

DEPARTMENT OF PHYSICS AND ELECTRONICS
LACHOO MEMORIAL COLLEGE OF SCIENCE AND
TECHNOLOGY (AUTONOMOUS)
JODHPUR

MEETING OF BOS-2017

ON MARCH 22, 2017

PROPOSED SYALLABUS FOR
UG: PHYSICS AND ELECTRONICS (2017-2020)
PG: PHYSICS (2017-2019)

ANUXURE- B2 (1)
SYLLABUS OF BSc. I YEAR (I AND II SEMESTERS)
SUBJECT: ELECTRONICS
(2017-2018)

BSc. I Year (I Semester)

Electronics Paper I

BSEC111: CIRCUIT ELEMENTS AND NETWORK ANALYSIS

Unit I

Basic Circuit Elements: Basic Circuit Concepts: Classification of elements: Resistance, Types of resistors and their rating, Capacitance, Types of capacitors, Inductance, Types of inductors, Capacitive and inductive reactance,

Network definitions, Voltage and current sources, Kirchhoff's Current Law (KCL), Kirchhoff's Voltage Law (KVL), Voltage division and current division.

Unit II

AC Circuit Analysis: Sinusoidal voltage and current, Voltage-current relationship in resistor, Inductor and capacitor, Phasor diagrams, Complex impedance, Analysis of RL, RC and RLC circuits, Resonance: Series and parallel, Frequency response, Sharpness of resonance, Quality factor (Q) and bandwidth.

Unit III

Network Analysis: Mesh analysis and node analysis, Two port networks and their reduction, Reduction of a complicated circuit into T and equivalents, Conversion between T and configuration (Star-Delta conversion).

Unit IV

Network Theorems: Superposition theorem, Thevenin's theorem, Norton's theorem, Millers theorem, Maximum power transfer theorem, simple problems related to the theorems,

Unit V

Coupled Circuits: Conductive and inductive coupled circuits, Self and mutual inductance, Coefficient of coupling, Transformers and its principle, Types of transformers, Equivalent circuit for transformer, Dot conventions, Transformer Efficiency, Losses in Transformers

Books Suggested:

1. John. D. Ryder: *Networks, Lines and Fields*, Prentice Hall of India, New Delhi, 2003.
2. Robert L. Boylestad: *Essentials of Circuit Analysis*, Pearson Education, 10th Ed., 2004.
3. B. Grob: *Basic Electronics*, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 1992.
4. N.N. Bhargava, D.C. Kulshrestha and S.C. Gupta: *Basic Electronics and Linear Circuits*, T.T. T. I, Chandigarh, Tata Mc-Graw Hill Publishing Company Ltd., New Delhi, 1984.

BSc. I Year (I Semester)

Electronics Paper II

BSEC112: SEMICONDUCTOR DEVICES

Unit I

Semiconductor Basics: Energy band in solids (metal, semiconductor and insulators), Intrinsic semiconductors, Extrinsic semiconductors: N-type and P-type, Mobility of charge carriers, Recombination, Life time, Drift current, Diffusion current, Fermi levels.

Unit II

Diode: P-N junction diode, Formation of depletion layer, Derivation of barrier potential at thermal equilibrium, depletion width and depletion capacitance. Forward and reverse biasing, I-V characteristic, Band diagram, Diode equation, Zener and avalanche breakdown, Zener diode, Tunnel diode.

Unit III

Bipolar Junction Transistors (BJT): PNP and NPN transistors, Transistor action, CB, CE and CC configurations: Input and Output characteristics, Current gains and their relationship, Comparison of CB, CE and CC configurations.

Unit IV

Field Effect Transistors (FET): JFET: Construction and working, Channel formation, Pinch-off voltage, Transfer characteristics, MOSFET: Construction and working, I-V characteristics, Enhancement and Depletion modes, SCR, DIAC AND TRIAC.

Unit V

Opto-electronic Devices: Photoconductive cells, Solar Cell : Construction and working, Characteristics, Fill Factor, Efficiency and uses of solar cell, p-i-n Photodiode, Avalanche photodiode, LED, LCD.

Books Suggested:

1. N.N. Bhargava, D.C. Kurukshretha and S.C. Gupta: *Basic Electronics and Linear Circuits*, T.T.T.I., Chandigarh, Tata Mc-Graw Hill Publishing Company Ltd., New Delhi, 1984.
2. V.K. Mehta and R. Mehta: *Principles of Electronics*, S. Chand and Company, Rev. Ed., 2010.
3. Allen Mottershead: *Electronic Devices and Circuits: An Introduction*, Prentice-Hall of India, 2005.
4. R. S. Sedha: *A Textbook of Applied Electronics*, S. Chand and Company Ltd., 1990.

BSc. I Year (I Semester)

BSEC121: ELECTRONICS LAB

List of Experiments:

1. Study of constant current source
2. Study of constant voltage source.
3. Study of maximum power transfer from source to load.
4. Characteristics of semiconductor diode and measurement of its forward static and dynamic resistance.
5. Characteristics of Zener diode and measurement of its reverse static and dynamic resistance.
6. Characteristics of DIAC and measurement of its breakdown voltage.
7. Characteristics of FET and determination of μ , r_d and g_m .
8. Characteristics of transistor in CE configuration and determination of its input and output resistance.
9. Characteristics of transistor in CB configuration and determination of its input and output resistance.
10. Characteristics of solar cell and determine its fill factor.

Books Suggested:

1. N.N. Bhargava, D.C. Kulshrestha and S.C. Gupta: *Basic Electronics and Linear Circuits*, T.T.T.I., Chandigarh, Tata Mc-Graw Hill Publishing Company Ltd., New Delhi, 1984.
2. L.K. Maheshwari and H.M.S. Anand: *Laboratory Manual Introductory Electronics Experiment*, Wiely Eastern Ltd., New Dehli, 1990.
3. S.L. Gupta and V. Kumar: *Practical Physics (Hindi & English)*, Pragti Prakashan, Meruth, 1998.

BSc. I Year (II Semester)

Electronics Paper I

BSEC211: AMPLIFIERS

Unit I

Transistor Biasing and Stabilizing: Transistor Biasing: Need for biasing, DC load line and operating point, Thermal instability, Stability factor, Fixed bias, Collector to base bias, Emitter bias, Voltage divider bias.

Unit II

Transistor Amplifiers: Small signal amplifier, Frequency response of amplifier and its band width, Small Signal hybrid equivalent circuit at low frequency, h-parameters: Definitions, Analysis of transistor amplifier using h-parameters, Current gain, Voltage gain, Input-output impedance and power gain.

Unit III

Multistage Amplifiers: Cascading of transistor amplifiers, R-C coupled amplifiers, Voltage gain at low, mid and high frequency, Effect of cascading on gain and bandwidth, Gain–Bandwidth product, FET amplifiers.

Unit IV

Power Amplifiers: Need for power amplifiers, classification of power amplifiers: Class A, Class B and Class C, Transformer coupled power amplifier, Efficiencies, Push pull amplifiers, Distortions in amplifiers, Transistor phase inverter, Class C tuned amplifier.

Unit V

Wide Band Amplifiers: Bandwidth requirement, High frequency hybrid model for transistors, Pulse testing, Sag, Rise time, Various compensation techniques.

Books Suggested:

1. Allen Mottershead: *Electronic Devices and Circuits: An Introduction*, Prentice Hall of India, 2005.
2. V.K. Mehta and R. Mehta: *Principles of Electronics*, S. Chand and Company, Rev. Ed., 2010.
3. Jacob Millman and C.C. Halkias: *Integrated Electronics: Analog and Digital Circuits*, Tata Mc-Graw Hill Publishing Ltd., New Delhi, 1991.
4. N.N. Bhargava, D.C. Kulshrestha and S.C. Gupta: *Basic Electronics and Linear Circuits*, T.T.T.I., Chandigarh, Tata Mc-GrawHill Publishing Company Ltd., New Delhi, 1984.
5. R. S. Sedha: *A Textbook of Applied Electronics*, S. Chand and Company Ltd., 1990.

BSc. I Year (II Semester)

Electronics Paper II

BSEC212: MEASURING INSTRUMENTS

Unit I

Power Supplies: Rectifiers, Half and full wave, Ripple factor and their efficiency, Filters: Series inductor, Shunt capacitor, L and section, Voltage regulation using Zener diode.

Unit II

Cathode Ray Oscilloscope: Construction of CRT, Deflection sensitivity, Block diagram of CRO, Vertical and horizontal deflection sections, Synchronization of sweep, Measurement of different parameters using CRO: Amplitude, Time period, Phase, Frequency, R.M.S. value and slope.

Unit III

Filters and Attenuators- Characteristic Impedance, Symmetrical T and circuits, Fundamental theorem on filters, Passive filters: Low pass, High pass, Band pass and band stop filter, Attenuators.

Unit IV

Measuring Instruments and Transducers: Galvanometer and its sensitivity, DC ammeter, Voltmeter, Voltmeter sensitivity, Multimeter, Rectifier type instruments, Electrodynamometer, Transducer: Resistive transducer, Resistance thermometer, Thermistor, Capacitive transducer, Piezoelectric transducer.

Unit V

Bridges: AC bridges, Balance conditions, Comparison bridges, Maxwell bridge, Hay bridge, Schering bridge, Wein bridge, Impedance bridge, Q-meter.

Books Suggested:

1. H.S. Kalsi: *Electronic Instrumentation*, Tata Mc-Graw Hill publishing Ltd., New Delhi, 3rd Ed, 2006.
2. D. A. Helfrick and D. William Cooper: *Modern Electronic Instrumentation and Measurement Techniques*, PHI, New Delhi, 1992.
3. Jacob Millman and C.C. Halkias: *Integrated Electronics: Analog and Digital Circuits*, Tata McGraw-Hill Publishing Ltd., New Delhi, 1991.
4. B. Grob: *Basic Electronics*, Tata Mc-Graw Hill Publishing Company Ltd., New Delhi, 1992.

BSc. I Year (II Semester)

BSEC221: ELECTRONICS LAB

List of Experiments:

1. Frequency response of a single stage BJT amplifier and determine its bandwidth.
2. Frequency response of a single stage FET amplifier and determine its bandwidth.
3. Frequency response of a series resonance circuit and determine its resonance frequency, bandwidth and quality factor.
4. Frequency response of parallel resonance circuit and determine its resonance frequency and bandwidth.
5. Voltage regulation using Zener diode.
6. Study of HWR and FWR and measurement of ripple factor with and without filters.
7. Study of low pass, high pass and band pass filter and determine their cutoff frequencies.
8. SCR characteristics and measurement of holding voltage and current.
9. Study of CRO: Measurement of amplitude and frequency of a sine wave, triangular wave and pulse.
10. Measurement of input and output impedance of a BJT amplifier at a fixed frequency.

Books Suggested:

1. N.N. Bhargava, D.C. Kulshrestha and S.C. Gupta: *Basic Electronics and Linear Circuits*, T.T.T.I., Chandigarh, Tata Mc-Graw Hill Publishing Company Ltd., New Delhi, 1984.
2. L.K. Maheshwari and H.M.S. Anand: *Laboratory Manual Introductory Electronics Experiment*, Wiely Eastern Ltd., New Dehli, 1990.
3. S.L. Gupta and V. Kumar: *Practical Physics (Hindi & English)*, Pragti Prakashan, Meruth, 1998.

ANUXURE- B2(2)
SYLLABUS OF BSc. II (III AND IV SEMESTERS)
SUBJECT: ELECTRONICS
(2018-2019)

BSc. II Year (III Semester)

Electronics Paper I

BSEC311: FEEDBACK SYSTEMS

Unit I

Classification of Amplifiers: Voltage amplifier, Current amplifier, Trans-conductance amplifier, Trans-resistance amplifier, Feedback concept, Feedback Factor, Positive and negative feedback, Advantages and Disadvantages, Sampling and mixing, Feedback topology: Voltage series, Voltage shunt, Current series, Current shunt.

Unit II

Effect of Feedback: Effect of positive and negative feedback on gain of amplifier, Frequency response, Gain-stability, Noise, Distortions, Effect of negative feedback on input and output impedances of an amplifier.

Unit III

Analysis of Feedback Circuits: Method of analysis of feedback circuits, CE amplifier with current series and voltage shunt feedback, Emitter follower, Source follower, Darlington pair, Bootstrapping principle.

Unit IV

Sinusoidal Oscillators: Classification of oscillators, Principle of operation, Barkhausen criterion for sustained oscillations, R-C Phase shift Oscillator, Wein Bridge oscillator, Tuned collector oscillator, Hartley oscillator, Colpitts oscillators, Crystal Oscillator: Series resonance mode, Parallel resonance mode.

Unit V

Non Sinusoidal Oscillators: Transistor as a switch, Switching times in a transistor, Introduction to multivibrators, Astable (free running multivibrator), Monostable and bistable multivibrators, Mathematical analysis, Multivibrators using 555 timer.

Books Suggested:

1. Allen Mottershed: *Electronic Devices and Circuits*, PHI, 2005.
2. Jacob Millman and Christos C. Halkias: *Electronic Devices and Circuits*, TMH, 2000.

BSc. II Year (III Semester)

Electronics Paper II

BSEC312: COMMUNICATION ELECTRONICS

Unit I

Introduction to Electronic Communication: Introduction, Electronic communication systems, Modulation and demodulation, Need for modulation, Technique of modulation, Types of modulation: Analog, Digital and Pulse Modulation, Advantages and Disadvantages, Electromagnetic frequency spectrum, Bandwidth and Information capacity, Power measurements (dB).

Unit II

Amplitude Modulation, Transmission and Reception: Principle of amplitude modulation, Side bands, Power considerations, DSBSC, SSB transmission, AM modulating circuits: Collector and base modulating circuits, AM transmitters.

Demodulation of AM signals, Square law demodulation, Envelope detector, AGC, AM receiver.

Unit III

Angle Modulation, Transmission and Reception: Frequency and phase modulation, FM and PM waveforms, Mathematical analysis, Bandwidth requirement, FM by reactance variation method, Armstrong PM system, FM transmitter

FM demodulation, Foster-Seeley discriminator, Ratio detector, Amplitude limiter.

Unit IV

Transmission Lines: Propagation constant, Characteristics impedance, Reflections on a line not terminated in characteristics impedance, VSWR, Reflection coefficient, Open and short circuited lines, Stub matching.

Unit V

Propagation of Radio Waves: Surface wave propagation, Space wave propagation, Range of space wave, Sky wave propagation, Structure of ionosphere, Critical frequency, MUF, Skip distance, Fading, Duct propagation.

Books Suggested:

1. D. Roddy and J. Coolen: *Electronic Communication*, 4th Ed, PHI, 2004
2. Anokh Singh: *Principles of Communication Engineering*, S. Chand & Company, 2nd Ed. 2006
3. Wayne Tomasi: *Advanced Electronic Communication System*, Pearson, 1997.

BSc. II Year (III Semester)

BSEC321: ELECTRONICS LAB

List of Experiments:

1. Cascading of filter circuits to simulate transmission lines.
2. Current series negative feedback amplifier.
3. Study of RC phase shift oscillator.
4. Study of Hartley oscillator.
5. Study of Collpitts oscillator.
6. Study of astable multivibrator.
7. Measurement of input and output impedance of emitter follower.
8. Measurement of input and output impedance of source follower.
9. 555 Timer application as astable multivibrator.
10. Measurement of input and output impedance of an amplifier with and without feedback.

Books Suggested:

1. N.N. Bhargava, D.C. Kulshretha and S.C. Gupta: *Basic Electronics and Linear Circuits*, T.T.T.I., Chandigarh, Tata Mc-Graw Hill Publishing Company Ltd., New Delhi, 1984.
2. L.K. Maheshwari and H.M.S. Anand: *Laboratory Manual Introductory Electronics Experiment*, Wiely Eastern Ltd., New Dehli, 1990.
3. S.L. Gupta and V. Kumar: *Practical Physics (Hindi & English)*, Pragti Prakashan, Meruth, 1998.
4. Allen Mottershed: *Electronic Devices and Circuits*, PHI, 2005.
5. J. Millman and C.C. Halkias: *Electronic Devices and Circuits*, TMH, 2000.

BSc. II Year (IV Semester)

Electronics Paper I

BSEC411: OPERATIONAL AMPLIFIERS

Unit I

Differential Amplifier: Common mode and difference mode signals and their gains, Common-Mode Rejection Ratio (CMRR) of differential amplifier, Emitter- Coupled differential amplifier, Differential amplifier circuit configurations, Cascaded differential amplifier.

Unit II

Basic Operational Amplifier (Op-Amp): Block diagram representation of a typical Op- Amp, Ideal operational amplifier, Equivalent circuit of OPAMP, Concept of virtual ground, Inverting and non-inverting OPAMP and their characteristics, Voltage-Series negative feedback OPAMP: Closed loop gain, Input and output impedance.

Unit III

Op-Amp Characteristics, DC parameters and their Measurements: Frequency-Response Curve of an Op-Amp, Band width of an Op-Amp, Input offset voltage, Input offset current, Input bias current, Output offset voltage, Differential input resistance, Input offset current drift, Input offset voltage drift, Power Supply Rejection Ratio (PSRR), Slew rate, Common-Mode Rejection Ratio (CMRR), Op-Amp IC-741 and its Pin-Connection.

Unit IV

Applications of Op-Amp: Inverting Op-Amp as constant multiplier, Sign-Changer, Adder or summing amplifier, Integrator, Integrator with adder, Differentiator, Subtractor, Divider, Log, Antilog, Filters (Qualitative idea only).

Unit V

Analog Computation: Basic building blocks of analog computer, Solution of linear differential equation with constant coefficient, Analog computer symbols, Time and amplitude scaling techniques, Combined time and amplitude scaling.

Books Suggested:

1. Ramakant A. Gayakwad: *Op-Amps and Linear Integrated Circuits*, Prentice Hall of India Private Limited, New Delhi, 2010.
2. Jacob Millman and Christos C. Halkias: *Integrated Electronics: Analog and Digital Circuits and Systems*, Tata Mc-Graw Hill Publishing Ltd., New Delhi, 1991.
3. R.F. Coughlin and F.F. Driscoll: *OPAMP and Linear Integrated Circuits*, PHI, 6th Ed., 1990.

BSc. II Year (IV Semester)

Electronics Paper II

BSEC412: WAVESHAPING AND LAB INSTRUMENTS

Unit I

Wavshaping: Step, Pulse, Ramp, Impulse, Square wave, High pass and low pass RC circuit and their response for step, pulse and square wave inputs, Differentiator, Integrator, Clipping and clamping circuits using diodes.

Unit II

Signal Conditioning: Schmitt trigger, UJT as saw tooth waveform generator, Time base signals, Simple voltage sweep and current sweep circuits, Errors in sweep signals: Slope error, Displacement error and transmission error and their relation.

Unit III

Controlled Rectification and Voltage Regulation: Half wave and full wave, SCR control, Current rating of SCR, DIAC and TRIAC; DIAC-TRIAC phase control circuits, Voltage regulation using transistors, OP-AMP and IC's.

Unit IV

Lab Equipments: Standard signal generators, FETVM, Digital voltmeter, Frequency counter, Harmonic distortion analyzer: Tuned circuit harmonic distortion analyzer, Heterodyne type harmonic distortion analyzer.

Unit V

Pulse Height Analysis: Single channel analyser, multi- channel analyser, Scintillation detectors, Radiation counter, Origin of bio-electric signals, ECG, Heart rate monitor, Sonography.

Books Suggested:

1. Allen Mottershed: *Electronic Devices and Circuits*, PHI, 1984.
2. J. Millman and C.C. Halkias: *Electronic Devices and Circuits*, TMH, 2000.
3. J. Millman and H. Taub: *Pulse, Digital and Switching Waveforms*, 3rd Ed., 2011.

BSc. II Year (IV Semester)

BSEC421: ELECTRONICS LAB

List of Experiments:

1. Study of differential amplifier circuit.
2. Characteristics of OPAMP.
3. Study of clipping circuit.
4. Study of clamping circuit.
5. Study of UJT relaxation oscillator.
6. Study of Schmitt trigger.
7. Adder and subtractor using OPAMP.
8. Voltage regulation using OPAMP.
9. Study of integrator circuit.
10. Study of differentiator circuit.

Books suggested:

1. N.N. Bhargava, D.C. Kulshrestha and S.C. Gupta: *Basic Electronics and Linear Circuits*, T.T.T.I., Chandigarh, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 1984.
2. L.K. Maheshwari and H.M.S. Anand: *Laboratory Manual Introductory Electronics Experiment*, Wiely Eastern Ltd., New Dehli.
3. S.L. Gupta and V. Kumar: *Practical Physics (Hindi & English)*, Pragti Prakashan, Meruth, 1998.
4. Ramakant A. Gayakwad: *Op-Amps and Linear Integrated Circuits*, Prentice Hall of India Private Limited, New Delhi, 2010.
5. Allen Mottershed: *Electronic Devices and Circuits*, PHI, 2005
6. J. Millman and C.C. Halkias: *Electronic Devices and Circuits*, TMH, 2000.

ANUXURE- B2(3)
SYLLABUS OF BSc. III (V AND VI SEMESTERS)
SUBJECT: ELECTRONICS
(2019-2020)

BSc. III Year (V Semester)

Electronics Paper I

BSEC511: AUDIO AND VIDEO SYSTEMS

Unit I

Radio Receiver: Characteristics and their measurements, Tuned radio frequency receiver, Frequency translation, Super-heterodyne receiver: Block diagram, Typical transistor receiver circuit, FM receiver.

Unit II

Television Transmission: Broadcast channels, Picture scanning, Frequency band and resolution, Bandwidth of video signal, Vestigial side band system, Camera tubes: Iconoscope, Image orthicon, Vidicon, Composite video signal, Block diagram of monochrome transmitter and explanation of each block; Color transmission, Color burst signal, PAL and NTSC systems.

Unit III

Television Receiver: Scanning sequence and interlacing, Synchronization and blanking, Block diagram of monochrome receivers and explanation of each block, Block diagram of color receivers and explanation of each block; Picture tube: Monochrome and color.

Unit IV

Microphones: Characteristics of microphone, Carbon microphones, Crystal microphone, Moving coil microphone, Ribbon microphone, Capacitor microphone.

Loudspeakers: Ideal loudspeakers, Crystal loudspeakers, Electrostatic loudspeakers, Dynamic loudspeakers, Permanent magnet loudspeakers, Woofers, Tweeters.

Unit V

Antennas: Antenna action, Radiation strength from short dipole, Power radiated and radiation resistance for short doublet, Half wave and quarter wave antenna, Vertically grounded antenna, Image antenna, Directive gain, Power gain, Directivity, Beam width, Bandwidth of antenna, Radiation patterns, Antenna arrays.

Books Suggested:

1. S.P. Bali and Rajeev Bali: *Audio & Video Systems*, Khanna Book Publishing, Delhi (2004)
2. A. M. Dhake: *Television and Video Engineering*, TMH, 1998
3. S.P. Sharma: *Basic Radio and Television*, TMH, 2nd Ed., 2010.

BSc. III Year (V Semester)

Electronics Paper II

BSEC512: DIGITAL ELECTRONICS AND MICROPROCESSOR

Unit I

Number System : Decimal, Binary, Octal and Hexadecimal, Interconversion, Character codes, ASCII, BCD, Gray code, Logical operations, Boolean algebra, Simplification of Boolean expression, Duality.

Gates- NOT, AND, OR, NAND, NOR and XOR gates, De-Morgans theorems, Universal gates, Logic circuits for Boolean expressions, Simplification of logical expression, Karnaugh maps.

Unit II

Combinational Circuits: Half adder, Full adder, Parallel adder, Half subtractor, Full subtractor, Parallel Subtractor, MUX and DMUX,

Sequential Circuits: Flipflops: RS, D, JK, clocked and edge triggered, PRESET and CLEAR, Counters: Asynchronous counters, Synchronous counter, Mod counter, Shift registers.

Unit III

Micro-Computer Hardware: Microcomputer memory: Semiconductor memories, RAM, SRAM, DRAM, ROM, CPU: Instruction register and decoder, ALU, Control unit, Buses: Data, Address and control buses, Minimum microcomputer configuration, Interrupts, Elementary concept of I/O mapped and memory mapped I/O.

Unit IV

Microprocessor 8085: Organization of 8085 microprocessor, Fetch and execution of instruction, Bus multiplexing, Interrupts : Maskable and non-maskable, Call locations, Interrupt service subroutine, Instruction set of 8085 microprocessor: Data transfer group, Arithmetic group, Logical group, Branches group, Stack related instructions, Mnemonics and operation codes, Addressing modes: Direct, Indirect, Immediate, Indexed and relative, Assembly language programming.

Unit V

Data Transfer: Data transfer to and from I/O devices, Types of data transfer: Processor controlled and peripheral controlled, DMA, 8257 DMA controller, 8255 programmable peripheral interface, 8279 keyboard-display interface, LED displays, A/D and D/A conversion.

Books Suggested:

1. A.P. Malvino and D.P. Leach: *Digital Principle and Applications 4th Ed.* TMH, 1991.
2. B. Ram: *Fundamental of Microprocessors and Microcomputers*, Dhanpat Rai Publications, New Delhi, 2010.
3. R. S. Gaonkar: *Microprocessor Architecture Programming and Applications with the 8085*, CBS Publishers, 2011
4. M. Morris Mano: *Digital Design, 4th Ed.*, Pearson, 1993.

BSc. III Year (V Semester)

BSEC521: ELECTRONICS LAB

List of Experiments:

1. Study of various logic gates and verification of De'Morgans theorems.
2. Study of flip flops.
3. Study of MUX (4-1) and DMUX(1-4)
4. Study of half adder and full adder.
5. Study of half and full subtractor.
6. Binary to gray code conversion and vice versa.
7. Study of encoder and decoder.
8. Study of shift registers.
9. Study of counters.
10. Study of MOD counters.

Books suggested:

1. N.N. Bhargava, D.C. Kulshrestha and S.C. Gupta: *Basic Electronics and Linear Circuits*, T.T.T.I., Chandigarh, Tata Mc-Graw Hill Publishing Company Ltd., New Delhi, 1984.
2. L.K. Maheshwari and H.M.S. Anand: *Laboratory Manual Introductory Electronics Experiment*, Wiely Eastern Ltd., New Dehli, 1992.
3. S.L. Gupta and V. Kumar: *Practical Physics (Hindi & English)*, Pragti Prakashan, Meruth, 1998.
4. A.P. Malvino and D.P. Leach: *Digital Principle and Applications 4th Ed.* TMH., 1992.
5. M. Morris Mano: *Digital Design, 4th Ed.*, Pearson, 1993.

BSc. III Year (VI Semester)

Electronics Paper I

BSEC611: DATA COMMUNICATION AND NETWORKING

Unit I

Principle of Data Communication: General features of a Communication system, Need for modulation, Theory of amplitude modulation, General principles of frequency modulation and phase modulation, Evolution of computer networks, Elements of LAN, WAN, MAN LAN topologies: MESH, STAR, BUS and RING network.

Unit II

Network Models: Layered tasks, OSI model, Layers in the OSI model, TCP/IP protocol suite, Addressing, Digital Transmission: Digital Signals, Bit rate, Bit Length, Baseband transmission, Broadband transmission, Digital data to digital signal conversion, Line coding schemes.

Unit III

Transmission medium: Guided media: Twisted pair cable, Coaxial cable, Fiber optic cable, Unguided media: Wireless, Radio waves, Microwaves, Infra- red, Frequency Division Multiplexing, Time Division Multiplexing.

Unit IV

Switching: Concept of switching, Circuit-switched networks, Datagram networks, Network switching, Addressing, Efficiency.

Multiple access: Random access ALOHA, Carrier sense multiple access (CSMA), CSMA/CD, CSMA/CA.

Unit V

Error Detection and Correcting Codes: Types of errors, Redundancy, Detection versus correction, Block coding, Hamming codes, Cyclic codes: Cyclic Redundancy Check, Hardware Implementation, Polynomials, Parity generation and detection, CRC.

Books Suggested:

1. Wayne Tomasi: *Introduction to Data Communication and Networking, 1st Ed.*, Pearson 2007.
2. A.B. Forouzan: *Data Communication and Networking, 4th Ed.*, TMH, 2006.

BSc. III Year (VI Semester)

Electronics Paper II

BSEC612: ADVANCED COMMUNICATION SYSTEMS

Unit I

Pulse Modulation: Introduction, Sampling theorem, Pulse amplitude modulation, Pulse code modulation, Quantization and the binary code, Dynamic range, Coding efficiency, Quantization error, Noise in PCM signals, Companding, Elementary ideas of PPM and PWM.

Unit II

Digital Modulation Techniques: Information capacity, Bit rate, Baud, Bandwidth, Encoding a signal, Amplitude shift keying, Frequency shift keying, Phase shift keying, Quadrature phase shift keying, Constellation diagrams.

Unit III

Optical Fiber Communication: Introduction, Light propagation in fibers, Total internal reflection, Numerical aperture of a given fiber, Fiber index profiles, Step index and graded index fiber, Fiber optic communication link.

Unit IV

Radar System: Basic Radar system, Radar range equation, Pulsed radar system, Doppler's effect, CW Doppler Radar system, Moving target Indicator principle, FM radar.

Unit V

Satellite Communication: Kepler's Laws, Satellites orbital patterns, Geo-synchronous satellites, Apogee, perigee, Angle of inclination, Antenna look angles, Satellite systems link modules: Uplink Model, Transponder, Downlink Model.

Books Suggested:

1. D. Roddy and J. Coolen: *Electronic Communication, 4th Ed.*, PHI, 2004.
2. Wayne Tomasi: *Advanced Electronic Communication System*, Pearson, 2007.
3. M.I. Scholnik: *Introduction to Radar Systems, 2nd Ed.*, TMH, 2006.

BSc. III Year (VI Semester)

BSEC621: ELECTRONICS LAB WITH PROJECT

List of Experiments:

Part A: Assembly Language Programming Lab using 8085 Microprocessor.

1. Data transfer using direct and indirect addressing.
2. Block data transfer.
3. Addition .
4. Subtraction.
5. Multiplication.
6. Division.
7. Array addition.
8. Binary to decimal and decimal to binary.
9. Binary to BCD and BCD to binary.
10. Largest and smallest from a set of numbers.
11. Sorting (Ascending and descending).
12. BCD addition and subtraction.

Part B: Project

Aim of the Course

- Equip the students to carry out working project independently.
- Design new circuits according to the need and trouble shooting

Useful projects should be produced. Students are advised to search for better projects.

Projects must include electronic hardware and the demonstration is compulsory.

Books Suggested:

1. N.N. Bhargava, D.C. Kulshrestha and S.C. Gupta: *Basic Electronics and Linear Circuits*, T.T.T.I., Chandigarh, Tata Mc-Graw Hill Publishing Company Ltd., New Delhi, 1984.
2. L.K. Maheshwari and H.M.S. Anand: *Laboratory Manual Introductory Electronics Experiment*, Wiely Eastern Ltd., New Dehli, 1990.
3. S.L. Gupta and V. Kumar: *Practical Physics (Hindi & English)*, Pragti Prakashan, Meruth, 1998.
4. B. Ram: *Fundamental of Microprocessors and Microcomputers*, Dhanpat Rai Publications, New Delhi, 2010.
5. R S Gaonkar: *Microprocessor Architecture Programming and Applications with the 8085*, CBS Publishers, 2011.