GOVT. DEGREE COLLEGE(ATONOMOUS),SIDDIPET.

DEPARTMENT OF PHYSICS FOR P.G.

UNDER- CBCS (with effect from the academic year 2017 –18)

Semester – III

PAPER I: MODERN OPTICS

Unit I:Principles of Lasers

Emission and absorption of Radiation – Einstein Relations. - Pumping Mechanisms – Optical feedback - Laser Rate equations for two, three and four level lasers. Pumping threshold conditions, Laser modes of rectangular cavity – Properties of Laser beams.

Unit II: Laser Systems

Classification of laser systems – Gas, Liquid and Solid Lasers-Gas lasers and Energy level schemes: He- Ne, Argon, Cos Gas lasers, Excimer lasers- Applications. Solid State lasers: Ruby, Neodymium, YAG lasers – Dye lasers- Applications
Semiconduct lasers: GA-As lasers and applications.

Unit III: Holography

Basic Principles of Holography- Recording of amplitude and phase- The recording medium- Reconstruction of original wave front- Image formation by wave front reconstruction- Gaber Hologram- Limitations of Gaber Hologram-Off axis Hologram- Fourier transform Holograms- Volume Holograms, Applications of Holograms- Spatial frequency filtering.

Unit IV: Fourier and Non-Linear Optics

Fourier optics- Thin lens as phase transformation – Thickness function- Various types of lenses- Fourier transforming properties of lenses – Object placed in front of the lens- Object placed behind the lens.
Non-Linear Optics-Harmonic generation- Second harmonic generation- Phase matching condition- Optical mixing- Parametric generation of light – Self focusing of light.

Recommended Books:

1. Opto Electronics- An Introduction – Wilson & JFB Hawkes 2nd Edition.
2. Introduction to Fourier optics – J.W. Goodman
3. Lasers and Non-Linear optics – B.B. Laud
4. Optical Electronics – Ghatak nd Thyga Rajan.
5. Principles of Lasers – O. S velto

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UNDER- CBCS (with effect from the academic year 2017 –18)

Semester – III

Paper – II: ADVANCED SOLID STATE PHYSICS

Unit I: Electronic Properties

Introduction to band theory of solids. Fermi surface and Brillouin zones. Construction of Fermi surfaces. Extended, periodic and reduced zone schemes. Fermi surfaces in simple cubic, bcc and fcc lattices. Effect of electric and magnetic fields on Fermi surfaces. Anomalous and skin effects. De Hass-van Alphen effect.

Unit II: Dielectrics and Ferroelectrics

Macroscopic description of the static dielectric constant. Concept of local field. The electronic, ionic and orientational polarizabilities. Measurement of dielectric constant of a solid. Clausius-Mosotti relation. Behavior of dielectrics in an alternating field, elementary ideas on dipole Relaxation. Classification of ferroelectric crystals- Ba TiO3 and KDP. Dipole theory of ferroelectricity.Spontaneous polarization and ferroelectric hysteresis.

Unit III: Magnetic Properties

Diamagnetism- Langevin's theory and quantum theory. Origin of permanent magnetic moment. Theories of paramagnetism. Paramagnetic cooling. Spontaneous magnetization – Weiss theory of spontaneous magnetization. Nature and origin of Weiss molecular field, Heisenberg exchange interaction. Ferromagnetic domains and hysteresis. The Bloch wall, Neel's theory of anti ferromagnetism. Ferrimagnetism, ferrites and their applications (basic concepts only)

Unit IV: Superconductivity

Occurrence of superconductivity. Experimental observations – persistent currents, effect of magnetic field, Meissner effect, Type I and type II superconductors. Isotope effect, entropy, heat capacity and thermal conductivity. Energy gap. Microwave and infrared absorption. Theoretical explanations: London' equations- penetration depth. Coherence length. Cooper pairs and elements of BCS theory. Giaver tunneling, Josephson effects (Basic ideas only). Elements of high temperature superconductors (basic concepts). Applications of superconductors.

Books Recommended:

1. Solid State Physics -- A.J.Deckker
2. Introduction to Solid State Physics -- Kittel
3. Solid State Physics -- R.L.Singhal
4. Elements of Solid State Physics -- J.P.Srivastava
5. Solid State Physics -- M.A.Wahab

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UNDER- CBCS (with effect from the academic year 2017 –18)
Semester –III
PAPER III : DIGITAL LOGIC CIRCUITS& MICROPROCESSOR

Unit I: Combinational Logic Circuits
Simplifying Logic Circuits, Sum of products form - Algebraic simplification, designing combinational logic circuits, Karnaugh Map Method, looping - pairs, quads, octets, complete simplification process, Don't care conditions, examples.
Digital Arithmetic Operations and Circuits Binary addition, representing signed numbers, binary subtraction, BCD addition, Hex arithmetic, ALU, parallel binary adder, design of full adder, carry propagation's, IC parallel adder, 2's compliments system, IEEE/ANSI symbols.
Unit II: Flip-Flops
NAND and NOR gate latches, clock signals and clocked flip-flops, clocked R-S, J-K, and DFFs, D latches, Asynchronous inputs, IEEE/ANSI symbols, Timing consideration, one shot.
Counters and Registers : Ripple counters, Counter with MOD numbers < 2n. IC asynchronous counters, asynchronous down counters, propagation delay in ripple counter, Up/Down counters.Presettable counters, 74193 counter, Decoding a counter, Decoding glitches, synchronous counter design, Left & Right shift registers, shift register counters, IEEE/ANSI symbols.
Unit III: IC Logic Families
Digital IC terminology, TTL logic family, TTL series characteristics, improved TTL series, TTL loading and fan-out other TTL characteristics, connecting TTL outputs together, tristate TTL,ECL Family, MOS digital IC's and characteristics, CMOS logic and characteristics, bilateral switch, TTL driving CMOS and vice versa. Low voltage technology**'s Logic Circuits:** Decoders, BCD to 7 segment decoder/driver, liquid crystal display,Encoders, multiplexers and their applications, demultiplexers, magnitude comparators, code converters, data busing, data bus operations, IEEE./ANSI symbols,
Unit IV: The 8086 Microprocessor:
General Organization of a Microcomputer, Detailed Architecture of 8086,Addressing Modes, Instructions Set, Assembly Language Programming, Programming Examples. The8086-Based **System Design -** Pins and Signals, System Components, Interfacing Memory, I/O Devices.

Text Books:1. Digital Systems - Principles and Applications - Ronald J.Tocci, 6/e, PHI, New Delhi.1999.
2. Modern digital electronics – R.P.Jain, Tata McGraw Hill 3rdEdition.
3. Digital Design – M.Morris Mano.
4. The 8086 Microprocessor : Programming & Interfacing the PC - By Kenneth J. Ayala Penram International Publishing, 1995
5. Microprocessors, PC Hardware and Interfacing - By N. Mathivanan, PHI, 2003
Reference Books:1. Digital Principles and Design -Donald D. Givone.
2. Digital Electronics - An introduction to Theory and Practice -- William H.Gothmann.
3. Digital Principles and Applications -- Albert Paul Malvino and Donald P. Leach
4. Switching theory and Logic design – R.P. Jain.

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DEPARTMENT OF PHYSICS FOR P.G.

UNDER- CBCS (with effect from the academic year 2017 –18)

Semester – III

Paper – IV:ELECTRONIC INSTRUMENTATION

Unit I: Measurement and Error

Definitions- Accuracy and Precision – Significant figures – Types of error – Statistical analysis-Probability of errors – Limiting errors.

Performance characteristics of an instrumentation system: Zero, First and Second Order systems – Response of first and second order systems to STEP, RAMP and IMPULSE inputs- Frequency response of first and second order systems. Specification and testing of dynamic response.

Unit II: Amplifiers and Signal Conditioning

Instrumentation amplifiers- Isolation amplifiers- Chopper amplifiers- Voltage to frequency and frequency to voltage converters-Frequency multipliers - Logarithmic amplifiers,- S/H Circuits- Attenuators. Second order active filters – Low pass , High pass, Band pass, and Band stop filters- Butterworth and Chebychev filters- Frequency transformation- All pass filters. Phase sensitive detectors (PSD) - Phase lock loop (PLL) – Lock-in-amplifier.

Unit III: Signal Generation

Frequency synthesized signal generator- Frequency divider generator- RF signal generator- Signal generator modulation- Sweep frequency generator- Function generator – Noise generator.

Signal Analysis: Wave Analyzer- Audio frequency Wave analyzer- Heterodyne wave analyzer-Harmonic distortion analyzer- Resonant harmonic distortion analyzer-Heterodyne harmonic distortion analyzer- Fundamental suppression harmonic distortion analyzer- Spectrum analyzer-Spectra of CW, AM, FM and PM waves.

Unit IV:Electronic Measuring Instruments

Q- meter- Vector impedance meter- Digital frequency meter – Digital voltmeter – Phase meter –RF power and voltage measurement – Power factor meter – Vector volt meter.

Display and Recording: X-t, X-Y Recorders – Magnetic tape Recorders- Laser printers – Ink jet printers. - Storage oscilloscope. **Characteristics of digital displays:** LED- LCD – Dot matrix and seven segment display systems.

Recommended Books

1. Modern Electronic Instrumentation and Measurement Techniques – A.O. Helfrick and W.D.Cooper, Prentice Hall India Publications.
2. Instrumentation Devices and Systems – C.S Rangan, G.R. Sharma and VSV Mani, Tata Mc Graw Hill Publications.
3. Introduction to Instrumentation and Control – A.K Ghosh – Prentice Hall India Publications.
4. Electrical and Electronics Measurement and Instrumentation – A.K.Sawhney.
5. Transducers and Instrumentation- D.V.S Murty PHI Publications.

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DEPARTMENT OF PHYSICS FOR P.G.

UNDER- CBCS (with effect from the academic year 2017 –18)

Semester – IV

Paper - I :NUCLEAR PHYSICS

Unit I: Nuclear Force And Nuclear Models

Systematics of nuclear force-strength, range, charge independence; Deuteron problem and its contribution to the definition of the Nuclear force. Exchange force theories-Majoranna,Bartlett, Heisenberg and YukawaThe liquid drop model-the semi empirical mass formula and its applications. The Shell modelstatesbased on square well potential and harmonic oscillator potential. Predictions-spins andparities of nuclear ground states, magnetic moments ,electric quadrupole moments.

Unit II: Nuclear Decay Processes

α-decay, Gamow's theory, fine structure of α spectrum. alpha decay, systematics, neutrino hypothesis, Fermi's theory of β-decay, Fermi-Kurie plot, angular momentum, selection rules for β-decay, -decay, Multipole radiation, selection rules.

Unit III: Nuclear Radiation Detection

Interaction of charged particles with matter, Bohr's theory, Bethe's formula. Range-energy relation. Stopping power. Measurements of range and stopping power. Interaction of gamma rays with matter-Photoelectric effect, Compton effect and pair production. gamma ray detection using gas, scintillation and solid state detectors.

Unit IV: Nuclear Reactions

Classification of nuclear reactions, Kinematics and Q-value of reactions.Basic theory of Direct nuclear reactions-Born approximation,stripping and pick-up reactions,characteristics,crosssections,examples and applications.Compound nucleusformation. Theory of Fission and fusionreactions.Nuclear structure information from nuclear reactions.

Particle Physics

Elementary Particles Classification and their Quantum Numbers (Charge, Spin, Isospin etc). Fundamental Forces, Conservation of Parity, Strangeness and Lepton and Baryon numbers,Quark model.

REFERENCES

1. Concepts of Nuclear Physics; B.L.Cohen (TMH)
2. Introductory Nuclear Physics: Kenneth S.Krane (Wiley)
3. Nuclear and Particle Physics:Blin-Stoyle (Chapman and Hall)
4. Nuclear Physics;I.Kaplan (Narosa 2002)
5. Introductory Nuclear Physics: W.Wong
6. Introductory Nuclear Physics: S.B.Patel
7. Nuclear Physics: Tayal

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DEPARTMENT OF PHYSICS FOR P.G.

UNDER- CBCS (with effect from the academic year 2017 –18)

Semester – IV

Paper – II: SPECTROSCOPY

Unit I: Atomic Spectra

Different series in alkali spectra (main features), Ritz combination principle,Termsfor equivalent & non-equivalent electron atom, Term values in alkali spectra and quantum defect, LSand j-j coupling; Energy levels and spectra;Spectroscopic terms.Spin-Orbit interaction,doublet structure in alkali spectra, selection rules, intensity rules, alkalilikespectra, Lamb shift, many electron atoms, isotope shift; hyperfine splitting of spectral lines,selection rules. Lande interval rule.

Unit II: Molecular Spectra

Types of Molecular spectra, Regions of the Spectrums, Salient features of rotational spectra, rotational spectra of diatomic molecule as a rigid rotator, Energy levels and spectra of a nonrigid
diatomic molecule, effect of isotopic substitution on rotational spectra, salient features of Vibrational-Rotational spectra, vibrating diatomic molecule as a harmonic oscillator and as anharmonic oscillator. Diatomic molecule as rigid rotator and harmonic oscillator diatomic molecule as a non-rigid rotator and anharmonic oscillator.

Unit III: Raman and Infrared (IR) Spectra

Raman effect and its salient features, classical and quantum theory of Raman effect, normal vibrations of CO2 and H2O molecules,vibrational and rotational Raman spectra,Infrared-spectroscopy; infrared spectroscopy –basic concept of IR spectroscopy-IR spectrophotometer Principle and Instrumentation-FTIR principle and working – interpretation of data from Raman and IR spectroscopy.

Unit IV: Nuclear Magnetic Resonance (NMR) and Electron Spin Resonance (ESR) Spectroscopy

Nuclear spin and magnetic moment, origin of nuclear magnetic resonance (NMR) spectra, Theory of NMR spectra, relaxation process – Bloch equations – chemical shift, experimental study of NMR spectroscopy, Experimental technique, ESR spectroscopy, origin and resonance condition – quantum theory – design of ESR spectrometer – hyperfine structure of ESR absorptions, fine structure in ESR spectra, ESR instrumentation, Applications of ESR.

Books Recommended

1. Elements of Spectroscopy - Gupta, Kumar, Sharma
2. Atomic Spectra & Atomic Structure - Gerhard Hertzberg
3. Introduction to Molecular Spectroscopy - G.M.Barrow
4. Molecular Spectroscopy - J.D.Graybeal
5. Atomic and Molecular Spectroscopy - Raj Kumar
6. Molecular Structure & Spectroscopy - G.Aruldhas

Reference Books

1. Introduction to Atomic Spectra - H.E.white
2. Fundamentals of Molecular Spectroscopy - C.N. Banwell and EM Mc Cash
3. Spectra of Diatomic Molecules - Herzberg
4. Spectroscopy Vol. I, II, III - Walker and Straughen
5. Principles of Magnetic Resonance - C.P.Slitcher
6. Electron Spin Resonance: Their Applications - Wertz and Bolton

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DEPARTMENT OF PHYSICS FOR P.G.
UNDER- CBCS (with effect from the academic year 2017 –18)
Semester – IV
PAPER III: EMBEDDED SYSTEMS AND ITS APPLICATIONS

Unit I:The 8051 Microcontroller

Introduction to Microcontrollers : History of Microcontrollers and Microprocessors, Embedded-Versus External Memory Devices, CISC and RISC Processors, Harvard and Von Neumann-Architectures, Block diagram of the 8051; **Inside the 8051**, Assembling and Running an 8051 Program, The Program Counter and ROM space, Date Types and Directives, Flag-Bits and PSW Register, Register Banks and Stack; **Pin Description**, I/O Programming,Bit-Manipulation; **Addressing Modes**-Immediate and Register Addressing Modes,Accessing Memory using Various Addressing Modes

Unit II: Programming the 8051

Instruction Set- Arithmetic instruction Programs- Add, Subtract, Multiplication and Division of Signed and Unsigned and Unsigned Numbers; **Logical** Instruction and Programs-Logic,Compare, Rotate, Swap, BCD and ASCII Application Programs; **Single Bit** Instructions andProgramming – Single Bit Instructions with CY; **Jump, Loop** and call Instructions, Time Delay-Generation and Calculation; Timer/Counter Programming, Serial Communication an interrupts-Programming.

Unit III: PIC Microcontrollers

Overview and Features, **PIC 16C6X/7X** Architecture (PIC 16C61/C71), Registers, Pin diagram, Reset action Memory Organization, **Instructions**, Addressing Modes, I/O Ports, Interrupts, Timers, Analog-to- Digital Converter (ADC).-Pin Diagram of PIC **16F8XX Flash Microcontrollers**, Registers, Memory organization,Interrupts, I/O Ports and Timers.

Unit – IV: Industrial Applications of Microcontrollers

Connecting of - Light Emitting Diodes (LEDs), Push Buttons, Relays and Latches. **Interfacing** of - Keyboard, 7-Segment Displays, LCD Interfacing, ADC and DAC with-89C51Microcontrollers.**Measurement Applications** of – Robot Arm, LVDT, RPM Meter, Digital Thermo Meter and Strain Gauges. **Automation and Control Applications** of – PID Controllers, D C Motors and Stepper Motors.

Recommended Books:

1. Microcontrollers – Theory and Applications – By Ajay V Deshmukh, TMH, 2005
2. The 8051 Microcontrollers and Embedded Systems – By Muhammad Ali Mazidi and Janice Gillispie Mazidi, Pearson Education Asia, 4th Reprint, 2002
3. The 8051 Microcontroller - architecture, programming & applications – By Kenneth J. Ayala, Penram International Publishing, 1995
4. Design with PIC Microcontrollers - By J B Peatman, MH, Pearson Education Asia, 2003

Reference Books:

1. Programming and Customizing the 8051 Microcontroller – By Myke Predko, TMH,2003
2. Embedded Microcontrollers Handbook, Intel Applications
3. Design with Microcontrollers By - J B Peatman, MH.
4. The 8051 Microcontroller - programming, interfacing and applications – By Howard Boyet and Ron Katz, (MII) Microprocessors Training Inc.
5. The concepts & features of Microcontrollers by Rajkamal, Wheeler Pub.
6. The Microcontroller Idea Book Circuits, Programs, & Applications featuring the 8052-BASIC Microcontroller By Jan Axelson, Penram International.

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Semester – IV

Paper-IV: INSTRUMENTATION FOR MEASUREMENT, CONTROL, DATA ACQUISITION,& DATA TRANSMISSION

Unit I:Transducers:
Classification of transducers-Active and Passive transducers- Electrical transducersDisplacement transducers -Digital transducers -Basic requirement of a transducer .
Displacement Measurement: Variable resistance devices– Variable inductance devices - Variable capacitance devices.
Strain Measurement: Theory of operation of strain gauge-Types of strain gauges-Strain gauge circuits-Quarter bridge-Half bridge and Full bridge-Temperature compensation-Calibration of strains gauges-Strain gauge load cell.

Unit II:Pressure Measurement:
Bourdon Tube- Bellows - Diaphragms – Transduction methods-Potentiometer device- Strain gauge transducer – LVDT type transducer –Variable capacitance device – Force- balance transducer – Piezoelectric transducer- Digital Pressure Transducer-Pressure calibration. **Temperature Measurement:** Classification of temperature measuring devices-Resistance type temperature-sensors (platinum resistance thermometer, thermistrors)–Resistance-thermometer circuits- Thermocouples – Types of thermocouples -Cold junction compensation-Solid State Sensors Temperature measurement by radiation methods – Calibration of thermometers.
Flow Measurement: Classification of flow meters-Head type flow meters-Orifice meter-venturi Tube-Pitot tube-Rota meter-Anemometer-Electromagnetic flow meter-Ultrasonic-flow meter.

Unit III: Process Control :
Open loop control – Closed loop control – Examples- Block diagram algebra-Block diagram of closed loop system - Closed loop transfer function –DC AND AC Servomotors-Stepper motor-Temperature Control-Liquid level control. **Analog and Digital Data Acquisition Systems**: Interfacing transducers to electronic control-and measuring systems – Digital to analog multiplexer - Analog to Digital multiplexer - IEEE488 Bus.

Unit IV: Data Transmission and Telemetry :
Methods of data transmission–General telemetry system-Functional blocks of telemetry system-Types of telemetry systems– Land line telemetering system-Voltage telemetering systems
Current telemetering system-Position telemetering system– Land line telemetry feedback system-Radio frequency telemetry - PAM, PCM Telemetering–Multiplexing in telemetering system- Transmission channels- Digital data transmission.

Recommended Books:
1. Modern Electronic Instrumentation and Measurement Techniques – A.O.Helfrick and W.D.Cooper, Prentice Hall India Publications.
2. Instrumentation Devices and Systems- C.S.Rangan, G.R. Sharma and VSV Mani, Tata Mc.Graw Hill Publications.
3. Introduction to instrumentation and Control- A.K.Ghosh – Prentice Hall India Publications.
4. Electrical and Electronics Measurement and Instrumentation – A.K.Sawhney.
5. Transducers and Instrumentation – DVS Murthy, PHI Publication

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LIST OF EXPERIMENTS IN GENERAL PHYSICS LAB

III and IV Semesters

NUCLEAR PHYSICS LABORATORY

1. **To draw the characteristic curve of the given G.M. Detector and determine its plateau length and working potential.**
2. **To determine the dead time of a given G.M. tube using double source.**
3. **To determine the half life of a long lived radio active substance .**
4. **To determine the linear and mass absorption coefficients of β-particles in a given material, i.e. Al.**
5. **To determine the absorption coefficient of gamma rays in different absorbing materials, i.e., Al and Pb.**
6. **To determine the half life of irradiated Indium foil.**
7. **To determine the half life of short lived and long lived irradiated silver (Ag) foil.**
8. **To verify inverse square law using beta or gamma source.**

MODERN OPTICS LAB

1. **Zeeman effect.**
2. **Raman effect.**
3. **Magnetic susceptibility of a paramagnetic liquid.**
4. **Verification of Beer's law.**
5. **Temperature variation of resistance/conductivity of a given material –two probe method.**
6. **Hall effect.**
7. **Curie temperature of PZT.**
8. **Powder X-ray diffraction method for Crystal Structure determination**
9. **Atomic Spectra**

LIST OF EXPERIMENTS IN SPECIAL LAB

III and IV Semesters

I) Analog, Digital & Simulation Lab

(A1) Analog Experiments :

1. Power control by SCR using UJT.
2. PLL (IC 565) as FM Detector.
3. Active filters.
4. PLL (IC565) as frequency synthesizer.
5. Strain gauge –Trainer kit.
6. LVDT -Trainer kit.
7. PLL (IC 565) as AM detector.

(A2) Analog Simulation Experiments

8. Active filters Using Op-Amps
9. Frequency Modulation and detection
10. Amplitude modulation and detection
11. Solution of differential equations using analog computation (Using TUTSIM)

(B) Digital experiments (Hardware and Simulation)

1. Construct a synchronous up/down counter using IC74192 and display count using 7-segment display.
2. Implement Boolean functions using a multiplexer.
3. Construct a shift register using IC 7495.
4. Construct an 8-bit full adder using two 4-bit adders.
5. Implement Boolean functions using Dec/D
6. Simulating a four variable Boolean function using a 1 of 16 data Sel/Mu
7. Given a four variable Boolean function design and simulate the circuit using gates.
8. Simulate a 4-bit Bin/BCD decade counter
9. Simulate a full adder circuit using a Dec/Dem
10. Simulate a 4-bit shift register.
11. Design a counter with skipped counts & simulate
12. Simulate a Johnson Counter

II) Microprocessors & Microcontrollers Lab

Programming and Interfacing using Microprocessor (8086)

1. Addition of fifty 16-bit numbers stored in consecutive memory location
2. Divide a 28 bit unsigned number by 8 .
3. Convert a 2-digit unsigned BCD number to binary.
4. To add two words ,each word containing four packed BCD digits.
5. Write a subroutine ,to multiply a signed 16-bit number and a signed 8-bit number, that can be called by a main program in a different code segment and stores the result in consecutive memory locations.
6. Simple programs on PC using Macro Assembler MASM 86
7. To interface the analog-to-digital converter (ADC) kit with PC and to develop suitable programs to convert the analog signal into digital value.
8. To interface the digital-to analog converter (DAC) kit with PC and to develop suitable programs to generate various waveforms to display it on CRO.
9. To interface the given stepper motor and to develop suitable program to rotate it at various stepping angles

Experiments using Microcontroller (8051)

1. To test the 8051 system and its ports.
2. To interface an ADC to the 8051.
3. To program the 8051 timer. To generate a square wave using the 8051 timer.
4. To interface a DAC to the 8051. To generate a sine wave on the scope using the DAC.
5. To interface a DAC to the 8051. To generate a sine wave on the scope using the DAC.
6. To interface a stepper motor to the 8051.To write a program to control the angle and direction of stepper motor rotation by the user
7. To examine and use an 8051 Assembler. To examine and use an 8051 simulator
8. To code a program to add hex numbers. To code a program to add BCD numbers.To code A program to add two multi-byte BCD numbers.
9. To practice converting data from decimal to binary and hexadecimal systems.
10. To write a program to convert data from hex to ASCII. To write a program to find the average of a set of hex data. To examine the 8051 division and multiplication instructions.