DEPARTMENT OF PHYSICS
TELANGANA UNIVERSITY, NIZAMABAD – 503 322
M.Sc. (PHYSICS)
SCHEME OF INSTRUCTION AND EXAMINATION
WITH EFFECT FROM 2018-19
SEMESTER III

Paper	Code	Subject	Instruction Hrs/ Week	Duration of Exam In Hrs	Max. Marks	Credits
THEORY						
I	PHY 301	Solid State Physics–II	4	3	70+30*	4
II	PHY 302	Quantum Mechanics -II	4	3	70+30*	4
III	PHY 303	Electronic Instrumentation	4	3	70+30*	4
IVA	PHY 304A	Digital Logic Circuits	4	3	70+30*	4
IVB	PHY 304B	Microprocessors & Interfacing				
PRACTICALS						
V	PHY 351	Nuclear Physics Lab	6	3	70+30#	3
VIA	PHY 352A	Analog & Digital Lab	6	3	70+30#	3
VIB	PHY 352B	Microprocessors Lab				
Seminar			2			
Total			**28+2**		**600**	**22**

Note: * Internal Assessment (20 Marks for Internal and 10 Marks for seminar)
Internal practical exam.

CHAIRMAN BOS
Department of Physics
Telangana University
Nizamabad.

M.Sc. (Physics) Semester III (w.e.f 2018-19)
Paper I -Solid State Physics–II

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, electronic, ionic and orientational polarizabilities, measurement of dielectric constant of a solid, Clausius-Mosotti relation, behavior of dielectrics in an alternating field-Bloch equations, elementary ideas on dipole relaxation, classification of ferroelectrics- $BaTiO_3$ and KDP. Dipole theory of ferroelectrics, spontaneous polarization and ferroelectric hysteresis and applications of ferroelectrics.

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.

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. London equations, London's penetration depth, coherence length, Cooper pairs and elements of BCS theory, basic concepts on Giaver tunneling, Josephson effects. Elements of high temperature superconductors. Applications of superconductors.

Reference Books:

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

CHAIRMAN BOS
Department of Physics
Telangana University
Nizamabad.

M.Sc. (Physics) Semester III (w.e.f 2018-19)
Paper II - Quantum Mechanics - II

UNIT–I

Scattering theory: Laboratory and centre of mass frames of references. kinematics of the scattering process: scattering cross-section – asymptotic form of scattering wave function. Scattering amplitude by Green's method. Born approximation method - screened potential and square well potential as examples. Partial wave analysis and phase shift - optical theorem – relationship between phase shift and potential. Scattering by a hard sphere. Collisions between identical particles.

UNIT -II

Theory of Angular momentum: Orbital angular momentum, commutation relations involving L^2 , L_x, L_y, L_z –eigen values and eigen functions of L^2 and L_z–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 $J_1 = ½, J_2 = ½$, and $J_1 = ½, J_2 = 1$.

UNIT - III

Many Electron Atom and Molecules: Thomas-Fermi atom, The Hatree and Hartree-Fock method, constants of motion in central field approximation – corrections to the central field approximation. Born-Oppenheimer method – molecular orbital theory. Valence bond theory -H_2^+ ion – hydrogen molecule.

UNIT-IV

Relativistic Quantum Mechanics : Klein-Gordon equation, plane wave solution and equation of continuity, Dirac equation – probability density –Dirac matrices, plane wave solution, significance of Negative energy states. Spin of Dirac particle - Dirac particle in electromagnetic field. Dirac's equation in covariant form. Properties of gamma matrices.

Reference Books:

1. Introduction to Quantum Mechanics : P.T.Mathews (McGraw Hill 1974)
2. Modern Quantum Mechanics : J.J.Sakurai (Pearson 1994)
3. Quantum Mechanics : L.I.Schiff (McGraw Hill 1968)
4. Quantum Mechanics : E.Merzbacher(Wiley 1970)
5. Quantum Mechanics : Arul das
6. Quantum Mechanics : B.K.Agarwal & Hari Prakash
7. Quantum Mechanics : Ghatak and Lokanathan
8. Quantum Mechanics : P A M Dirac

CHAIRMAN BOS
Department of Physics
Telangana University
Nizamabad.

M.Sc. (Physics) Semester III (w.e.f 2018-19)
Paper III - 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 amplifier- isolation amplifier- chopper amplifier- voltage to frequency and frequency to voltage converter- frequency multiplier- logarithmic amplifier.

Active filters: Low pass, high pass, band pass and band stop filters – Butterworth filters- all Pass filters. Phase sensitive detectors (PSD)-Phase lock loop (PLL)- Lock-in-amplifier.

UNIT-III (Block diagram approach)

Signal Generation: Frequency synthesized signal generator- frequency divider generator-RF signal generator- signal 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 (Block diagram approach)

Electronic Measuring Instruments: Q-meter, vector impedance meter, digital frequency meter, digital voltmeter, phase meter, RF power and voltage measurement–power factor meter, vector voltmeter.

Display and Recording: X-t, X-Y recorders, magnetic tape recorders, storage oscilloscope.

Characteristics of digital displays: Seven segment display systems, dot matrix, LCD and LED.

Reference Books:

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

CHAIRMAN BOS
Department of Physics
Telangana University
Nizamabad.

M.Sc. (Physics) Semester III (w.e.f 2018-19)
Paper IVA - Digital Logic Circuits

UNIT-I

Combinational Logic Circuits: Simplifying logic circuits, sum of products form- algebraic simplification, designing combinational logic circuits, Karnaugh map method- 4 variable method, looping- pairs, quads and octets. Complete simplification process, don't care conditions, examples.

Digital Arithmetic Operations And Circuits: Binary addition, representing signed numbers, 2's compliment system, binary subtraction, BCD addition, Hex arithmetic, ALU, parallel binary adder, design of full adder, carry propagations.

UNIT- II

MSI 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.

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.

UNIT-III

Flip-Flops: NAND and NOR gate latches, locked signals and clocked flip-flops, clocked R-S, J-K, and D-FFs, D latches, asynchronous inputs, timing consideration, one shot.

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.

UNIT- IV

Memory Hierarchy: General memory operation, CPU-memory connection, read only memories, ROM architecture, ROM timing, and types of ROMs, flash memory and ROM applications. Semiconductor RAMs, RAM architectures, static RAM, dynamic RAM (DRAM), DRAMS structure and its operation, DRAM read/write cycles, DRAM refreshing expansion of word sizes and capacity.

Programmable Logic Devices: Basic ideas, PLD architectures (PROM), PAL, PLAs, application of programmable logic devices - GAL 16V, 8A programming PLDs development softwares, universal compiler for programmable logic (CUPL).

Reference 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 3rd Edition.
3. Digital Design – M.Morris Mano.
4. Digital Principles and Applications by Albert Paul Malvino and Donald P. Leach, TMH, India.
5. Computer Architecture and Logic Design by Thomas C.Bartee, McGraw-Hill. Inc.
6. Switching theory and Logic design – R.P. Jain.

CHAIRMAN BOS
Department of Physics
Telangana University
Nizamabad.

M.Sc. (Physics) Semester III (w.e.f 2018-19)
Paper IVB - Microprocessors & Interfacing

UNIT- I

The 8086 Microprocessor - General organization of a microcomputer, detailed architecture of 8086, addressing modes, instructions, assembly language programming, programming examples. The 8086 based system design - pins and signals, system components, interrupts. Basic DMA operation, DMA controller (8237).

UNIT- II

Peripheral Interfaces and Advanced Microprocessors - Parallel I/O methods, interfacing memory, I/O devices, data converters, stepper motor, programmable peripheral interface (8255 A), priority interrupt controller (8259 A), programmable interval timer (8254), serial I/O, UART (PC 16550 D).

UNIT- III

The IBM PC Motherboard and Drives - Motherboard components, system resources, ROM BIOS services. drives - principles of magnetic storage, floppy disk drive, hard disk drive, IDE interface, SCSI interface, CD-ROM drive, BIOS disk drive services.

UNIT- IV

I/O Buses, Ports and Universal Serial Bus - ISA, MCA, EISA, PCI buses; local buses, VL bus, AGP. parallel and serial ports. USB - USB system, USB transfer, USB controller. advanced microprocessors - protected mode operation. The 80286, 80386, 80486, Pentium, Pentium-Pro and Pentium I - IV microprocessors.

Reference Books

1. Microprocessors, PC Hardware and Interfacing - By N. Mathivanan, PHI, 2003.
2. The Intel Microprocessors 8086/8088, 80186/80188, 80286,80386,80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium 4, Architecture, Programming, and Interfacing - By Barry B. Brey, 6th Ed., PHI / PEA, 17th Reprint, 2003.
3. The 8086 Microprocessor : Programming & Interfacing the PC - By Kenneth J. Ayala Penram International Publishing, 1995.
4. The 8088 and 8086 Microprocessors - Programming, Interfacing, Software, Hardware and Applications - By Walter A Triebel and Avtar Singh, PHI, 4th Ed., 2002.
5. Microcomputer Systems: The 8086/8088 Family, Architecture, Programming, and Design - By Yu-cheng Liu and Glenn A. Gibson, PHI, 2nd Ed., 1986.
6. Microprocessors – Data Hand Book, BPB.
7. Digital Principes and Design-Donald D. Givone.
8. Digital Integrated Electronics - Herbert Taub and Donal Schilling, McGraw Hill, 1985.
9. Digital Electronics - An introduction to Theory and Practice by William H.Gothmann.

CHAIRMAN BOS
Department of Physics
Telangana University
Nizamabad.

M.Sc. (Physics) Semester III(w.e.f 2018-19)
Practical Paper–V (Phy 351): Nuclear Physics Lab

Experiments

1. Study of GM detector characteristics.
2. Determination of Half life of a given β source.
3. Determination of Half life of Indium.
4. Determination of linear absorption coefficients of aluminium and lead using gamma rays.
5. Recording of gamma ray spectrum and determination of linearity of Scintillation counter.
6. Fermi – Kurie plot (β-rays)
7. Verification of Inverse square law.

Practical Paper –VIA (PHY 352A) :Analog & Digital Lab

A1 Analog Experiments

1. Power control by SCR using UJT.
2. PLL (IC 565) as FM Detector.
3. Study of Active filters-low pass, high pass and band pass.
4. Operation of PLL (IC565) as frequency synthesizer.
5. Calibration of Strain gauge.
6. Studying the operation of LVDT.
7. Application of PLL (IC 565) as AM detector.

A2 Digital Experiments

1. Construction of a synchronous up/down counter using IC74192
2. Implementation of Boolean functions using a multiplexer.
3. Construction of a shift register using IC 7495.
4. Construction of an 8-bit full adder using two 4-bit adders.
5. Implementation of Boolean functions using Dec/D.
6. Designing a four variable Boolean function using a 1 of 16 data Sel/Mu.
7. Designing a four variable Boolean function using gates.
8. Construction of a 4-bit BCD decade counter.
9. Construction of a full adder circuit using Decoder/Demultiplexer.
10. Construction of a Johnson Counter.

Practical Paper –VIB (PHY 352B): Microprocessors Lab

(B) Programming and interfacing using Microprocessor (8086)

1. Addition of 16-bit numbers stored in consecutive memory locations.
2. Division of a 28 bit unsigned number by 8.
3. Conversion of a 2-digit unsigned BCD number to binary.
4. Addition of two words, each word containing four packed BCD digits.
5. Interfacing the analog-to-digital converter (ADC) kit with PC and to develop suitable programs to convert the analog signal into digital value.
6. Interfacing the digital-to analog converter (DAC) kit with PC and to develop suitable programs to generate various waveforms to display it on CRO.
7. Interfacing the given stepper motor and to develop suitable program to rotate it at various stepping angles.

CHAIRMAN BOS
Department of Physics
Telangana University
Nizamabad.

DEPARTMENT OF PHYSICS
TELANGANA UNIVERSITY, NIZAMABAD – 503 322
M.Sc. (PHYSICS)
SCHEME OF INSTRUCTION AND EXAMINATION
WITH EFFECT FROM 2018 – 19
SEMESTER IV

Paper	Code	Subject	Instruction Hrs/ Week	Duration of Exam In Hrs	Max. Marks	Credits
THEORY						
I	PHY 401	Nuclear Physics	4	3	70+30*	4
II	PHY 402	Molecular Spectroscopy	4	3	70+30*	4
III	PHY 403	Instrumentation for Measurement, control and Data Transmission	4	3	70+30*	4
IVA	PHY 404A	Embedded Microsystems	4	3	70+30*	4
IVB	PHY 404B	PC Architecture & Hardware				
PRACTICALS						
V	PHY 451	Modern Physics Lab	6	3	70+30#	3
VIA	PHY 452A	Microcontrollers Lab	6	3	70+30#	3
VIB	PHY 452B	Simulation Lab				
Seminar			2			
Total			**28+2**		**600**	**22**

Note : * Internal Assessment (20 Marks for Internal and 10 Marks for seminar)
Internal practical exam

CHAIRMAN BOS
Department of Physics
Telangana University
Nizamabad.

M.Sc. (Physics) Semester IV (w.e.f 2018-19)
Paper I – Nuclear Physics

UNIT-I

Nuclear decay: α-decay, fine structure of α spectrum, Gamow's theory of α –decay, β-spectrum, Neutrino hypothesis, Fermi theory of β -decay, Fermi-Curie plots, selection rules for β -decay, γ -emission –multipole radiation, selection rules for γ - decay.

UNIT-II

Nuclear radiation & Detection: Interaction of charged particles with matter, Bohr's theory–Bethe's formula. Range- Energy relation. Measurement of range and stopping power. Interaction of γ - radiation with matter -photo electric effect, Compton effect, pair–production. Scintillation and solid state detectors for γ –rays.

UNIT-III

Nuclear forces: Nature of nuclear force, deuteron problem, exchange forces (Majorana, Bartlett and Heisenberg forces). Yukawa theory of nuclear forces.
Nuclear models: Liquid drop model, semi empirical mass formula. Shell model-its evidence and predictions (spin and parities of nuclear ground states, magnetic moments and electric quadrupole moments).

UNIT-IV

Nuclear reactions: Classification of nuclear reactions, kinematics of nuclear reaction and Q-value, nuclear cross section, compound nucleus formation. Basic properties of neutrons (mass, spin, half life). Classification of neutrons, average logarithmic energy decrement, moderating ratio. Nuclear diffusion, Fermi age equation, Bohr and Wheeler theory of fission.
Particle Physics: Classification of elementary particles, fundamental interactions, conservation of parity, strangeness, lepton number and baryon number, quark model.

Reference Books

1. Nuclear Physics by D.C.Tayal.
2. Introductory Nuclear Physics by S.B.Patel.
3. Introductory Nuclear Physics by Kenneth S.Krane.
4. Introductory Nuclear Physics by M.W.Wong.
5. Nuclear Physics by Kaplan.

CHAIRMAN BOS
Department of Physics
Telangana University
Nizamabad.

M.Sc. (Physics) Semester IV (w.e.f 2018-19)
Paper II –MOLECULAR SPECTROSCOPY

UNIT-I

Molecular Symmetry: Symmetry elements. Algebra of symmetry operations. Multiplication table. Molecular point groups and symmetry groups with more than one symmetry axis. T, T_h, T_d, O and O_h. Matrix representation of symmetry operations. Reducible, irreducible representations. The great orthogonality theorem. Character table for C_{2v} amd $C_{3\sigma}$ point groups. Symmetry species of point groups. Distribution of fundamentals among the symmetry species.

UNIT-II

Molecular Spectra: Types of molecular spectra, regions of the spectra, salient features of rotational spectra, rotational spectra of diatomic molecule as a rigid rotator and non-rigid rotator, effect of isotopic substitution on rotational spectra, Salient features of vibrational-rotational spectra, vibrating diatomic molecule as a harmonic oscillator and as anharmonic oscillator. Vibration-rotational spectrum of a diatomic molecule.

UNIT-III

Infrared spectroscopy: Basic concept of IR spectroscopy –IR spectrophotometer –principle and instrumentation –FTIR principle and working.

Raman Spectroscopy: Raman effect and its salient features, classical and quantum theory of Raman effect, normal vibrations of CO_2 and H_2O molecules, vibrational and rotational Raman spectrum of a diatomic molecule. 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, principle of nuclear magnetic resonance (NMR), theory of NMR spectra, relaxation process –Bloch equations –chemical shift, experimental technique of NMR spectroscopy. ESR spectroscopy-origin and resonance condition–hyperfine structure of ESR absorptions, fine structure in ESR spectra, ESR instrumentation, applications of ESR.

Reference Books

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.
7. Introduction to Atomic Spectra - H.E.White.
8. Fundamentals of Molecular Spectroscopy - C.N. Banwell and EM Mc Cash.
9. Spectra of Diatomic Molecules – Herzberg.
10. Spectroscopy Vol. I, II, III - Walker and Straughen.
11. Principles of Magnetic Resonance - C.P.Slitcher.
12. Electron Spin Resonance: Their Applications - Wertz and Bolton.

CHAIRMAN BOS
Department of Physics
Telangana University
Nizamabad.

M.Sc. (Physics) Semester IV (w.e.f 2018-19)
Paper III – Instrumentation for measurement, control and data transmission

UNIT-I

Transducers: Basic requirement of a transducer, classification of transducers – active and passive transducers, electrical transducers, displacement transducers, digital transducers.
Displacement Measurement: Variable resistance devices, variable inductance devices (LVDT) and variable capacitance devices.
Strain Measurement: Theory of strain gauge, types of strain gauges, strain gauge circuits, temperature compensation, calibration of strain gauge- strain gauge load cell.

UNIT-II

Pressure Measurement: Elastic transducers- Bourdon tube, bellows, diaphrams. Transduction methods, force balance pressure transducer, digital pressure transducer. pressure calibration.
Temperature Measurement: Classification of temperature measuring devices- resistance type temperature sensors (platinum resistance thermometer, thermistors), thermocouples-types of thermocouples - cold junction compensation. solid state sensors, pyrometers, resistance thermometer circuits. 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, electromagnetic flow meter, anemometer, ultrasonic flow meter.

UNIT-III

Process Control: Open loop and closed loop control with examples, block diagram algebra, block diagram of a closed loop system – 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- computer controlled test systems- testing an audio amplifier- testing a radio receiver -IEEE 488 bus – synthesized signal generator interfaced with IEEE488 bus – computer interfaced spectrum analyzer- adjustable ac supply using IEEE 488 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 system, current telemetering system, position telemetering system, land-line telemetry feedback system, radio frequency telemetry- PAM, PCM telemetry. Multiplexing in telemetering system, transmission channels, digital data transmission.

Reference Books

1. Modern Electronic Instrumentation and Measurement Techniques – A.O. Hefnick 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 Publications.

M.Sc. (Physics) Semester IV (w.e.f 2018-19)
Paper IVA– Embedded Microsystems

UNIT-I

Embedded Microcontrollers: Introduction to microcontrollers. The detailed architecture of 8051 – block diagram, programming model, pin assignments, PSW, internal RAM organization, special function registers, I/O ports and circuits, external memory, counters and timers, serial data I/O, interrupts. addressing modes - immediate, register, direct and indirect modes.

UNIT-II

Programming the 8051: Instruction set – moving data – internal and external data moves, Push and Pop opcodes, data exchanges; logical – byte and bit level operations, rotate and swap operations; arithmetic – flags, increment, decrement, add, sub, multi and div; jump and call instructions – jumps, calls, subroutines, interrupts, returns with programming examples.

UNIT-III

Interfacing and Applications of 8051: Interfacing an LCD, ADC and sensors with the 8051, interfacing a stepper motor, keyboard and DAC to generate waveforms on CRO with the 8051.

UNIT-IV

Other Microcontrollers and Software: 8051 programming, Dallas semiconductor DS 87000 programmer, Atmel AT 89Cx051 programmer circuits software - development tools/environments, 8051 assembly language programming styles, interpreters, high-level languages, Intel hex format object files, debugging hints. Emulators – types of emulators, monitor programs. Real-time operating systems-basics of RTOS, 8051 examples of RTOS, full RTOS, LCD digital clock / thermometer using full RTOS.

Reference Books

1. The 8051 Microcontroller - architecture, programming & applications – By Kenneth J. Ayala, Penram International Publishing, 1995.
2.The 8051 Microcontrollers and Embedded Systems – By Muhammad Ali Mazidi and Janice Gillispie Mazidi, Pearson Education Asia, 4th Reprint, 2002.
3. Programming and Customizing the 8051 Microcontroller – By Myke Predko, TMH, 2003
4. The concepts & features of Microcontrollers by Rajkamal, Wheeler Pub.
5. The 8051 Microcontroller - programming, interfacing and applications – By Howard Boyet and Ron Katz, (MII) Microprocessors Training Inc.
6. The Microcontroller Idea Book Circuits, Programs, & Applications featuring the 8052-BASIC Microcontroller by : Jan Axelson, Penram International.
7. Embedded Microcontrollers Handbook, Intel Applications.
8. Advanced Microprocessors and Peripherals, Architecture, Programming and Interface - By A. K. Ray and K. M. Bhurchandi, TMH, 2000.
9. Design with Microcontrollers By - J B Peatman, MH.

CHAIRMAN BOS
Department of Physics
Telangana University
Nizamabad.

M.Sc. (Physics) Semester IV (w.e.f 2018-19)
Paper IVB– PC Architecture & Hardware

UNIT-I

Basic Computer Organization: Instruction codes, computer instructions, timing and control, memory referred instructions, I/O and interrupts, complete computer description and design.
Programming the Computer: Assembly language, assembler, program loops, Arithmetic and logical operations, subroutines and I/O programming.

UNIT-II

Microprogrammed Control: Control memory, address sequencing and micro program examples.
Central Processing Unit: Introduction to CPU, general register organization, Stack organization, instruction formats, addressing modes, data transfer and manipulation, program control and RISC.

UNIT-III

Pipeline and Vector Proccessing: Parallel processing, pipelining, arithmetic pipeline, instruction pipeline and RISC pipeline, vector processing and array processors.
Computer Arithmetic: Addition, subtraction and multiplication algorithms, division algorithms, floating point arithmetic operations, decimal arithmetic unit, and decimal algorithmic operations.

UNIT- IV

Input-Output Organization: Peripheral devices, input-output interface, asynchronous data transfer, modes of transfer, priority interrupt, direct memory access(DMA), input-output processor(IOP), serial communication.
Memory Organization: Memory hierarchy, main memory, auxiliary memory, associate memory, cache Memory, virtual memory, memory management hardware.

Reference Books

1. Computer system architecture by Morris mano, PHI(2000).
2. Computer Architecture and parallel processing by K. Hang and F.A bigg, Mc graw-Hill.
3. Computer Architecture and logic design by Thomas C. Bartee, Mcgraw-Hill
4. Computer. fundamentals, Architecture and Organization by B. Ram 3rd Edition. New Age International.
5. An introduction to digital computer design by V. Rajaraman and T.Radhakrishna.

CHAIRMAN BOS
Department of Physics

M.Sc. (Physics) Semester IV (w.e.f 2018-19)
Practical Paper–V (PHY 451): Modern Physics Lab

Experiments

1. Zeeman effect.
2. Raman effect.
3. Magnetic susceptibility.
4. Verification of Beer's Law.
5. Electrical resistivity – Four Probe Method.
6. Electrical resistivity – Two Probe Method.
7. Hall effect.
8. X-Ray Diffraction Powder Method.
9. Study of ESR spectrum.

Practical Paper-VI A (PHY 452A): Microprocessors &Microcontrollers Lab

Experiments using Microcontroller (8051)

1. Interfacing of an ADC to the 8051.
2. Generating a square wave using the 8051 timer.
3. Generating a sine wave on the scope using the DAC.
4. Interfacing of a stepper motor to the 8051.To write a program to control the angle and direction of stepper motor rotation by the user
5. Addition of two hexadecimal numbers
6. To code a program to add hex numbers.
7. To code a program to add BCD numbers.
8. To code a program to add two multi-byte BCD numbers.
9. Conversion of Decimal to Binary and Decimal to Hexadecimal.
10. Conversion of Hexadecimal to ASCII.

Practical Paper-VI B (PHY 452B):Digital Simulation experiments

1. Construction of a synchronous up/down counter using IC74192 and display count using 7-segment display.
2. Implementation of Boolean functions using a multiplexer.
3. Construction of a shift register using IC 7495.
4. Construction of an 8-bit full adder using two 4-bit adders.
5. Implementation of Boolean functions using Decoder/De-multiplexer.
6. Simulation of four variable Boolean function using a 1 of 16 data Sel/Mu.
7. Simulation of 4 variable K-map and its study
8. Simulation of 4-bit binary/BCD decade counter.
9. Simulation of a full adder circuit Decoder/De-multiplexer.
10. Simulation of a 4-bit shift register.
11. Design of a counter with counts skipping.
12. Simulation of a Johnson Counter.

CHAIRMAN BOS
Department of Physics
University