

**GOVT.DEGREE COLLEGE (AUTONOMOUS)-SIDDIPET,  
DIST: MEDAK  
DEPARTMENT OF PHYSICS (P.G)  
Semester-I**

S.No	Sub. Code	Paper No.	Subject	Instruction s. Hrs/Week	Credits	Max. Marks
<b>THEORY</b>						
1	PAE 101 T	I	Mathematical Physics	4	4	100*
2	PAE 102 T	II	Classical Mechanics	4	4	100*
3	PAE 103 T	III	Quantum Mechanics - I	4	4	100*
4	PAE 104 T	IV	Solid state physics	4	4	100*
<b>PRACTICALS</b>						
5	PAE 151 P		Computer programming	4	2	100
6	PAE 152 P		Electronics,	4	2	100
7	PAE 153 P	VI	Heat & acoustics,	4	2	100
8	PAE 154P	VII	Optics Lab	4	2	100
			<b>TOTAL:</b>		24	800

**\* Out of 100 Marks for each theory paper 20 Marks are allotted for internals and 80 for University exam. Common Syllabus to University and Constituent Colleges. There shall be no internal assessment examinations for practical's. Practical Examinations will be conducted at the end of each semester.**

**Pattern of Question Paper:** The question paper consists of two parts, each covering all the **four** units.

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Semester-II**

S.No	Sub. Code	Paper No.	Subject	Instruction s. Hrs/Week	Credits	Max. Marks
<b>THEORY</b>						
1	PAE 201 T	I	Electromagnetic Theory	4	4	100*
2	PAE 202 T	II	Statistical Mechanics	4	4	100*
3	PAE 203 T	III	Quantum Mechanics - II	4	4	100*
4	PAE 204 T	IV	Electronics - II	4	4	100*
<b>PRACTICALS</b>						
5	PAE 251 P		Computer programming	4	2	100
6	PAE 252 P		Electronics,	4	2	100
7	PAE 253 P	VI	Heat & acoustics,	4	2	100
8	PAE 254P	VII	Optics Lab	4	2	100
			<b>TOTAL:</b>		24	800

**\* Out of 100 Marks for each theory paper 20 Marks are allotted for internals and 80 for University exam. Common Syllabus to University and Constituent Colleges. There shall be no internal assessment examinations for practical's. Practical Examinations will be conducted at the end of each semester.**

**Pattern of Question Paper:** The question paper consists of two parts, each covering all the **four units**.

Part – A consists of EIGHT short notes questions, carrying 4 marks each. The student has to answer all the questions.

Part – B consists of FOUR essay type questions with an internal choice. Each question carries 12 marks.

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**DEPARTMENT OF PHYSICS FOR P.G.**

**Under CBCS (with effect from the academic year 2016 –17)**

**Semester – I**

**PAE 101 T Paper –I: Mathematical Physics**

**UNIT –I: (13 Hrs)**

**Legendre's Differential equation:** The Power series equation: Solution–Legendre Functions of the first and second kind –Generating Function- Rodrigues'-OrthogonalFormulaProperties – Recurrence Relations.Beta and Gamma function – Properties –Relations between them.

**Bessel's Differential Equation:** Power series Solution equation–Bessel Functions of First and Second kind- Generating Function –Orthogonal Properties –Recurrence Relations.

**UNIT –II: (13 Hrs)**

**Hermit Differential Equation:** Power series Solution–Hermit polynomials - GeneratingFunction-Orthogonality –Recurrence relations -Rodriguez formula – Hypergeometric equation-solution-Laplace equation-Solution Wave equation and its Applications to rectangular membrane.

**UNIT –III : (13 Hrs)**

**Fourier Transform:** Infinite Fourier Sine and Cosine transforms–Properties of Fourier transforms-Derivative of Fourier transforms –Fourier transform of a derivative-Fourier Sine and Cosine transform of derivatives-Finite Fourier transforms –Applications of Fourier Transforms.

**Laplace Transform:** Properties of Laplace transforms –Derivative of Laplace transform–Laplace transform of a derivative –Laplace transform of periodic functions- Inverse Laplace transform and its properties –Inverse Laplace theorem –Convolution theorem-Evaluation of inverse Laplace Transforms by Convolution theorem.

**Unit –IV: (13 Hrs)**

Matrices–Addition, subtraction and multiplication of matrices –Inverse of matrices- Characteristic equation of a matrix- Eigen values- Eigen vectors- Types of matrices square, diagonal, unit symmetric and skew symmetric and Hermitian matrices.

Tensors –Order and rank of the tensors –transformation laws Covariant and contra variant tensors - Addition, subtraction and multiplication of tensors-Christofis symbols of first and second rank and their transformation law.

**Recommended Books:**

1. Applied Mathematics for Engineers and Physicists –Lious A Pipes and Lawrance R. Rarvill.
2. Mathematical Physics –AK Ghatak, IC Goyal and SL Chua-Macmillan India Ltd.
3. Vector and Tensor Analysis –Scham Series.
4. Mathematical Physics –SatyaPrakash

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**Semester – I**

**PAE 102 T Paper –II: CLASSICAL MECHANICS**

**UNIT –I: (13 Hrs)**

**Newtonian formalism:** Inertial frames and Galilean transforms-Non-inertial frames pseudo Forces, rotational frames, rotational transforms and conservation Theorems. Description of rotations in terms of Euler angles-Euler's equations of motion For a rigid body. Murkowski space, space-time diagrams, world point and world line relativistic Motion and Lorentz transforms as rotations in four-space, four velocity, energy momentum vectors with few examples.

**UNIT –II: (13 Hrs)**

**Lagrangian formalism:** Constraints, generalized coordinates. Principle Lagrange's Equations from-Applications D'Alembert's of principle, Lagrangian (plane and spherical Pendulums, L-C circuit), velocity dependent potential-Lagrangian for a charged particle in electromagnetic field, Eel Hamilton's-Lagrange equation's from Hamilton's principle.

**UNIT –III: (13 Hrs)**

**Hamiltonian formalism :** Principle of Least Action–Applications and Hamilton's of Hamiltonian equation of(motion of a particle in a central force field, projectile motion of a body). Cyclic coordinates and conservation theories, Canonical coordinates and canonical transforms, Conditions for a transformation to be canonical, generating functions, Lagrange and Poisson brackets. Hamilton equations in Poisson bracket from, Hamilton-Jacobi theory.

**UNIT –IV: (13 Hrs)**

**Mechanics of continuous systems:** Analysis of the free vibrations of a linear tri atomic Molecule, Eigen value equation- Principal axis transformation-Frequencies and normal Coordinates Lagrangian formulation for continuous systems, Hamiltonian formulation.

**Reference Books :**

1. Classical Mechanics : By Goldstein, Poole & Safko (Pearson 2002)
2. Classical Mechanics :By JC Upadhyaya (Himalaya Publishing House)
3. Introduction to Classical Mechanics : Takwale&Puranik (TMH)
4. Classical Mechanics :Rana&Joag (TMH)
5. Classical Mechanics of Particles and Rigid Bodies :Kiran C Gupta. (New Age International Publishers)
6. Lagrangian and Hamiltonian Mechanics: Calkin (Allied Publishers 2000)
7. Lagrangian Dynamics : Dave Wells (schaum series 19)

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**Semester – I**

**PAE 103 T Paper –III: Quantum Mechanics- I**

**UNIT –I (13 hrs):**

**Basics of Quantum Mechanics** : Linear Vector space, Dirac's Ket and Bra notation. Eigenvalue equation, Eigen kets and Eigen values – Degenerate and non-degenerate states - completeness relation, Wave functions in position and momentum space. Normalization and Orthogonality of wave functions, change of basis. Observables- Operators, Hermitian operators and their properties-Commuting and non-commuting operators, Physical significance. Matrix representations of vectors and operators – Observable and expectation value of an observable - Parity operator, Projection operator and significance. Basic commutation relations. Uncertainty principle between any two non commuting Operators.

**UNIT –II (13 hrs):**

**Exactly Solvable problems** :The Schrodinger, Heisenberg picture and interaction pictures. Linear harmonic oscillator-Solution to Schrodinger equation, Eigen values and Eigen functions, properties of stationary states. Linear harmonic oscillator- Solution by operators method. Raising and Lowering operators, the number operator. Hydrogen atom, solution of the radial part of the Schrodinger equations.

**UNIT –III (13 hrs):**

**Symmetries in Quantum Mechanics** : Space and time displacements –unitary operators of space and time displacements and equations of motion. Generators of infinitesimal rotations. Space inversion and unitary inversion operator - intrinsic parity. Time reversal operator –anti-linear operator- time reversal operator for spin zero and non- zero spin particles.

**UNIT –IV (13 hrs):**

**Angular Momentum**: Orbital Angular Momentum, Commutation Relations involving:  $L_2$ ,  $L_x$ ,  $L_y$ ,  $L_z$  –Eigen values and Eigen functions of  $L_2$  –Generalized angular momentum,  $J$ – commutation relations between  $J_2$  and components of  $J$ .  $J_+$  and  $J_-$  Eigen values of  $J_2$  and  $J_z$ . Matrix representation for  $J_2$  and  $J_z$ . Spin angular momentum-Pauli spin matrices and their properties. Addition of angular momenta - Clebsch-Gordon coefficients- Recursion relations-C-G coefficients for  $J_1 = \frac{1}{2}$ ,  $J_2 = \frac{1}{2}$ , and  $J_1 = \frac{1}{2}$ ,  $J_2 = 1$ , as examples.

**Reference Books :**

1. Quantum Mechanics by LI Schiff
2. A Text book Quantum Mechanics : PM Mathews and K Venkateshan (TMH)
3. Quantum Mechanics by Ghatak and Lokanathan (Macmillian)
4. Quantum Mechanics by E Merzbacher (John Wiley)
5. Quantum Mechanics by Aruldas (New Age International)
6. Modern Quantum Mechanics by Sakurai (Addison Wesley)

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**Semester – I**

**PAE 204 T Paper – IV: Solid State Physics**

**UNIT – I: (13 Hrs)**

**Crystalline State & Structural Studies** : Crystal translational vectors, unit cell, Bravais Lattices, Crystal system, Miller indices, Symmetry operations, Point groups, Space groups and their notation. Crystal structures of fcc, bcc, hcp, CsCl, NaCl, ZnS and Diamond. Bragg's law, Atomic structure factor, Geometrical structure factor and Debye Waller factor, Concept of reciprocal lattice, Concept of Brillouin zones, Experimental methods of X-ray diffraction of crystals – Laue and Powder methods, Determination of unit cell parameters of a cubic crystal, Elements of neutron and electron diffraction.

**UNIT – II: (13 Hrs)**

**Lattice Vibrations and Thermal Properties** :Elastic waves in one dimensional array of identical atoms, Vibration modes of a diatomic linear lattice and dispersion relations,Acoustic and Optical modes, Infrared absorption in ionic crystals, Phonons and verification of dispersion relation in crystal lattices. Lattice heat capacity- Einstein and Debye theories,Lattice thermal conductivity –Phonon mean free path, Origin of thermal expansion and Grunseisen relation.

**UNIT – III : (13 Hrs)**

**Band Theory and Semiconductor Physics** : Failure of Free electron theory of metals, Bloch theorem, Behaviour of electron in periodic potentials, Kronig- Penny model, E vs K relation, Density of states in a band, Effective mass of electron, Negative effective mass and concept of hole. Distinction between metals, Semiconductors and Insulators, Intrinsic semiconductors, Fermi level, Expressions for electron and hole concentrations in intrinsic and extrinsic semiconductors, Hall effect in semiconductors.

**UNIT – IV: (13 Hrs)**

**Crystal Growth and Imperfections** : Crystal growth from solution and melt, growth from vapour phase, Experimental techniques of growth from melt. Classification of imperfections, Schottky and Frenkel defects, expression for their equilibrium concentrations in metals and ionic crystals, Colour centers and their models, Diffusion mechanisms, Fick's laws of diffusion, Kirkendal effect, Ionic conductivity, Dislocations-Edge and Screw dislocations, Dislocation multiplication, Grain boundaries.

**Reference Books. :**

1. Crystallography and Solid State Physics – A.R. Verma and O.N. Srivastava
2. Solid State Physics – A.J. Deckker, Macmillian Indian Ltd, 2003.
3. Introduction to Solid State Physics – C. Kittel, Johan Wiley Sons Inc, New York
4. Solid State Physics- RL Singhal, KedarNath&Ramnath& Co, 2006
5. Elements of Solid State Physics – J.P. Srivastava, Prentice Hall India, 2006.
6. Elements of Solid State Physics -- Ali Omar, Pearson Education Inc, 2002.

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**Semester – II**

**PAE 201 T Paper – I: Electromagnetic Theory**

**UNIT – I: (13 Hrs)**

**Electro-Static Potentials and Maxwell's Field Equations:** Special techniques for Calculating electrostatic potential : Poisson's and Laplace's equations- Solutions of Laplace's equations for electrostatic potential in Cartesian, spherical and cylindrical coordinates-Multi pole expansion of the energy of a system of charges in an electrostatic field-The scalar and vector magnetic potentials. Derivation of Maxwell's equations-General wave equation-Gauge transformations-Lorentz and Coulomb gauges-Momentum, angular momentum and free energies of electromagnetic field-Poynting Theorem (work energy Theorem in electrodynamics).

**UNIT – II: (13 Hrs)**

**Propagation of Plane Electromagnetic Waves:** Electromagnetic (EM) waves in Unbounded media-EM wave equation for a homogeneous isotropic dielectric medium- Propagation of plane EM waves in free space-Propagation of EM waves in homogeneous isotropic dielectric medium- Energy transmitted by a plane EM wave-Propagation of EM wave in conducting medium- Attenuation and Skin effect-Energy transmitted –Polarization of EM wave.

**UNIT – III: (13 Hrs)**

**Interaction of Electromagnetic Waves with Matter:** Propagation of EM waves in bounded media-Boundary conditions for EDB and H – Reflection and Refraction of plane EM waves at plane interface between two dielectrics- Laws of reflection and refraction-Fresnel's relations- Reflection (R) and Transmission( T) coefficients -Brewster's angle-Total internal reflection-Reflection and Refraction of plane EM waves at plane interface between non-conducting and conducting medium-Metallic reflection and its applications–Dispersion in non-conductors –Normal and anomalous dispersion.

**UNIT – IV: (13 Hrs)**

**Electromagnetic Field and Radiation system:**Electromagnetic radiation: inhomogeneous wave equation for potentials-Retarded potentials-Multi-pole expansion of EM radiation for harmonically oscillating source-Long wavelength approximation-Oscillating electric dipole radiation-Oscillating magnetic dipole radiation-Radiation from centered linear antenna.**Radiation from accelerated charges:**LienardWiechert potentials-Electromagnetic field of a charge in arbitrary motion.

**Reference Books:**

1. Classical Electrodynamics by SP Puri, Tata McGraw-Hill Publishing Co., Ltd (2000).
2. Introduction to Electrodynamics by DJ Griffiths, Prentice- Hall of India (1998).
3. Electricity and Magnetism by MH Nayfeh and MK Brussel, John Wiley and Sons (1985).
4. Classical Electrodynamics by JD Jackson, John Wiley and Sons (1999).
5. Foundations of Electromagnetic Theory by JR Rietz, FJ Milford and Christy, Narosa Publishing house (1986)
6. Engineering Electromagnetics by WH Hayt and JA Buck Tata Mc-Graw Hill (2001)
7. Electromagnetic waves and Radiating systems by EC Jordan and KGBalmain, Prentice Hall

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**Semester – II**

**PAE 202 T Paper – II: Statistical Mechanics**

**UNIT – I: (13 Hrs)**

Relation between thermodynamics and statistical mechanics- Micro stages and macro States of a system – Phase space- Ensembles – Mean values and ensemble average– Density distribution in phase space- Liouville's theorem. Apriori probability postulate –Micro canonical, canonical and grand canonical ensembles –Quantization of phase space. Entropy and Probability–Equilibrium conditions: Thermal, mechanical and concentration equilibrium. Entropy of a perfect gas using micro canonical ensemble-Gibbs paradox-Sackur.-Tetrode equation.

**UNIT – II: (13 Hrs)**

Maxwell –Boltzmann statistics-Distribution law- Maxwell velocity distribution-Equi-partition theorem. Canonical ensemble- Partition function-Ideal gas, Grand canonical ensemble- Partition function-Ideal gas .Quantum Statistical Mechanics-Postulates-Indistinguishability- Bose-Einstein and Fermi-Dirac statistics and distribution laws. Partition function and thermodynamic quantities-Translational, rotational and vibration partition functions - Specific heat of diatomic molecules.

**UNIT – III: (13 Hrs)**

Ideal Bose-Einstein gas-Energy and pressure of the gas. Bose-Einstein condensation- Liquid Helium-Two Fluid model-Phonons, protons, super fluidity. Ideal Fermi-Dirac gas Energy and pressure of the gas –Electronic specific heat, thermionic emission, white dwarfs.

**UNIT – IV: (13 Hrs)**

Fluctuation-mean square deviation-Fluctuations in energy, volume and concentration Brownian motion-Classification of phase transition-Phase transitions of first and second kind: using model, Bragg-Williams approximation-One dimensional using model a application to Ferro magnetic systems-Order-Disorder transition.

**Reference Books. :**

1. Statistical Mechanics by SatyaPrakash and JP Agarwal (Pragati Prakahan-2002)
2. Statistical Mechanics by Gupta and Kumar (PragathiPrakahan -2002)
3. Statistical Mechanics by BK Agarwal and M Eisner (New Age Internaional)
4. Statistical Mechanics by RK Srivatava and J Ashok (Prentice Hall, India)
5. Introduction to phase transitions and critical Phenomena HE Stanley (Clrendon Press, Oxford).
6. Heat and Thermodynamics by Zemansky (TMH).



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**Semester – II**

**PAE 203 T Paper – III: Quantum Mechanics – II**

**UNIT – I (13 hrs):**

**Scattering Theory:** Kinematics of Scattering Process: differential and total cross-section -Asymptotic form of scattering wave function. Scattering amplitude by Green's method. Born approximation method and screened potential and square well potential as examples-Partial wave analysis and phase shift-Optical Theorem- Relationship between phase shift and Potential. Scattering by Hard sphere.

**UNIT – II (13 hrs):**

**Time Independent Perturbation Theory:** Approximation Methods. Non-degenerate case, First-and Second- order cases-Examples of harmonic and an-harmonic Oscillators. Degenerate case- Stark effect for H-atom for  $n=2$  level. Variation Method - Helium atom ground state.WKB approximation method - connection formulae- application to Alpha Decay.

**UNIT – III (13 hrs):**

**Time Dependent Perturbation Theory:** Time development of state, variation of Constants (coefficients), Transition probability- Selection rules for transition. Constant Perturbation. Transition probability to closely spaced levels- Fermi's golden rule. Harmonic perturbation- Transition probability rate. Interaction of an atom with Electromagnetic radiation. Electric dipole approximation. The Einstein Coefficients.

**UNIT – IV (13 hrs):**

**Relativistic Quantum Mechanics:** Klein –Gordon Equation, Plane wave solution and Equation of continuity, Probability density- Dirac Equation, alpha, beta- matrices, Plane wave solution, significance of negative energy states. Spin of Dirac particle Relativistic particle in central potential –Total Angular Momentum, Particle in a magnetic field – Spin Magnetic moment, properties of gamma matrices- Dirac's equation in covariant form.

**Reference Books:**

1. Quantum Mechanics by LI Schiff
2. A Text book Quantum Mechanics by PM Mathews and K Venkateshan (TMH)
3. Quantum Mechanics by Ghatak and Lokanathan (Macmillian)
4. Quantum Mechanics by E Merzbacher (John Wiley)
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**Semester – II**

**PAE 104 T Paper – IV: Electronics**

**UNIT – I: (13 Hrs)**

**Regulated Power Supply:** basic Principle of Zener regulator and its working, Transistorized Series regulator, Regulated power supplies using IC 723, 78XX and Switch Mode Power Supply **Amplifiers:**, Single Stage and two stage RC coupled amplifiers and their frequency Response, hybrid  $\pi$ - model. High frequency response using hybrid  $\pi$ -model. **Feed back:** The concept of feedback, Positive and Negative feedback. Advantages of Negative feedback in amplifiers, Emitter follower and Darlington pair **Sinusoidal Oscillators (Using BJT's):** Barkhausen Criterion, Phase shift Oscillator, Wein Bridge Oscillator Hartley and Collpitts Oscillators, Crystal Oscillator. **Multi-vibrators:** Collector coupled Astable, Mono-stable, Bi-stable multi-vibrators, Schmitt trigger and its applications.

**UNIT – II: (13 Hrs)**

**Operational Amplifiers:** Characteristics of Ideal operational Amplifier, Block diagram of an IC operational Amplifier, Emitter coupled differential amplifier and its transfer characteristics. Analysis inverting amplifier, Non-inverting amplifier, Integrator, Differentiator, summing amplifier, Difference amplifier, Comparator, Logarithmic amplifier and exponential amplifier, Analog computation, Square wave, Rectangular wave, Triangular wave and Sine wave generators. **Timer IC 555:** Working of IC 555, Astable and Mono-stable Multi-vibrator with IC 555.

**D/A Converters:** R-2R ladder type, 4 bit Binary Converter, D/A Accuracy and Resolution.

**A/D Converters :** Counter method, Successive approximation Conversion, Dual slope A/D conversion, A/ D Accuracy and Resolution.

**.UNIT – III: (13 Hrs)**

**Logic Circuits:** Min terms and Max terms, Karnaugh Maps (up to 4 variables), Half adder and Full adder, Decoder/ De-multiplexer, Data selector/ Multiplexer, Encoder

**Flip –Flops:** RS, D JK and M/S JK flip flops with their truth tables, timing diagrams.

**Shift Registers:** Types of Registers, Serial in Serial out, Serial in Parallel out, Parallel in Serial out and Parallel in Parallel out Registers, IC 7496, Ring Counter.

**Counters:** Ripple (Asynchronous) Counters, Divide by N Counter, Synchronous Counters, Decade Counter using Flip-Flops and IC's 7490, 7493.

**UNIT – IV: (13 Hrs)**

**Microprocessor:** Introduction to Microprocessors –Architecture of 8085 microprocessor, Instruction set: Data transfer instructions, Arithmetic Logic and Branch operations, Interrupts, Simple Assembly language programming: 8-bit addition, 8-bit subtraction, 8-bit multiplication, Ascending and descending arrangement of given numbers.

**Reference Books. :**

1. Integrated Electronics –Milman Halkies.
2. Microelectronics –Milliman & Grabel.
3. Digital principles and applications- Malvino and Leech
4. Operational amplifier –Gawkward
5. Principles of Digital Electronics –Gothman
6. Digital Principles and Applications Computer Electronics –Malvino.
7. Microprocessors Architecture, Programing and Application with the 8085 / 8080 – Goankar
8. Pulse Digital & Switching Waveforms by Millman and Taub, TMH 2001.
9. Fundamentals of electronics by JD Ryder, Wiely.

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## **PRACTICALS:**

### **COMPUTER PROGRAMMING**

#### **Semester – I**

1. Evolution of function sine  $x$ ,  $\cos x$ ,  $\log x$ .
2. Evolution of determinant of a matrix and multiplication
3. Evolutions of the values of 1<sup>st</sup> order Bessel function solution of none equation s
4. Newton –Raphason method
5. Bisection method
6. Trapezoidal rule
7. Simpson's 1/3 and 3/8 rule

#### **Semester – II**

8. Gaussian Quadrature
9. Eulers methods
10. Runge- Kutta method
11. Making difference table
12. Lagrange's Interpolation
13. Polynomial curve fitting method
14. Gauss Elimination method
15. Gauss seidel method

# **ELECTRONICS EXPERIMENTS**

## **Semester – I**

1. R-C coupled transistor amplifier
2. Characteristics of OP AMP (741) and study inverting and none inverting amplifier
3. Astable multivibrator ( 555)
4. Triangular and Square Wave Generator( 741)
5. Monostable multivibrator (555)
6. Saw tooth Generator (555)
7. A-D Converter
8. Half adder and Full Adder
9. Flip-Flops R-S,J-K,D-Type
10. Construction of Shift register

## **Semester – II**

11. Logic circuit s with discrete components
12. Experiments using microprocessor 8085 kit
13. R-C coupled transistor amplifier
14. R-S Phase shift oscillator
14. Colpitts oscillator
15. Wien Bridge oscillator
16. Smitt trigger with 741 and 555
17. SMPS
18. Regulator power supply with 723
19. Regulator power supply with 78xx
20. Voltage controlled Oscillator 555
21. AM and Detection 555
22. D-A Converter
23. Construction and verification of logic gates/circuits using NAND Gates 7400 IC
24. Construction and verification of the followings
  - a) Divide by 10 counters with 7490
  - b) Divide by 16 counters with 749
  - c) Divide by 12 counters with 7492
  - d) Divide by N counter with 7476

## **OPTICS EXPERMENTS**

### **Semester – I**

- 1. Refractive index of glass prism by spectrometer**
- 2. Refractive index of quartz prism by spectrometer**
- 3. Refractive index of double quartz prism by spectrometer**
- 4. Refractive index of hallow prism by spectrometer**
- 5. He-Ne laser**

### **Semester – II**

- 6. Determination of wave length of given source by bi-prism experiment.**
- 7. LED characteristics**
- 8. Malus law**
- 9. Velocity of ultrasonic waves in given medium**
- 10. Determination of Cauchy's Constance of given material**
- 11. Determination Thickness of thin transparent film by bi-prism experiment**

## **HEAT & ACOUSTICS EXPERMENTS**

### **Semester – I**

- 1. Determination of young's modulus of flat spiral spring.**
- 2. Determination of Rigidity modulus of flat spiral spring**
- 3. Viscosity of water**
- 4. Stefan's constant**
- 5. Determination of linear coefficient of given solid**

### **Semester – II**

- 6. Temperature coefficient of thermister. (Resistivity)**
- 7. Specific heat of graphite.**
- 8. Determination of Curie temperature of solids.**
- 9. Ultrasonic velocity in Liquids.**