPTICS

TIME: 3Hrs   Max. Marks: 75
SECTION-A

Answer All questions   5x10=50M

1. What is Lloyd's mirror? How would you proceed to determine the wavelength of monochromatic light by using Lloyd's mirror.

   లాయిడ్ దర్పణము నిర్మాణము మరియు పనిచేసే విధానము తెలిపి సిద్దాంత సహాయంతో ఏకవర్ణ
   కాంతి తరంగదద్వైర్ ఘ్ యం ఎలా కనుగొందువో వివరింపుము..

   (Or)

   Explain the Construction and Working of Michelson Interferometer and the Method of determining refractive Index of a thin Transparent Layer?

   మ్నైఖిలేల్ సన్ వ్ యతతీకరణ మాపకము నిర్మాణము మరియు పనిచేసే విధానము తెలిపి సిద్దాంత
   సహాయంతో ఏకవర్ణ కాంతి తరంగదద్వైర్ ఘ్ యం ఎలా కనుగొందువో వివరింపుము..

2. Give the theory and construction of a plane transmission diffraction grating and explain the formation of spectra by it.

   సమతల ప్ రసార వివర్ తన జాలకమును తయారుచేసే విధానాన్ ని వర్ణించుము. వివర్ తన జాలకముతో
   వర్ణ పటములు ఏర్ పడే విధానాన్ ని సిద్ డంతముతో వివరించుము.

   (Or)

   What is Zone plate? Explain its construction and working?

   మండల ఫలకము అంటే ఏమిటి? దాని నిర్ మాణము పనిచేసే విధానము వివరింపుము

3. Explain the construction and working of Nicol prism?

   నికాల్ పట్ టకము యొక్ క నిర్ మాణము పనిచేసే విధానము ను వివరింపుము.

   (or)

   Define specific rotatory power. Explain how its value for sugar solution can be determined experimentally by Laurent half shaded polarimeter.

   విశిష్ట భ్ రమణ సామర్ థ్ యం ను నిర్ వచించి, లారెంట్ అర్ ధఛాయా పోలరిమీటర్
   సాయంతో చక్ కెర ద్ రావణం యొక్ క
   విశిష్ట భ్ రమణ సామర్ థ్ యం ఎట్ లా కనుగొంటామో వివరించుము.

4. Explain Chromatic Aberration and Derive the Condition for Achromatism when the lenses are in Contact?

   వర్ ణ విపధనమును వివరించుము. రెండు కాటకాలు తాకుతూ ఉన్ నపుడు అవర్ ణమునకు షరతు
   రాబట్ టుము.   (Or)

   Explain Spherical aberration with neat diagram. Describe eliminations of spherical aberration using to Plano convex lenses separated by distance.?

   గోళీయ విపధనమును వివరించుము. రెండు సమతల కుంభాకార కటకములు ఒక అక్ షంఫ్నై కొంత
   దూరంలో వోరుచేసే గోళీయ విపధనమును నివారించు పద్ దతిని వివరించుము.

5. Explain the working He-Ne Laser with diagrams.

   He-Ne వాయు లేసర్ యొక్ క నిర్ మాణము పనిచేసే విధానము ను చక్ కటి పట సహాయంతో

వివరింపుము   (or)

What is holography. What is difference between holography and ordinary photography. Explain the principle and applications of holography.

హోలోగ్రాఫీ అనగానేమి. హోలోగ్రాఫీ మరియు సాధారణ ఫోటోగ్రాఫీ కి మధ్య తేడా యేమిటి. హోలోగ్రాఫీ యొక్క సూత్రము మరియు అనువర్తనాలను వ్రాయుము.

SECTION-B

Answer any Five questions   **5x5=25M**

6. Explain the formation of colours in thin film.?

    పలుచని పొరలలో వర్ణాలు కనిపించడానిసో వివరించండి.

7. In Newton rings experiment the diameter of 10th dark ring is 0.433cm.Find the wavelength of incident light. If the radius of curvature is 70cm.

    న్యూటన్ వలయ ప్రయోగంలో 10 వ చీకటి వలయం యొక్క వ్యాసము 0.433cm అయినకాంతో జనకం యొక్క తరంగదద్దైర్ఘ్యం ఎంత? కటకం యొక్క వక్రతల వ్యాసార్ధం 70cm

8. Compare Fresnel and Fraunhofer classes of diffraction?

    ఫ్రెనెల్ మరియు ఫ్రాన్ హోఫర్ వివర్తనాలను పోల్చండి.

9. Explain Malus law for Polarization?

    మాలస్ నియమానిసో వివరింపుము.

10. Calculate the specific rotation if the plane of polarization is turned through 26.4° traversing 20cm length of 20% sugar solution.

    20% చక్కెర ద్రావణము ఉన్న 20cm పొడవు గల గొట్టము ధ్రువణ తలానిసో 26.4° తో రొప్పేపొనది. విశిష్ట

    భ్రమణ సామర్ధ్యంను లెక్కించుము.

11. Explain Astigmatism and its remedial methods?

    బిందు విస్తరణను వివరించి, దానిసో తొలగించో పద్దతులను తెల్పుము

12. The dispersive powers for crown and flint glass are 0.015 and 0.045 respectively. Calculate the focal lengths of the lenses which form an achromatic doublet of focal length 60cm when placed in contact.

    0.015 మరియు 0.045 విక్షేపక సామర్ధ్యాలు గల రెండు కటకాలను కలిసి తాకుతూ 60cm నాభ్యతరం

    గల ఒక అవర్ణ యుగ్మంగా ఏర్పడితో ఆ రెండు కటకాల నాభ్యతరాలను కనుగొనుము

13. Write the applications of Lasers.

    లేసర్ యొక్క అనువర్తనాలను వ్రాయుము.

BLUE-PRINT
I B.Sc. Physics Semester-II

Paper-II: WAVE OPTICS

Blue Print Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
1. Unit - I	2	1+1Problem	30
2. Unit - II	2	1	25
3.Unit - III	2	1+1Problem	30
4.Unit -IV	2	1+1Problem	30
5.Unit - V	2	1	25
Total			140

Department of Physics

PAPER III: Heat and thermodynamics

4 Hour/Week
Total Hours: 60

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 CP-CV (iii) Value of CP/CV (iv) Joule-Kelvin coefficient for ideal 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 substancesat low temperatures.

UNIT V: Quantum theory of radiation: (12 hrs) Blackbody and its spectral energy distribution
of black body radiation, Kirchoff's law, Wein'sdisplacement law, Stefan-Boltzmann's law and Rayleigh-Jean's law (Noderivations), 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 Angstrompyroheliometer, Estimation of surface temperature of Sun.

Additional Inputs:
Average speed, Most Probable speed, RMS speed, Introduction to Celsius Scale and Fahrenheit Scale, Relation between them., Reversible Cell Introduction to pyrometers

Reference books:

1. BSc Physics, Vol.2, Telugu Akademy, Hyderabad
2. Thermodynamics, R.C.Srivastava, S.K.Saha&AbhayK.Jain, Eastern Economy Edition.
3. Unified Physics Vol.2, Optics & Thermodynamics, Jai PrakashNath&Co.Ltd., Meerut
4. Fundamentals of Physics. Halliday/Resnick/Walker.C. Wiley India Edition 2007
5. Heat and Thermodynamics -N BrijLal, P Subrahmanyam, S.Chand& Co.,2012
6. Heat and Thermodynamics- MS Yadav, Anmol Publications Pvt. Ltd, 2000
7. University Physics, HD Young, MW Zemansky,FW Sears, Narosa Publishers, NewDelhi

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. Thermo emf- 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.

11. Calculation of temperature coefficient of given material using Carry Fosters bridge.

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Suggested student activities

Student seminars, group discussions, assignments, field trips, study project and experimentation using virtual lab

Examples

Seminars - A topic from any of the Units is given to the student and asked to give a brief seminar presentation.

Group discussion - A topic from one of the units is given to a group of students and asked to discuss and debate on it.

Assignment - Few problems may be given to the students from the different units and asked them to solve.

Field trip:Visit to Vijjeswaram Barrage, kovvur, paper mill,Rajamahendravaram etc

Study project - Web based study .

Domain skills:

Logical derivation, experimentation, problem solving, data collection and analysis, measurement skills

1. Each theory paper is of 100 marks and practical paper is also of 50 marks.
   Each theory paper is 75 marks University Exam (external) + 25 marks mid Semester Exam (internal). Each practical paper is 50 marks external
2. The teaching work load per week for semesters I to IV is 4 hours and for V & VI is 3
    Hours per paper for theory and 3hours for all laboratory (practical) work.
3. The duration of the examination for each theory paper is 3.00 hrs.
4. The duration of each practical examination is 3 hrs with 50 marks, which are to be
   Distributed as 30 marks for experiment
   10 marks for viva
   10 marks for record

Practicals	**50 marks**
Formula & Explanation	6
Tabular form +graph +circuit diagram	6
Observations	12
Calculation, graph, precautions & Result	6
Viva-Voce	10
Record	10

SRI A S N M GOVERNMENT COLLEGE (A) , PALAKOL, W.G. DT
(Affiliated to Adikavi Nannaya University, Rajamahendravaram)
(Accredited with NAAC "B" Grade with 2.61 CGPA points)

II Year B.Sc.-Physics: III Semester (Model Paper)- (2020-21 Admitted Batch) w.e.f. 2021-22
Paper III – HEAT AND THERMODYNAMICS

TIME: 3Hrs   **Max. Marks: 75**
SECTION-A

Answer All questions   **5x10=50M**

1. Deduce Maxwell's law of distribution of molecular speeds and its derivation?
   మాక్స్ వాల్ అణు వేగ వితరణ నియమాన్ని వివరింపుము. (Or)
   Derive an expression for coefficient of viscosity on the basis of kinetic theory of gases?
   వాయు అణుచలన సౌద దాంత పరంగా స్నిగ్ నతా గుణకానికి సమీకరణం సాదింఛుము.

2. Describe the working of Carnots engine and derive an expression for its effiency?
   కార్ నాట్ ఉష్ణ యంత్రం పనిచేసే విధానాన్ని వివరించి దాని దక్షతకు సమీకరణం
   సాదింఛుము.

                                        (Or)

   Define entropy and explain entropy changes in reversible and irreversible process?
   ఎంట్ రోపి ని నిర్ వచించి, ద్విగత మరియు ఏకగత ప్రక్ రియలలో ఎంట్ రోపి లోని
   మార్ పును వివరింఛుము

3. Define the four thermodynamic potentials , obtain Maxwell's thermodynamic equations
   using these potentials.
   నాలుగు ఉష్ణగతిక శక్ మౌలును నిర్ వచించి, వాటి నుండి మాక్స్ వాల్ సమీకరణాలను
   రాబట్ టుము.

                                        (Or)

   Derive an expressions for difference of specific heats of gas.
   ఒక వాయువు యొక్ క విశిష్ట ట్ ఓష్ ణముల బేధానికి కి సమీకరణములు రాబట్ టుము.

4. How are low temperatures produced by adiabatic demagnetization with theory?
   నిరయస్ కాంతీకరణ పద్ దతిలో అల్ ప ఉష్ ణోగ్ రతలను పొందే విధానమును సౌద దాంతముతో
   వివరింపుము.

                                        (Or)

   What is Joul Thomson effect. Derive an expression for Joul Thomson cooling.

5. State Plank's postulates and derive Plank's radiation law
   ప్ లాంక్ ఊహనలను తెలిపి, వికిరణ సూత్ రాస్ ని రాబట్ టుము

                                        (Or)

   Define Solar constant and explain the determination of Solar constant by using Angstrom
   Pyroheliometer. Estimate the surface temperature of Sun.
   స్ ఓలార్ స్ థిరాంకమును నిర్ వచించి అంగ్ స్ ట్ రామ్ ప్వైరో హాలియో మీటర్ తో స్ ఓలార్
   స్ థిరాంకమును కనుగొనే ప్ రయోగము వివరించి, సూర్ యుని ఉస్ ట్ ఓగ్ రతను లెక్ కింఛుము.

SECTION-B
Answer any Five questions   **5x5=25M**

6. Explain diffusion of gases on the basis of kinetic theory of gases?

వాయు అణుచలన సిద్దాంతం పరంగా వాయు విtతరణను వివరింపుము

7. Calculate the work done when 1gm mole of a perfect gas expands isothermally at 27^0C to double its original volume (R= 8.314 J K^{-1}mol^{-1}).

27 ^{0}C ల వద్ద ఉన్న ఒక వాయువు స్థిరోష్ణంగా విiయాకోచం చెందో దాని ఘనపరిమాణం రెట్టింపు అవటానికి జరిగే పని లెక్కించుము

8. State Second law of thermodynamics

ఉష్ణగతికశాస్త్ర రెండవ నియమాన్ని నిర్వచించడి.

9. A reversible engine works between two temperatures whose difference is 100^0 C. If it absorbs 746 J of heat from the source and gives 546 J of heat to sink. Calculate the temperatures of source and sink.

ఒకదిశగత యంత్రం పనిచేయు ఉష్ణోగ్రతల మధ్య బేధం 100^0 C. ఈ యంత్రము 746 J ల ఉష్ణాన్ని జనకం

నుంచి గ్రహించి 746 J ల ఉష్ణాన్ని సింక్ కు విసర్జించినట్లైతే, జనకము మరియు సింక్ ల ఉష్ణోగ్రతలను

గణించండి.

10. Deduce Clausius – Clapeyron equation. What is its importance.

క్లాసియస్ క్లాపరాన్ సమీకరణాన్ని రాబట్టి దాని ప్రాముఖ్యతను వివరింపుము.

11. Explain Liquefaction of air by Linde's method

Linde's పద్దతిన గాలి ద్రవీకరణం ను వివరించుము

12. Define Kirchoff's law, Wein's displacement law, Stefan-Boltzmann's law and Rayleigh-Jean's law

Kirchoff's నియమము, Wein's స్థానభ్రంశట నియమము, Stefan-Boltzmann's నియమము and Rayleigh- Jean's నియమము

13. Determine the temperature of the sun with help of weins constant b =2.92X10^{-3} m k, maximum wavelength is 4900A°.

వీన్ స్థిరాంకను ఉపయోగించి సూర్యుని ఉష్ణోగ్రతను లెక్కించుము.(b = 2.92 X 10^{-3}m-k, గరిష్ఠ

తరంగ ద్వైర్ఘ్యం = 4900A°)

BLUE-PRINT
I B.Sc. Physics Semester-III

Paper-III: HEAT AND THERMODYNAMICS

Blue Print Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
1. Unit - I	2	1+1Problem	30
2. Unit - II	2	1+1Problem	30
3.Unit - III	2	1	25
4.Unit -IV	2	1	25
5.Unit - V	2	1+1Problem	30
Total			140

II B. Sc. Physics Semester-IV: Syllabus 2021-2022

Department of Physics
PAPER IV: Electricity, Magnetism & Electronics

4 Hour/Week
Total Hours: 60

UNIT I:
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 uniformly charged sphere.
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:
Magnetostatics: (6 hrs): Biot-Savart's law and its applications: (i) circular loop and (ii) solenoid, Ampere's Circuital Law and its application to Solenoid, Hall effect, determination of Hall coefficient and applications.
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.

UNIT III:
Alternating currents: (6 hrs): Alternating current - Relation between current and voltage in L,C, R, LR and CR circuits, Phasor and Vector diagrams, LCR series and parallel resonant circuit, Q – factor, Power factor.
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). Velocity of wave equation using maxwells relations in vaccum.

UNIT IV:
Basic Electronic devices: (12 hrs): PN junction diode, Zenerdiode andLight 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 characteristicsofa transistor in CE mode, Relation between alpha, beta and gamma; Transistor as an amplifier.

UNIT-V:
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.

Additional Inputs:

Poisson's and Laplace's equations for a homogeneous dielectric, Force on a current carrying conductor, Energy stored in a magnetic field ,Advantages of AC over DC,Wave Guide,Light Emitting Diode ,Half Subtractor

REFERENCE BOOKS

1. BSc Physics, Vol.3, Telugu Akademy, Hyderabad.
2. Electricity and Magnetism, D.N. Vasudeva. S. Chand & Co.
3. Electricity and Magnetism, B.D.Duggal and C.L.Chhabra. Shobanlal& Co.
4. Electricity, Magnetism with Electronics, K.K.Tewari, R.Chand& Co.,
5. Electricity and Magnetism, R.Murugeshan, S. Chand & Co.
6. Principles of Electronics, V.K. Mehta, S.Chand& Co.,
7. Digital Principles and Applications, A.P. Malvino and D.P.Leach, McGrawHillEdition

Practical Paper IV: Electricity, Magnetism & Electronics

Work load: 45 hrs
3 hrs/week

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

13. Universal gates construction and verification of truth tables.

Suggested student activities
Student seminars, group discussions, assignments, field trips, study project and experimentation using virtual lab
.
Examples
Seminars - A topic from any of the Units is given to the student and asked to give a
brief seminar presentation.
Group discussion - A topic from one of the units is given to a group of students and asked to
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Assignment - Few problems may be given to the students from the different units and

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Domain skills:

Logical derivation, experimentation, problem solving, data collection and analysis, measurement skills

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   Each theory paper is 75 marks University Exam (external) + 25 marks mid Semester Exam
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2. The teaching work load per week for semesters I to IV is 4 hours and for V & VI is 3
    Hours per paper for theory and 3hours for all laboratory (practical) work.
3. The duration of the examination for each theory paper is 3.00 hrs.
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    Distributed as 30 marks for experiment
    10 marks for viva
    10 marks for record

Practicals	**50 marks**
Formula & Explanation	6
Tabular form +graph +circuit diagram	6
Observations	12
Calculation, graph, precautions & Result	6
Viva-Voce	10
Record	10

II Year B.Sc.-Physics: IV Semester (Model Paper)- (2020-21 Admitted Batch) w.e.f. 2021-22
Paper IV – ELECTRICITY, MAGNETISM AND ELECTRONICS

TIME: 3Hrs   Max. Marks: 75
SECTION-A

Answer All questions   **5x10=50M**

1 a) State and prove Gauss's law. Derive the expression for electric field intensity due to charged spherical shell

గాస్ నియమాన్ని నిరూపించి నిరూపించుము. ఆవేశపూరిత గోళం వలన కలిగిన విద్యుత్ క్షేత్ర తీవ్రతకు

సమీకరణం సాధించుమురాబట్టుము.
(Or)

   b) Define and Derive the relation among D, E and P.

D, E మరియు P లను నిర్వచించి వాటి మధ్య సంబంధం రాబట్టుము

2 a) State and explain Biot–Savart's law. Derive an expression for the magnetic induction at a point on the axis of a current carrying solenoid.

బయట్ సావర్ట్ నియమాన్ని వ్రాసి వివరించుము. విద్యుత్ ప్రవాహం ఉన్న ఒక పొడవైన సోలినాయిడ్

లోపల అక్షంపై ఏర్పడే అయస్కాంత ప్రేరణ తీవ్రతకు సమీకరణము రాబట్టుము.
(Or)

   b) Define self induction and Derive an expression for the self inductance of a long solenoid.

పొడవైన సోలినాయిడ్ యొక్క స్వయం ప్రేరకత్వం నిర్వచించి సమీకరణం

రాబట్టుము

3 a) Describe the behavior of series LCR circuit when an alternating voltage is applied to it. Explain the condition for resonance.

ఒక శ్రేణి LCR వలయమునకు ఏకాంతర వోల్టేజిని అనువర్తింప చేసినపుడు ఆ వలయం యొక్క

ప్రవర్తనను వర్ణించుము. అననాదానికి నిభందన రాబట్టుము.
(Or)

   b) Derive the equation of electromagnetic wave and hence determine the velocity of propagation of electromagnetic wave in free space.

విద్యుత్ అయస్కాంత తరంగానికి సమీకరణం రాబట్టి, శూన్యాంతరాళంలో దాని వేగానికి సమీకరణం

ఉత్పాదించండి.

 4.a) What is transistor? Explain the working of PNP and NPN Transistor.

ట్రాన్సిస్టర్ అంటే ఏమిటి? PNP మరియు NPN ట్రాన్సిస్టర్ పనిచేసే విధానము వివరించుము.
(Or)

   b) Explain the CE characteristics of a Transistor. Derive Relation between alpha, beta and gamma

ట్రాన్సిస్టర్ యొక్క CE వాన్యాసంలో లక్షణాలను వివరించుము. alpha, beta and gamma ల మధ్య

సంభందము రాబట్టుము.

5.a) Explain the functioning of a Half Adder and a Full Adder along with respective truth tables.

అర్థ సంకలనో మరియు ఫూర్ణ సంకలనో లు పనిచేసే విధానంను, వాటికో సంబధింఛిన సత్య పట్టికలు

తో వివరింఛుము.

(Or)

b) State and prove De Morgan's laws. Realize AND, OR and NOT gates from NAND logic.

డి మోర్గాన్ నియమాలు వ్రాసి నిరుపింఛుము. NAND ద్వారం నుంచి AND, OR మరియు NOT

ద్వారాలను ఫలితాలను రాబట్టుము.

SECTION-B

Answer any FIVE questions 5x5=25M

6. State the boundary conditions at the dielectric surface.

రోధక ఉపరితలం వద్ద సరిహద్దు నియమాలను నిర్వచింఛండి.

7. What is Hall Effect? Write the applications of Hall Effect.

హాల్ ఫలితం అంటే ఏమిటి? దాని యొక్క అనువర్తనాలు వ్రాయుము

8. What is the self inductance of a 50 cm long solenoid with 2 cm diameter and having 200 turns.

50 cm పొడవు, 2 cm వ్యాసము మరియు 200 చుట్లు గల పొడవైన తీగ చుట్ట యొక్క స్వయం

ప్రేరకత్వము లెక్క కొంఛుము.

9. Write the integral and differential forms of Maxwell's equations.

మాక్స్ వెల్ సమీకరణాల అవకలన మరియు సమాకలన రూపాలను తెల్పుము.

10. Calculate the resonance frequency of a LCR series circuit with a resistance 10Ω, inductance 20mH and a capacitance of $0.02\mu F$.

నిరోధం 10Ω, ప్రేరకత్వం 20 mH మరియు కెపాసిటెన్స్ గల LCR శ్రేణి వలయం యొక్క అననాద

ఫ్రీక్వెన్స్ లెక్క కొంఛండి.

11. Explain the V-I characteristics of Zener diode.

జీనర్ డ్వైయోడ్ యొక్క V-I అభి లక్షణాలను వివరింఛుము.

12. Expain Exclusive-OR gate.

Exclusive-OR gate ను వివరింఛుము.

13. Convert following Binary to Decimal (i) $(10100)_2$ (ii) $(11001)_2$

(i) $(10100)_2$ (ii) $(11001)_2$ లను దశాంశమానంలోకి మార్ఛుము

BLUE-PRINT
II B.Sc. Physics Semester-IV

Paper-IV: ELECTRICITY, MAGNETISM AND ELECTRONICS

Blue Print Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
1. Unit - I	2	1	25
2. Unit - II	2	1+1Problem	30
3.Unit - III	2	1+1Problem	30
4.Unit -IV	2	1	25
5.Unit - V	2	1+1Problem	30
Total			140

II B. Sc. Physics Semester-IV: Syllabus 2021-2022

Department of Physics
PAPER IV: Modern Physics

4 Hour/Week
Total Hours: 60

UNIT I :
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:
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 and photons (Gamma ray microscope),Bohr's principle of complementarity.

UNIT III:
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) three dimensional box - tunneling effect.

UNIT IV:
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:
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).*

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

Additional Inputs:

High Temperature Superconductors Stark Effect, G.P. Thomson Experiment, Photoelectric effect, Compton Effect, Semi Empirical Formula, Mossbauer Effect, Cesium Chloride Structure

REFERENCE BOOKS

1. BSc Physics, Vol.4, Telugu Akademy, Hyderabad

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

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

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

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

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

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

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

9. Textbook of Nanoscience and Nanotechnology, BS Murthy, P Shankar, BaldevRaj,BB Rathand J Murday-Universities Press-IIM

Work load: 45 hrs
3 hrs/week

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 heatedvacuumdiode.

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

14. Study of photo cell characteristics.

Suggested student activities

Student seminars, group discussions, assignments, field trips, study project and experimentation using virtual lab
.
Examples

Seminars - A topic from any of the Units is given to the student and asked to give a brief seminar presentation.

Group discussion - A topic from one of the units is given to a group of students and asked to discuss and debate on it.

Assignment - Few problems may be given to the students from the different units and asked them to solve.

Field trip:Visit to Vijjeswaram Barrage, kovvur, paper mill,Rajamahendravaram etc

Study project - Web based study .

Domain skills:

Logical derivation, experimentation, problem solving, data collection and analysis, measurement skills

1. Each theory paper is of 100 marks and practical paper is also of 50 marks.
   Each theory paper is 75 marks University Exam (external) + 25 marks mid Semester Exam (internal). Each practical paper is 50 marks external

2. The teaching work load per week for semesters I to IV is 4 hours and for V & VI is 3
    Hours per paper for theory and 3hours for all laboratory (practical) work.

3. The duration of the examination for each theory paper is 3.00 hrs.

4. The duration of each practical examination is 3 hrs with 50 marks, which are to be
    Distributed as 30 marks for experiment
    10 marks for viva
    10 marks for record

Practicals	**50 marks**
Formula & Explanation	6
Tabular form +graph +circuit diagram	6
Observations	12
Calculation, graph, precautions & Result	6
Viva-Voce	10
Record	10

II Year B.Sc.-Physics: IV Semester (Model Paper)- (2020-21 Admitted Batch) w.e.f. 2021-22
Paper V – MODERN PHYSICS

TIME: 3Hrs   **Max. Marks: 75**

<div align="center">

SECTION-A

</div>

Answer All questions
5x10=50M

1. a) What is Vector Atom model. Explain the quantum numbers associated with it.

   పరమాణు సదిశా నమూనాను వివరించి, వివిధ క్వాంటం సంఖ్యల ప్రాముఖ్యత తెల్పుము.

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

   b) What is Raman Effect? How it is experimentally studied.

   రామన్ ఫలితం అనగానేమి? దానిని ప్రయోగాత్మక వివరణ వివరింపుము.

1. a) Explain de-Broglie hypothesis for matter waves. Derive an expression for de-Broglie wave length.

   ద్రవ్య తరంగాలకు డీ బ్రోగ్లీ ఊహలను వివరించండి. డీ బ్రోగ్లీ తరంగ ద్వైర్ఘ్యంకు సమీకరణం రాబట్టండి.

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

   b) Explain Davison and Germer experiment for detection of matter waves.

   ద్రవ్య తరంగాల ఉనికికి డివిసన్ మరియు జెర్మేర్ ప్రయోగాన్ని వివరింపుము.

3. a) Derive Schrödinger's time independent wave equation.

   కాలం పై ఆధారపడని ష్రోడింజర్ తరంగ సమీకరణాన్ని ఉత్పాదించండి.

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

   b) Obtain an expression for the energy of a particle in one dimensional potential well.

   ఏకమితీయ శక్మ అఘాధములలో ఉన్న కణము యొక్క శక్తికి సమీకరణాన్ని ఉత్పదించుము.

4. a) What are various nuclear models? Give brief discussion about liquid drop model of Nucleus.

   వివిధ కేంద్రక నమూనాలు ఏమిటి. కేంద్రక ద్రవబిందు నమూనానను వివరింపుము. .

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

   b) Explain the construction and working of GM Counter.

   GM కౌంటర్ నిర్మాణము మరియు పనిచేయు విధానము వివరించుము..

5. a) Explain the Classification of nano materials.

   నానో పదార్ధాల వర్గీకరణను వివరింపుము. (or)

   b) What is super conductivity? Explain Meissner's effect. Mention the applications of super conductivity.

అతివాహకత్వం అనగానేమి? మైస్నర్ ఫలితాన్ని వివరించి అతివాహకత్వ అనువర్తనాలను తెల్పుము.

SECTION-B

Answer Any Five Questions   **5x5=25M**

6. Explain L-S coupling and J-J coupling.
   L-S మరియు J-J సంధానములను వివరింపుము.

7. Explain Heisenberg uncertainty principle.
   హైసెన్ బర్గ్ అనిశ్చితత్వ నియమాన్ని వివరించండి..

8. Calculate the de-Broglie wave length associated with a proton moving with a velocity of 2200m\s. (h=6.625×10^{-34} J s, m_p=1.6×10^{-27} kg)

   2200m\s వేగంతో ప్రయాణిస్తున్న ప్రోటాన్ తో సహచర్యంలో ఉన్న డీ బ్రోగ్లి లో తరంగం యొక్క తరంగ ద్వైర్ఘ్యం లెక్కించుము. (h=6.625×10^{-34} J s, m_p=1.6×10^{-27} kg)

9. Explain the basic postulates of quantum mechanics.
   క్వాంటం యాంత్రిక శాస్త్రము యొక్క ప్రాథమిక ఊహనలను వివరింపుము..

10. A neutron breaks into a proton and an electron. Calculate the mass defect in the reaction.
    (m_p=1.6725×10^{-27} Kg ,me =9×10^{-31} kg, m_n =1.6747×10^{-27} kg)

    ఒక న్యూట్రాన్, ప్రోటాన్ మరియు ఎలక్ట్రాన్ జంటగా విడిపోతే ద్రవ్యరాశి తరుగుదలను లెక్కించుము.
    (m_p=1.6725×10^{-27} Kg ,me =9×10^{-31} kg, m_n =1.6747×10^{-27} kg)

11. Explain the classification of elementary particles.
    ప్రాథమిక కణాల వర్గీకరణను వివరించండి.

12. Mention of applications of nano materials
    నానో పదార్ధాల యొక్క అనువర్తనాలను వ్రాయుము.

13. Explain type-I and type-II super conductors.
    మొదటి రకం మరియు రెండవ రకం అతివాహకాల గూర్చి వివరించండి.

BLUE-PRINT
II B.Sc. Physics Semester-IV

Paper-V: MODERN PHYSICS

Blue Print Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
1. Unit - I	2	1	25
2. Unit - II	2	1+1Problem	30
3.Unit - III	2	1+1Problem	30
4.Unit -IV	2	1	25
5.Unit - V	2	2	30
Total			140

Department of Physics
PAPER V: Electricity, Magnetism and Electronics

3Hours/Week
Total Hours: 45

UNIT-I (9 hrs)

1. Electric Field Intensity and Potential
Gauss's law statement and its proof- Electric field intensity due to (1) Uniformly charged sphere and (2) an infinite conducting sheet of charge. Electrical potential –Equipotential surfaces- potential due to (1) a point charge, (2) charged spherical shell.
Addl.Inputs: Coulomb's law from Gauss' law

2. Dielectrics:
Electric dipole moment and molecular Polarizability, Electric displacement D, electric polarization P –relation between D, E and P- Dielectric constant and susceptibility. Boundary conditions at the dielectric surface.
Addl.Inputs: Poission's and Laplace's equations for a homogeneous dielectric

UNIT-II (9 hrs)

3. Electric and Magnetic Fields
Biot-Savart's law, explanation and calculation of 'B' due to long straight wire, a circular current loop and solenoid – Hall effect – determination of Hall coefficient and applications.
Addl.Inputs: Force on a current carrying conductor

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. Transformer, energy losses, efficiency.
Addl.Inputs: Energy stored in a magnetic field

UNIT-III (9 hrs)

5. Alternating Currents and Electromagnetic 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.
Addl.Inputs: Advantages of AC over DC

6. Maxwell's Equations
Idea of displacement current - Maxwell's equations (integral and differential forms) (no derivation), Maxwell's wave equation (with derivation). Pointing theorem (statement), Production of electromagnetic waves (Hertz experiment).
Addl.Inputs: Wave Guides

UNIT-IV (9 hrs)

7. Basic Electronics:

PN junction diode, Zener diode, I-V characteristics, PNP and NPN transistors, CB, CE and CC configurations – Relation between α, β and γ - transistor (CE) characteristics , Transistor as an amplifier.

Addl.Inputs: Light Emitting Diode

UNIT-V: (9 hrs)
8. Digital Electronics
Number systems - Conversion of binary to decimal system and vice versa. Binary subtraction (2's complement methods).Laws of Boolean algebra - De Morgan's laws-statement and proof, Basic logic gates, NAND and NOR as universal gates, exclusive-OR gate, Half adder and Full adder.

Addl.Inputs: Half Subtractor

Text Books and Reference Books:
1.Modern Physics by R. Murugeshan and Kiruthiga Siva Prasath – S. Chand & Co.
    (for semiconductor &Digital Principles)
2. Fundamentals of Physics- Halliday/Resnick/Walker - Wiley India Edition 2007.
3. Berkeley Physics Course – Vol. II - Electricity and Magnetism – Edward M Purcell –The McGraw-Hill Companies.
4. Electricity and Magnetism – D.N. Vasudeva. S. Chand & Co.
5. Electronic devices and circuits – Millman and Halkias. Mc.Graw-Hill Education.
6. Electricity and Magnetism Brijlal and Subramanyam. Ratan Prakashan Mandir.
7. Digital Principles and Applications by A.P. Malvino and D.P. Leach. McGraw Hill Educat
8. Vivek B.Sc. Third Year Physics Paper-5, D.V.Brahmaji,A.Sreenivasa Rao, Venkateswara Publications,Guntur
9. Unified Physics Vol.3 – S.L. Gupta and Sanjeev Gupta – Jai Prakasah Nath & CO Meerut

Practical Paper V: Electricity, Magnetism & Electronics

Work load: 45 hrs
3 hrs/week

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 Kirchhoff's laws and Maximum power transfer theorem.

5. Field along the axis of a circular coil carrying current.

6. PN Junction Diode Characteristics

7. Zene Diode Characteristics

8. Transistor CE Characteristics- Determination of hybrid parameters

9. Carey Foster's Bridge – measurement of specific resistance.

10. Impedance and Power factor of LR Circuit

Suggested student activities

Student seminars, group discussions, assignments, field trips, study project and experimentation using virtual lab
.
Examples
Seminars - A topic from any of the Units is given to the student and asked to give a brief seminar presentation.
Group discussion - A topic from one of the units is given to a group of students and asked to discuss and debate on it.
Assignment - Few problems may be given to the students from the different units and asked them to solve.
Field trip: Visit to Satish Dhawan Space Centre, Sriharikota/Thermal and hydroelectric power stations etc.,
Study project - Web based study.

 Domain skills:
Logical derivation, experimentation, problem solving, data collection and analysis, measurement skills
1. Each theory paper is of 100 marks and practical paper is also of 50 marks.
   Each theory paper is 75 marks University Exam (external) + 25 marks mid Semester Exam
   (internal). Each practical paper is 50 marks external
2. The teaching work load per week for semesters I to IV is 4 hours and for V & VI is 3
    Hours per paper for theory and 3hours for all laboratory (practical) work.
3. The duration of the examination for each theory paper is 3.00 hrs.
4. The duration of each practical examination is 3 hrs with 50 marks, which are to be
    Distributed as 30 marks for experiment
    10 marks for viva
    10 marks for record

Practicals   **50 marks**

Formula & Explanation   6
Tabular form +graph +circuit diagram   6
Observations   12
Calculation, graph, precautions & Result   6
Viva-Voce   10
Record   10

SRI A S N M GOVERNMENT COLLEGE (A), PALAKOL, W.G. DT

III B.Sc.: Physics Semester- V (Model Paper)- (2018-19 Admitted Batch)
Paper V – ELECTRICITY, MAGNETISM AND ELECTRONICS

Time: 3Hrs   **Max. Marks: 75**
<div align="center">

SECTION-A
</div>

Answer All questions   **5X10=50M**

1. a) State and prove Gauss's law.
   గాస్ నియమానని నిరూపించి నిరూపించుము.

   (Or)

   b) Explain the boundary conditions at the dielectric surface.
   రోధక ఉపరితలం వద్ద సరిహద్దు నియమాలు వివరించండి

2. a) State and explain Biot–Savart's law. Derive an expression for the magnetic induction at a point on the axis of a current carrying solenoid.
   బయట్ సావర్ట్ నియమానని వ్రరాసి వివరించుము. విద్యుత్ ప్రవాహం ఉనన ఒక పొడవైన సోలిన్నాడ్
   లోపల అక్షంషఫ్ ఏర్పడే అయస్ కాంత ప్రేరణ తీవ్రతకు సమీకరణము రాబట్టుము.

   (Or)

   b) Describe the construction and working of a transformer. Explain its energy losses.
   ట్రాన్స్ ఫార్మర్ సూత్రాన్ని, రూపకల్పనను మరియు పనిచేసే ప్రకర్రియను వివరింపుము.
   ట్రాన్స్ ఫార్మర్ లో కలిగే సామర్ధ్య నష్టాలు ఏమిటి.

3. a) Describe the behavior of series LCR circuit when an alternating voltage is applied to it. Explain the condition for resonance.
   ఒక శ్రేణి LCR వలయమునకు ఏకాంతర వోల్టేజిని అనువర్తింప చేసినపుడు ఆ వలయం యొక్క
   ప్రవర్తనను వర్ణించుము. అనునాదానికి నిభందన రాబట్టుము.

   (Or)

   b) Derive the equation of electromagnetic wave and hence determine the velocity of propagation of electromagnetic wave in free space.
   విద్యుత్ అయస్ కాంత తరంగానికి సమీకరణం రాభట్టి,
   శూన్యాంతరాళంలో దాని వేగానికి సమీకరణం ఉత్పాదించండి.

4. a) What is transistor? Explain the working of PNP and NPN Transistor.
   ట్రాన్సిస్టర్ అంటే ఏమిటి? PNP మరియు NPN ట్రాన్సిస్టర్ పనిచేసే విధానము వివరించుము.

   (Or)

   b) Explain the CE characteristics of a Transistor.
   ట్రాన్సిస్టర్ యొక్క CE విన్యాసను వివరించుము.

5. a) Explain the functioning of a Half Adder and a Full Adder along with respective truth tables.

అర్ధ సంకలని మరియు ఫూర్ణ సంకలనిలు పనిచేసే విధానాను, వాటికి సంబధించిన సత్య పట్టికలు తో వివరించుము.

(Or)

b) State and prove De Morgan's laws. Realize AND, OR and NOT gates from NAND logic.

డి మోర్గాన్ నియమాలు వ్రాసి నిరుపించుము. NAND ద్వారం నుంచి AND, OR మరియు NOT ద్వారాలను ఫలితాలను రాబట్టుము.

SECTION-B

Answer any FIVE questions   5x5=25M

6. Derive the relation among D, E and P.

   D, E మరియు P ల మధ్య సంబంధం రాబట్టుము.

7. Derive expression for the potential due to a point charge.

   బిందు విద్యుదావేశం వలన వచ్చే విద్యుత్ పొటెన్షల్ కి సమీకరణం ఉత్పాదించు.

8. What is Hall Effect? Write the applications of Hall Effect.

   హాల్ ఫలితం అంటే ఏమిటి? దాని యొక్క అనువర్తనాలు వ్రాయుము.

9. Derive an expression for the self inductance of a long solenoid.

   పొడవైన సోలెనోయిడ్ యొక్క స్వయం ప్రేరకత్వం కి సమీకరణం రాబట్టుము.

10. Write the integral and differential forms of Maxwell's equations.

    మాక్స్ వెల్ సమీకరణాల అవకలన మరియు సమాకలన రూపాలను తెల్పుము.

11. Calculate the resonance frequency of a LCR series circuit with a resistance 10Ω, inductance 20mH and a capacitance of $0.02\mu F$.

    నిరోధం $10~\Omega$, ప్రేరకత్వం 20 mH మరియు కెపాసిటెన్స్ సు గల LCR శ్రేణి వలయం యొక్క అనునాద ఫ్రీక్వెన్సీ లెక్కించండి.

12. For a transistor $\alpha = 0.95$ and its emitter current is 1mA. Find its base and collector currents

    ట్రాన్సిస్టర్ యొక్క $\alpha = 0.95$ మరియు దాని ఉద్గార విద్యుత్ 1mA అయితే దాని ఆధార మరియు సేకరణి విద్యుత్ లను కనుగొనుము.

13. Convert following Binary to Decimal (i) $(10100)_2$ (ii) $(11001)_2$

    (i) $(10100)_2$ (ii) $(11001)_2$ లను దశాంశమానంలోకి మార్చుము.

BLUE-PRINT
III B.Sc. Physics Semester-V
Paper-V: Electricity, Magnetism and Electronics

Blue Print Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
1. Unit - I	2	2	30
2. Unit - II	2	2	30
3.Unit - III	2	1+1Problem	30
4.Unit -IV	2	1Problem	25
5.Unit - V	2	1Problem	25
Total			140

Department of Physics

PAPER VI: MODERN PHYSICS

No. of Credits: 03   **3 Hour/Week**
                                                          Total Hours: 45

UNIT-I (9 hrs)
1. Atomic and Molecular Physics
Introduction –Drawbacks of Bohr's atomic model. Vector atom model and Stern-Gerlach experiment - quantum numbers associated with it. L-S and J- J coupling schemes. Zeeman Effect (Definition only) -Raman Effect, hypothesis, Stokes and Anti Stokes lines. Quantum theory of Raman Effect. Experimental arrangement – Applications of Raman effect
Addl.Inputs: Stark Effect

UNIT-II (9 hrs)
2. Matter Waves & Uncertainty Principle
Matter waves, de Broglie's hypothesis - wavelength of matter waves, Properties of matter waves - Davisson and Germer experiment – Heisenberg's uncertainty principle for position and momentum & Energy and time
Addl.Inputs: G.P. Thomson Experiment

UNIT-III (9 hrs)
3. Quantum (wave) Mechanics
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 particle in one dimensional infinite box.
 Addl.Inputs: Photoelectric effect, Compton Effect

UNIT-IV (9 hrs)

4. General Properties of Nuclei
Basic ideas of nucleus -size, mass, charge density (matter energy), binding energy, magnetic moment, electric moments. Liquid drop model and Shell model (qualitative aspects only) - Magic numbers.
Addl.Inputs: Semi Emprical Formula

5. Radioactivity Decay
Alpha decay: basics of α-decay processes. Theory of α-decay. Gamow's theory, Geiger Nuttal law. β-decay, Energy kinematics for β-decay, positron emission, electron capture, neutrino hypothesis.
Addl.Inputs: Mossbauer Effect

UNIT-V (9 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.
Additional Inputs: Cesium Chloride Structure

7. Super Conductivity
Introduction - experimental facts, critical temperature - critical field - Meissner's effect – Isotope effect - Type I and type II superconductors - applications of superconductors.
Addl.Inputs: High Temperature Superconductors

Text Books and Reference Books:
1. Modern Physics by G. Aruldhas & P. Rajagopal. *Eastern Economy Edition*.
2. Concepts of Modern Physics by Arthur Beiser. *Tata McGraw-Hill Edition*.
3. Modern Physics by R. Murugeshan and Kiruthiga Siva Prasath. *S. Chand & Co.*
4. Nuclear Physics by D.C. Tayal, *Himalaya Publishing House(HPH)*.
5. Molecular Structure and Spectroscopy by G. Aruldhas. *Prentice Hall of India, New Delhi*.
6. Spectroscopy –Atomic and Molecular by Gurdeep R Chatwal and Shyam Anand – *HPH*
7. Third Year Physics - *Telugu Academy*.
8. Vivek B.Sc. Third Year Physics Paper-6, D.V.Brahmaji,A.Sreenivasa Rao, Venkateswara Publications,Guntur
8. Elements of Solid State Physics by J.P. Srivastava. (for chapter on nanomaterials)-*PHI Pvt*

Practical Paper VI: Modern Physics

Work load: 45 hrs
3 hrs/week

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 M & H.

7. Logic Gates- AND, OR, NOT and XOR gates. Verification of Truth Tables.

8. Verification of De Morgan's Theorems.

9. Verification of Truth Tables of Universal gates

10. Verification of truth tables of Half and Full adders

Suggested student activities
Student seminars, group discussions, assignments, field trips, study project and experimentation using virtual lab
.

Examples

Seminars - A topic from any of the Units is given to the student and asked to give a brief seminar presentation.

Group discussion - A topic from one of the units is given to a group of students and asked to discuss and debate on it.

Assignment - Few problems may be given to the students from the different units and asked them to solve.

Field trip: Visit to Satish Dhawan Space Centre, Sriharikota/Thermal and hydroelectric power stations etc.,

Study project - Web based study.

Domain skills:

Logical derivation, experimentation, problem solving, data collection and analysis, measurement skills

1. Each theory paper is of 100 marks and practical paper is also of 50 marks.
   Each theory paper is 75 marks University Exam (external) + 25 marks mid Semester Exam (internal). Each practical paper is 50 marks external
2. The teaching work load per week for semesters I to IV is 4 hours and for V & VI is 3
    Hours per paper for theory and 3hours for all laboratory (practical) work.
3. The duration of the examination for each theory paper is 3.00 hrs.
4. The duration of each practical examination is 3 hrs with 50 marks, which are to be
   Distributed as 30 marks for experiment
   10 marks for viva
   10 marks for record

Practicals	**50 marks**
Formula & Explanation	6
Tabular form +graph +circuit diagram	6
Observations	12
Calculation, graph, precautions & Result	6
Viva-Voce	10
Record	10

III B.Sc.: Physics Semester- V (Model Paper) - (2018-19 Admitted Batch)
Paper VI – MODERN PHYSICS

Time: 3Hrs   Max. Marks: 75

SECTION-A
Answer ALL questions   **5x10=50M**

1. a) Describe Stern and Gerlach experiment. What is its importance?
    స్టెర్న్ గెర్లాక్ ప్రయోగమును వివరించి దాని ప్రాముఖ్యత తెల్పము.

(or)

   b) What is Raman Effect? How it is experimentally studied.
    రామన్ ఫలితం అనగానేమి? దాని ప్రయోగాత్మక వివరణ వివరింపుము.

2. a) Explain de-Broglie hypothesis for matter waves. Derive an expression for de-Broglie wave length.
    ద్రవ్య తరంగాలకు డీ బ్రోగ్లి ఊహలను వివరించండి. డీ బ్రోగ్లి తరంగ ద్వైర్ఘ్యంకు సమీకరణం రాబట్టండి.

(or)

   b) Explain Davison and Germer experiment for detection of matter waves.
    ద్రవ్య తరంగాల ఉనికికి డెవిసన్ మరియు జెర్మేర్ ప్రయోగాన్ని వివరింపుము.

3. a) Derive Schrödinger's time independent wave equation.
    కాలం ఫై ఆధారపడని ష్రోడింజర్ తరంగ సమీకరణాన్ని ఉత్పాదించండి.

(or)

   b) Obtain an expression for the energy of a particle in one dimensional potential well.
    ఏకమితీయ శక్మ అఘాధములలో ఉన్న కణము యొక్క శక్తికి సమీకరణాన్ని ఉత్పాదించుము.

4. a) What are various nuclear models? Give brief discussion about liquid drop model of Nucleus.
    వివిధ కేంద్రక నమూనాలు ఏమిటి. కేంద్రక ద్రవబిందు నమూనాను వివరింపుము. .

(or)

   b) Explain Gamow theory of α –decay.
    α- క్షీణతకు గామో సిద్ధాంతాన్ని వివరింపుము.

5. a) Describe different crystal systems.
    వివిధ స్పటిక నిర్మాణాలను వివరింపుము. (or)

   b) What is super conductivity? Explain Meissner's effect. Mention the properties of super conductivity.

అతిప్రవాహకత్వం అనగానేమి? మైస్నర్ ఫలితాన్ని వివరించి అతిప్రవాహకత్వ ధర్మాలను తెల్పుము.

SECTION-B

Answer Any Five Questions   5x5=25M

6. Explain L-S coupling and J-J coupling.
   L-S మరియు J-J సందానములను వివరింపుము.

7. Explain Heisenberg uncertainty principle.
   హైసెన్ బర్గ్ అనిశ్చితత్వ నియమాన్ని వివరించండి..

8. Calculate the de-Broglie wave length associated with a proton moving with a velocity of 2200m\s. (h=6.625x10^{-34} J s, m$_p$=1.6 x10^{-27} kg)

   2200m\s వేగంతో ప్రరయాణిస్తున్న ప్రోటాన్ తో సహచర్యంలో ఉన్న డీ బ్రోగ్లీ తరంగం యొక్క తరంగ ద్వైర్ఘ్యం లెక్కకొంచుము. (h=6.625x10^{-34} J s, m$_p$=1.6 x10^{-27} kg)

9. Define Photo electric effect and Compton Effect.
   కాంతి విద్యుత్ ఫలితం మరియు కాంప్టన్ ఫలితం లను నిర్వచించండి.

10. A neutron breaks into a proton and an electron. Calculate the mass defect in the reaction. (m$_p$=1.6725x10^{-27} Kg, me =9x10^{-31} kg, m$_n$ =1.6747x10^{-27} kg)

    ఒక న్యూట్రాన్, ప్రోటాన్ మరియు ఎలక్ట్రాన్ జంటగా విడిపోతే ద్రవ్యరాశి తరుగుదలను లెక్కకొంచుము.
    (m$_p$=1.6725x10^{-27} Kg, me =9x10^{-31} kg, m$_n$ =1.6747x10^{-27} kg)

11. Explain Geiger Nuttal's Law.
    గైగర్ నట్టల్ నియమాన్ని వివరించండి.

12. Calculate the inter planar spacing for a (1 1 0) plane in simple cubic lattice with unit cell side 5.63 A^0
    యూనిట్ సెల్ భుజము 5.63 A^o గల ఘన వ్యవస్థలో మిల్లర్ సూచికలు (1 1 0) గల లాటిస్ తలాల మధ్య దూరం లెక్కకొంచుము.

13. Explain type-I and type-II super conductors.
    మొదటి రకం మరియు రెండవ రకం అతిప్రవాహకాల గూర్చి వివరించండి.

BLUE-PRINT
III B.Sc. Physics Semester-V,
Paper-VI: MODERN PHYSICS

Blue Print Module	Essay Questions 10 marks	Short Questions 5 marks	Marks allotted
1. Unit - I	2	1	25
2. Unit - II	2	1+1Problem	30
3.Unit - III	2	1	25
4.Unit -IV	2	1+1Problem	30
5.Unit - V	2	1+1Problem	30
Total			140

III B. Sc. Physics Semester-VI: Syllabus 2021-2022

Department of Physics

Elective Paper-VII (A) - Analog and Digital Electronics

3 Hour/Week
Total Hours: 45

Unit-I (10 Hours)
1. FET-Construction, Working, characteristics and uses; MOSFET-enhancement MOSFET, construction and working , drain characteristics of MOSFET, applications of MOSFET
2. Photo electric devices: Structure and operation, characteristics, application of LDR, LED

Unit-II (9Hours)
3. Operational Amplifiers: Characteristics of ideal and practical Op-Amp (IC 741), Basic differential amplifiers, Op-Amp supply voltage, IC identification, Internal blocks of Op-Amp, CMRR, slew rate, concept of virtual ground.

Unit-III (8 Hours)
4. Applications of Op-Amp: Op-Amp as, Inverting amplifier, Non-inverting amplifier, voltage follower, summing amplifier, difference amplifier, comparator, integrator, differentiator.

Unit-IV(9 Hours)
5. Data processing circuits: Multiplexers, De-multiplexers, encoders, decoders, Characteristics for Digital ICs -RTL, DTL, TTL, (NAND & NOR Gates).
6. IC 555 Timer -Its pin diagram, internal architecture, Application as astablemulti vibrator and mono stable multi vibrator.

Unit-V (9 Hours)
7. Sequential digital circuits: Flip-flops, RS, Clocked SR, JK, D, T, Master-Slave, Flip- flop,.
8. Code Converters: Design of code converter, BCD to 7 segment, binary/BCD to gray, gray to binary/BCD.

Reference Books
1. Digital Electronics by G.K.Kharate Oxford University Press
2. Unified Electronics by Agarwal and Agarwal.
3. Op- Amp and Linear ICs by Ramakanth A Gayekwad, 4th edition PHI
4. Digital Principles and Applications by Malvino and Leach, TMH, 1996, 4th edition.
5. Digital Circuit design by Morris Mano,PHI
6. Switching Theory and Logic design by A.AnandKumar ,PHI
7. operations amplifier by SV Subramanyam.

3 Hour/Week
Total Hours: 45

Minimum of 6 experiments to be done and recorded

1) Characteristics of FET

2) Characteristics of MOSFET

3) Characteristics of LDR

4) Characteristics of Op-amp.(IC741)

5) Op-Amp as amplifier/inverting amplifier

6) Op-Amp as integrator/differentiator

7) Op-Amp as summing amplifier/difference amplifier

8) IC 555 as astable multivibrator

9) IC 555 as monostable amplifier

10) Master slave flip-flop

11) JK flip-flop

Suggested student activities
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experimentation using virtual lab
. **Examples**
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    Hours per paper for theory and 3hours for all laboratory (practical) work.
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   Distributed as 30 marks for experiment
   10 marks for viva

10 marks for record

Practicals   **50 marks**

Formula & Explanation	6
Tabular form +graph +circuit diagram	6
Observations	12
Calculation, graph, precautions & Result	6
Viva-Voce	10
Record	10