Undergraduate Degree Courses in Engineering & Technology

BACHELOR OF ENGINEERING (ELECTRONICS & COMMUNICATION ENGINEERING)

General, Course structure & Theme
&
Semester-wise credit distribution

A. Definition of Credit:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week 2 Hours Practical (Lab)/week	0.5 credits 1 credit

B. Structure of Undergraduate Engineering program:

S. No.	Category	Suggested Breakup of Credits (Total 160)
1.	Basic Science Courses (BSC)	20
2.	Engineering Science Courses (ESC)	30
3.	Humanities, Social Science and Management Courses (HSMC)	10
4.	Professional Core Courses (PCC)	60
5.	Professional Elective Courses (PEC)	18
6.	Open Elective Courses (OEC)	14
7.	Seminar	2
8.	Project	10
9.	Internships in industry	8
10.	Mandatory Courses (MC)	NC
	Total Credits	172

E. Course code and definition:

Course code	**Definitions**
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management courses
PCC	Professional core courses
PEC	Professional Elective courses
OEC	Open Elective courses
LC	Laboratory course
MC	Mandatory courses

**Minor variation is allowed as per need of the respective disciplines.*

B.E II Year (Semester-III) Electronics & Communication Engineering
Course Structure & Evaluation Scheme

S No.	Course Category	Course Code	Course Title	Periods			Sessional Marks			End Semester Marks			Credit
				L	T	P	CT	TA	Total	TE	PE	Total	
1	BSC	BSC 301	Mathematics III	4	-	-	30	10	40	60	-	100	4
2	PCC	BEC 301	Digital Electronics	4	-	-	30	10	40	60	-	100	4
3	PCC	BEC 302	Electronic Devices & Circuits	3	-	-	30	10	40	60	-	100	3
4	ESC	BEE 301	Network Analysis & Synthesis	3	1	-	30	10	40	60	-	100	4
5	ESC	BCS 302	Data Structure	3	-	-	30	10	40	60	-	100	3
6	MC	MC 302	Human Values & Professional Ethics	2	-	-	30	10	40	60	-	100	-
7	ESC	BCS 352	Data Structure Lab	-	-	2	20	20	40	-	60	100	1
8	PCC	BEC 351	Digital Electronics lab	-	-	2	20	20	40	-	60	100	1
9	PCC	BEC 352	Electronic Devices & Circuits Lab	-	-	2	20	20	40	-	60	100	1
10		BEC 354	Mini Project or Internship Assessment	-	-	-	-	-	100	-	-	100	2
			Total	19	1	6	240	120	460	360	180	1000	23

*The Mini Project or internship (4 weeks) conducted during summer break after II semester and will be assessed during III semester.

B.E II Year (Semester-IV) Electronics & Communication Engineering
Course Structure & Evaluation Scheme

S No.	Course Category	Course Code	Course Title	Periods			Sessional Marks			End Semester Marks			Credit
				L	T	P	CT	TA	Total	TE	PE	Total	
1	HSMC	BHSM 401	Industrial Management	3	-	-	30	10	40	60	-	100	3
2	PCC	BEC 401	Electromagnetic Theory	3	1	-	30	10	40	60	-	100	4
3	PCC	BEC 402	Microprocessor and its Applications	3	1	-	30	10	40	60	-	100	4
4	PCC	BEC 403	Signals & Systems	3	1	-	30	10	40	60	-	100	4
5	ESC	BCS 404	JAVA	3	-	-	30	10	40	60	-	100	3
6	MC	MC 401	Environment and Ecology	2	-	-	30	10	40	60	-	100	-
7	PCC	BEC 451	PCB Design Lab	-	-	2	20	20	40	-	60	100	1
8	PCC	BEC 452	Microprocessor and its Applications Lab	-	-	2	20	20	40	-	60	100	1
9	ESC	BCS 454	JAVA Lab	-	-	2	20	20	40	-	60	100	1
				17	3	6	240	120	360	360	180	900	21

BCS-301 Mathematics III

L-T-P-C
4-0-0-4

Unit-1 (9 Hrs)

Fourier Transform: Fourier integral, conditions of convergence, Fourier sine and cosine integrals, complex form, applications, Inversion formula for Fourier transform, operational properties. Discrete and Fast Fourier transform. Applications of Fourier transform to solve boundary value problems.

Unit-2 (8 Hrs)

Functions of a Complex Variable and Conformal mapping: Limit, Continuity, Differentiability and Analyticity of functions of a complex variable, Cauchy-Riemann equations, Harmonic functions, Complex functions as mappings, Linear Transformation, Inverse transformation, Bilinear Transformations, Conformal Mapping & applications.

Unit-3 (9 Hrs)

Integration of Complex Functions: Contour integrals and evaluations, Cauchy's Theorem, Cauchy's Integral Formulae, Liouville's theorem, Convergence of power series, Taylor series, Laurent series, Zeros and Singularities of a complex function, Residues and Residue theorem, Evaluation of definite and improper integrals.

Unit-4 (7 Hrs)
Curve-fitting: method of least- squares, Normal equations, Normal equation in case of straight line, Fitting a straight line, Polynomial, non-linear and exponential curves, Change of origin.
Probability: Basics of probability, random variables, Expectation, Baye's theorem and probability distributions, Binomial, Poisson and Normal distributions.

Unit-5 (9 Hrs)
Statistical Methods: Sampling Theory, Parameters of Statistics, Tests of hypothesis and significance, z-test, t-test, $\chi 2$-test **,**Goodness of fit test**,** Time series analysis, Index numbers, Quality control chart and acceptance sampling, Introduction to design of experiments, Forecasting models.

Text & Reference Books:

1. R.K. Jain and S.R.K. Iyengar; Advanced Engineering Mathematics, Narosa Publishing House, 2002.
2. Erwin Kreyszig; Advanced Engineering Mathematics, John Wiley & Sons, 1962.
3. R.V. Churchill and J.L. Brown, Complex Variables and Applications, McGraw Hill, 1990.
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publisher, 2005.
5. J.H. Mathews and R.W. Howell, Complex analysis for Mathematics and Engineering, 3rd Ed. Narosa, 1998.

Course Outcomes: Upon successful completion of this course, students will be able to:

1. Solve the Fourier Transform of function.
2. Compute poles & zeros.
3. Evaluate the real & complex integrals with the help of Cauchy's Residue Theorem.
4. Utilize curve fitting techniques for data representations and computation in engineering analysis.
5. Use Binomial, Poisson & Normal Distribution to solve statistical problems.

BEC 301 Digital Electronics

L-T-P-C
3-0-0-3

Unit-1 (7 Hrs)

Digital Fundamentals: Number Systems – Decimal, Binary, Octal, Hexadecimal, 1's and 2's complements, Codes – Binary, BCD, Excess 3, Gray, Alphanumeric codes, Boolean theorems, Logic gates, Universal gates, Sum of products and product of sums, Minterms and Maxterms, Karnaugh map minimization and Quine-Mc Cluskey method of minimization.

Unit-2 (7 Hrs)
Combinational Logic Design: Design Examples: Arithmetic Circuits, BCD to 7 segment decoder, Code converters. Adders and their use as subtractor, look ahead carry, Digital Comparator, Parity generators, Multiplexers and their use in combinational logic designs, multiplexer, De-multiplexers and their use in combinational logic designs, Decoders, Demultiplexer.

Unit-3 (8 Hrs)

Sequential Logic Design: 1 Bit Memory Cell, Clocked SR, JK, MS J-K flip flop, D and T flip-flops. Use of preset and clear terminals, Excitation Table for flip flops. Conversion of flip flops. Application of flip flops: Registers, Shift registers, Counters, Sequence Generators, ripple counters, up/down counters, synchronous counters. Basic design steps-State diagram, State table, State reduction, State assignment, Mealy and Moore machines representation, Implementation, Finite state machine implementation.

Unit-4 (6 Hrs)

Digital Logic Families: Classification of logic families, Characteristics of digital ICs-Speed of operation, power dissipation, Figure of merit, Fan in, Fan out, Current and voltage parameters, Noise immunity, Operating temperatures and Power supply requirements, TTL logic. Operation of TTL NAND gate, Active pull up, Wired AND, Open collector output. Tri-State logic. CMOS logic –CMOS inverter, NAND, NOR gates, Wired logic, Open drain output. Interfacing CMOS and TTL. Comparison table of Characteristics of TTL, CMOS, ECL, RTL, I2L, DCTL.

Unit-5 (8 Hrs)

Programmable Logic Devices and Semiconductor Memories: Programmable logic devices: Detail architecture, Study of PROM, PAL, PLA, Designing combinational circuits using PLDs. General Architecture of FPGA and CPLD Semiconductor memories: memory organization and operation, expanding memory size, Classification and characteristics of memories, RAM, ROM, EPROM, EEPROM, NVRAM, SRAM, DRAM.

Text/ Reference Books:

1. R.P. Jain, Modern Digital Electronics, 3rd edition, 12th reprint, Tata McGraw Hill Publication, 2007.
2. M. Morris Mano, Digital Logic and Computer Design, 4th edition, Prentice Hall of India, 2013.
3. Anand Kumar, Fundamentals of digital circuits, 1st edition, Prentice Hall of India, 2001.
4. Tokheim, H. Roger L., Digital Electronics Principles & Application, 8th edition Tata McGraw-Hill, 2013.
5. NPTEL video lectures on Digital Circuits.

Course Outcomes: At the end of the course, students will demonstrate the ability to:

1. Understand binary codes, binary arithmetic, minimization techniques and their relevance to digital logic design.
2. Design & analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder and sequential logic circuits.
3. Understand finite state machines and develop a digital logic to find out sustainable solution of a real life problem.
4. Understand and implement various digital integrated circuits using different logic families and simple systems composed of PLDs.

BEC 351 Digital Electronics Lab

List of experiments:

1. To study about logic gate and verify their Truth table.
2. To design and implement half adder and full adder.
3. To design and implement half subtractor and full subtractor
4. To design and implement 8:1 MUX.
5. To design and implement 1:8 DEMUX.
6. To design and implement Encoder.
7. To design and implement Decoder.
8. To design and implement R-S flip flop and J K flip flop
9. To design and implement D& T flip flop
10. To design and implement Master -Slave flip flop
11. To design and implement SISO AND SIPO.
12. To design and implement PISO and PIPO.
13. To design and implement DECADE counter

Text/Reference Books:

1. R.P. Jain, Modern digital Electronics, Tata McGraw Hill, 4th edition, 2009
2. A. Anand Kumar, Switching Theory & Logic Design, PHI.
3. W.H. Gothmann, Digital Electronics- An introduction to theory and practice, PHI, 2nd edition, 2006.

Course Outcomes: At the end of the course, students will demonstrate the ability to:

1. Implement the basic digital theory concepts practically and will be able to verify various results derived in theory.
2. Design, analyze and troubleshoot broad range of combinational and sequential circuits for various practical problems using basic gates and flip flops I.C's.
3. Develop technical writing skills to communication effectively and present one's own work.
4. Acquire teamwork skills for finding sustainable solution of a complex problem and working effectively in groups.

BEC 302 Electronic Devices & Circuits

L-T-P-C

3-0-0-3

Unit-1 (7 Hrs)

Semiconductor Physics- Mobility and conductivity, Charge densities in a semiconductor, Fermi Dirac distribution, Carrier concentrations and Fermi levels in semiconductor, Generation and recombination of charges, Diffusion and continuity equation, Mass action Law, Hall effect.

Unit-2 (8 Hrs)

Junction Diodes- Formation of homogenous and heterojunction diodes V-I characteristics, Small signal models of diode, Diode as a circuit element, Diode parameters and load line concept, Applications of diodes in rectifier, Clipping, Clamping circuits and voltage multipliers, Breakdown diodes, and Zener diode as voltage regulator

Special Semiconductor Devices: Optoelectronic Devices, Photoconductors, Photo Diode, Photo Transistor, Photo Voltaic Sensor, Photo Emission, Solar Cells, LED, LCD, Laser Diode, Schottky Diode

Unit-3 **(7 Hrs)**

Small Signal Circuit: Two Port Network, Hybrid (H-Parameter)Model, Typical Values of H-Parameter Model, Conversion of CE, CB, CC Configuration to Equivalent Hybrid Model, CB Circuit Analysis, CE circuit with & without R_E analysis, CC circuit analysis, Analysis of CE, CB & CC Configuration with approximate Hybrid Model.

Unit-4 (8 Hrs)

FET: Introduction, The Junction FET, Basic Construction, Operation, P- Channel FET, N-Channel FET, High Frequency Model of FET, Low Frequency FET Amplifiers, Transfer Characteristics of FET, MOSFET, Enhancement Mode, Depletion Mode of FET, Circuit Symbol of MOSFET,V-MOSFET.

Unit-5 (9 Hrs)

Feedback Amplifiers and Oscillators: Principles of feedback in amplifiers advantages of negative feedback. Classification of feedback, voltage series, and voltage shunt, current series. Current – shunt effect of feedback on input and output impedance. Gain, stability, noise, distortion and band width Barkhausen criterion for sinusoidal oscillators. Phase shift oscillator. Wein-bridge oscillator, Hartley oscillator, Colpitts oscillator, crystal oscillator, frequency stability.

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Text/Reference Books:

1. Millman Halkias, Integrated Electronics, T.M.H
2. R.L. Boylestad, Louis Nashelsky, Electronic Devices & Circuits Theory, Pearson education
3. David Bell, Electronic Devices & Circuits, Oxford Publications
4. M. Rashid, Microelectronic Circuits : Analysis & Design, Cengage learning
5. Millman, Electronics Devices and Circuits, TMH
6. Electronic Devices,7edition, Floyd, Pearson 2008
7. A.S. Sedra and K.C. Smith, Microelectronic Circuits, Saunder's College Publishing
8. Shail Jain & D.R. Choudhary, Linear Integrated Circuit, PHI.

Course Outcomes: At the end of the course, students will be able to:

1. Understand the working of switching devices and apply the same in designing complex circuits with fewer devices.
2. Design amplifier and other complex circuits with the help of special semiconductor devices which will further increase real time applications and reduce runaway situations.
3. Apply the mathematical modeling for the electronic devices and circuits in turn helps in improvement in design in terms of size, power requirement and ease of use.
4. Use variety of electronic devices for designing society friendly electronic gadgets used for security and other useful purposes.

BEC 352 Electronic Devices & Circuits Lab

List of experiments:

1. Study of Lab Equipments and Components: CRO, Multimeter, and Function Generator, Power supply- Active, Passive Components and Bread Board.
2. P-N Junction diode: Characteristics of PN Junction diode - Static and dynamic resistance measurement from graph.
3. Applications of PN Junction diode: Half & Full wave rectifier- Measurement of Vrms, Vdc, and ripple factor.
4. Characteristics of Zener diode: V-I characteristics of zener diode, Graphical measurement of forward and reverse resistance.
5. Application of Zener diode: Zener diode as voltage regulator. Measurement of percentage regulation by varying load resistor.
6. Characteristic of BJT: BJT in CE configuration- Graphical measurement of h-parameters from input and output characteristics. Measurement of Av, AI, Ro and Ri of CE amplifier with potential divider biasing.
7. Field Effect Transistors: Single stage Common source FET amplifier–plot of gain in dB Vs frequency, Measurement of, bandwidth, input impedance, maximum signal handling capacity (MSHC) of an amplifier.
8. Oscillators: Sinusoidal Oscillators a. Wein's bridge oscillator b. phase shift oscillator.
9. Simulation of Amplifier circuits studied in the lab using any available simulation software.

Course Outcomes: At the end of the course, students will be able to:

1. Understand the characteristics of diodes, transistors, JFETs..
2. Understand the operation and characteristics of different configurations of BJT.
3. Design complex electronic circuits with fewer devices.
4. Able to understand the concept and applications of feedback mechanism in electronic circuits.

Text/Reference Books:

1. Millman Halkias, Integrated Electronics, T.M.H
2. R.L. Boylestad, Louis Nashelsky, Electronic Devices & Crcuits Theory, Pearson education
3. David Bell, Electronic Devices & Circuits, Oxford Publications
4. M. Rashid, Microelectronic Circuits : Analysis & Design, Cengage learning
5. Millman, Electronics Devices and Circuits, TMH
6. Electronic Devices,7 edition, Floyd, Pearson 2008
7. A.S. Sedra and K.C. Smith, Microelectronic Circuits, Saunder's College Publishing
8. Shail Jain & D.R. Choudhary, Linear Integrated Circuit, PHI.

BEE 301 Network Analysis & Synthesis

L-T-P-C

3-1-0-4

Unit-1 (9 Hrs)

Unit – I: Graph Theory- Graph of a network, Definitions, Tree, Co tree, Link, basic loop and basic cut set, Incidence matrix, Cut set matrix, Tie set matrix, Node and Mesh Analysis with dependent current and voltage sources. Mutual coupled circuits, Dot Convention in coupled circuits.

Unit-2 (7 Hrs)

Network Theorems (Applications to AC Networks)- Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Reciprocity theorem. Millman's theorem, Compensation theorem.Concept of duality and dual networks.

Unit-3 (9 Hrs)

Network Transient and steady state analysis-Solution of first and second order differential equations for Series and parallel R-L, R-C, R-L-C circuits, initial and final conditions in network elements, forced and free response, time constants, steady state and transient state response, Evaluation of time response both through classical and Laplace methods.

Unit -4 (10 Hrs)

Network Functions- Concept of complex frequency, Transform impedances network functions of one port and two port networks, Concept of poles and zeros, Properties of driving point and transfer functions.

Two Port Networks- Characterization of LTI two port networks; Z, Y, ABCD, A'B'C'D', g and h parameters, Reciprocity and symmetry, Inter-relationships between the parameters, Interconnections of two port networks, Ladder and Lattice networks: T & Π representation.

Unit-5 (8 Hrs)

Network Synthesis- Positive real function; definition and properties, Properties of LC, RC and RL driving point functions, Synthesis of LC, RC and RL driving point immitance functions using Foster and Cauer first and second forms.

Text/Reference Books:

1. M. E. Van Valkenburg, Network Analysis, Prentice Hall of India
2. Alexander, Sadiku, Fundamentals of Electric Circuits, McGraw Hill
3. D. Roy Choudhary, Networks and Systems, Wiley Eastern Ltd.
4. C. L. Wadhwa, Network Analysis and Synthesis, New Age International Publishers
5. A. Chakrabarti, Circuit Theory, Dhanpat Rai & Co.
6. Hayt, Kimmerly, Durbin, Engineering Circuit Analysis, McGraw Hill
7. Donald E. Scott, An Introduction to Circuit analysis: A System Approach, McGraw Hill
8. M. E. Van Valkenburg, An Introduction to Modern Network Synthesis, Wiley Eastern Ltd.
9. T. S. K. V. Iyer, Circuit Theory, Tata McGraw Hill.
10. Joseph A. Edminister, Theory& Problems of Electric Circuits, McGraw Hill.
11. U.A Bakshi, V.A Bakshi, Network Theory , Technical Publications
12. C.K Alexander and Sadiku, Fundamentals of Electric Circuit, Indian Edition.
13. A.V. Oppenheim, A.S. Willsky, with S. Nawaab, Signals & Systems, Prentice Hall India

Course Outcomes: At the end of this course students will demonstrate the ability to

1. Understand basics electrical circuits with nodal and mesh analysis.
2. Appreciate electrical network theorems.
3. Apply Laplace Transform for steady state and transient analysis.
4. Determine different network functions.

BCS 301 Data structure

L-T-P-C

3-0-0-3

Unit-1 (8 Hrs)

Introduction: Basic concepts and notations, Mathematical background, Revision of arrays and pointers, Recursion and implementation of Recursion, Time and Space Complexity, Asymptotic notations: Big Oh, Big Theta and Big Omega, Time-Space trade-off.

Searching: linear search and binary search techniques.

Unit 2 (7 Hrs)

Stacks and Queues: Sequential representation of stacks and queues, Primitive Stack operations: Push & Pop, Application of stack: Prefix and Postfix Expressions, Evaluation of postfix expression, conversion of infix to postfix.

Lists: List representation techniques, Dynamics Storage allocation, Representation of stacks and queues using linked list, Operations on a Linked List: Insertion, Deletion, Traversal, Introduction to Doubly linked list, introduction to circularly linked list.

Unit 3 (8 Hrs)

Sorting Algorithms and hashing: Insertion sort, Bubble sort, Quick sort, Merge sort, Heap sort, Shell sort, Time and Space complexity of sorting algorithms, hashing.

Unit 4 (7 Hrs)

Trees: Definition and basic concepts, Linked tree **r**epresentations, Binary tree traversal algorithms,(Preorder, Inorder, Postorder), Binary search tree, Insertion and Deletion in Binary search tree, Multiway search trees, B trees, B+ tree and their applications.

Unit 5 (6 Hrs)

Graphs: Introduction to Graphs, Data Structure for Graph Representations: Adjacency Matrices, Adjacency List, Graph Traversal: Depth First Search and Breadth First Search, Shortest Path algorithm: Warshal Algorithm and Dijikstra Algorithm.

Text Books and References:

1. Y. Langsam, M.J. Augenstein and A.M. Tenenbaum, Data Structure Using C and C++. Second Edition, Prentice Hall of India, 1997.
2. Seymour Lipschutz, Data Structures, Schaum's Outlines, Tata McGraw Hill , New Delhi, 2006
3. Lafore – Data structure & Algorithms in java, BPB Publication.
4. Sartaj Sahni – Data structure, Algorithms & application in C++ , McGraw Hill.

Course Outcomes: At the end of this course students will demonstrate the ability to

1. To review the concepts of fundamental data structures to be used in programming. To understand various searching algorithms.
2. To understand the various operations on different types of data structures such as stacks, queues and linked lists. To apply and analyze various data structures on different applications.
3. To understand, analyze and compare various sorting algorithms. To understand the concept of hashing and its techniques.
4. To understand the various types of tree structures and their implementation. To evaluate various tree structures. To be able to apply tree structures on various problems.
5. To understand and implement various types of graphs**.** To study and implement various shortest path algorithms on graphs.

BCS 352 Data Structures Lab

Course Detail: Write Program in C / C++ for following:

List of experiments:

1. To implement stack using array.
2. To implement queue using array.
3. To implement circular queue using array.
4. To implement various operations on linked list:(a)insert (b)delete (c) display
5. To implement stack using linked list.
6. To implement queue using linked list.
7. To implement linear search.
8. To implement binary search.
9. To implement bubble sort.
10. To implement insertion sort.
11. To implement merge sort.
12. To implement quick sort.
13. Program to find the factorial of a number using recursion.
14. To implement Heap sort.
15. Implementation of graph menu driven program.

Course Outcomes: At the end of the course, students will be able to:

1. Analyze the algorithms to determine the time and computation complexity and justify the correctness.
2. Implement search problem (Linear Search and Binary Search) .
3. For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.
4. Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity and will able to implement Graph search and traversal algorithms and determine the time and computation complexity.

MC 302/MC 402 Human Values & Professional Ethics

L-T-P-C

2-0-0-0

Unit-1 (7 Hrs)

Course Introduction: Need, Basic Guidelines, Content and Process for Value Education Understanding the need, basic guidelines, content and process for Value Education, Self-Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self-exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations, Right understanding, Relationship and Physical Facilities- the basic requirements for fulfilment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfill the above human aspirations.

Unit-2 (7 Hrs)

Understanding Harmony in the Human Being - Harmony in Myself Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha, Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya.

Unit-3 (7 Hrs)

Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship Understanding harmony in the Family- the basic unit of human interaction, Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti (Mutual Happiness); Trust (Vishwas) and Respect (Samman) as the foundational values of relationship, Understanding the meaning of Vishwas; Difference between intention and competence, Understanding the meaning of Samman, Difference between respect and disrespect; the other salient values in relationship, Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals, Visualizing a universal harmonious order in society.

Unit-4 (7 Hrs)

Understanding Harmony in the Nature and Existence - Whole existence as Co-existence Understanding the harmony in the Nature, Interconnectivity and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature, Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence.

Unit-5 (7 Hrs)

Implications of the Holistic Understanding of Harmony on Professional Ethics Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in Professional Ethics: a) Ability to utilize the professional competence for augmenting universal human order, b) Ability to identify the scope and characteristics of people-friendly and eco friendly production systems, technologies and management models. Improving quality of work life at work place.

Text/References Books:

1. R R Gaur, R Sangal, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, 2009.
2. A Nagraj, Jeevan Vidya EkParichay, Divya Path Sansthan, Amarkantak,1998.
3. R. Subramanian, Professional Ethics, 2017.
4. P L Dhar, RR Gaur, Science and Humanism, Commonwealth Publishers, 1990.
5. A N Tripathy, Human Values, New Age International Publishers, 2003..
6. Subhas Palekar, How to practice Natural Farming, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati, 2000.
7. E G Seebauer & Robert L. Berry, Fundamentals of Ethics for Scientists &Engineers , Oxford University Press, 2000.
8. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
9. B P Banerjee, Foundations of Ethics and Management, Excel Books, 2005.
10. B L Bajpai, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

Course Outcome: On completion of this course, the students will be able to:

1. Understand the significance of value inputs in a classroom, distinguish between values and skills, understand the need, basic guidelines, content and process of value education, explore the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society
2. Distinguish between the Self and the Body, understand the meaning of Harmony in the Self the Co-existence of Self and Body.
3. Understand the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a harmonious society.
4. Distinguish between ethical and unethical practices, and start working over the strategy to actualize a harmonious environment wherever they work.

BHSM 401 Industrial Management

L-T-P-C

3-0-0-3

Unit-1 (8 Hrs)

Introduction: Concept and scope of Industrial Management. Productivity: Definition, measurement, productivity index, types of production system, Industrial Ownership.

Unit-2 (7 Hrs)

Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management, Social responsibilities of Management, Introduction to Human resources management: Nature of HRM, functions and importance of HRM.

Unit-3 (7 Hrs)

Work Study: Introduction, definition, objectives, steps in work study, Method study: definition, objectives, steps of method study, Work Measurement: purpose, types of study — stop watch methods — steps — allowances — standard time calculations — work sampling, Production Planning and Control Inventory Control: Inventory, Cost, Models of inventory control: EOQ, ABC, VED

Unit-4 (7 Hrs)

Quality Control: statistical quality control, Control charts for variables and attributes, Acceptance Sampling- Single sampling- Double sampling plans, Introduction to TQM.

Unit-5 (5 Hrs)

Project Management: Project network analysis, CPM, PERT and Project crashing and resource leveling.

References:

1. Engineering Management (Industrial Engineering & Management)/ S.C. Sharma & T.R Banga, Khanna Book Publishing Co. (P) Ltd., Delhi (ISBN: 978-93-86173-072)
2. Industrial Engineering and Management/ P. Khanna, Dhanpatrai publications Ltd.
3. Production & Operation Management /PaneerSelvam /PHI.
4. Industrial Engineering Management/NVS Raju/Cengage Learning.
5. Industrial Engineering Management I RaviShankar/ Galgotia.

BEC-401 Electromagnetic Theory

L-T-P-C

3-1-0-4

Unit-1 (10 Hrs)

Electrostatics and Magnetostatics: Review of vector calculus, Coulomb's law, Electric displacement and Displacement density, Lines of Force and Lines of Flux. Gauss's law, The potential function, Field of infinitesimal electric dipole, Field due to continuous distribution of charges, equipotential surfaces, Divergence Theorem, Poisson's Equation and Laplace's equation, Solution by means of Electrical images, Capacitance, Capacitance of parallel plate and coaxial cables, Energy in Electrostatic fields, Boundary conditions.

Unit-2 (8 Hrs)

Steady Magnetic Field: Magnetic field strength H, Magnetic flux density B, MMF, Ampere's circuital law, Ampere's law in differential vector form, Permeability, Energy stored in a Magnetic field, Ampere's law for a current element (Biot-Savart Law), Magnetic vector potential, Boundary conditions, Analogies between Electric and Magnetic fields.

Unit-3 (8 Hrs)

Time varying fields and Maxwell's equation: The Equation of continuity for Time-Varying Fields, Maxwell's Equations, Representation in Differential form, Integral form, Boundary conditions, Faraday's law of electromagnetic induction, Transformer and motional emf, Time harmonic field, Electromagnetic potential, Relation between circuit theory and field theory.

Unit-4 (8 Hrs)

Uniform plane wave: Wave equation: solution for Dielectric and Conducting media, free space propagation, Surface impedance, Depth of penetration (skin depth), phase velocity, and group Velocity, Polarization of uniform plane waves, Reflection by a Perfect conductor and perfect dielectric (normal and oblique incidence), Brewster Angle.

Poynting Vector and Flow of Power: Poynting theorem, Instantaneous average and Complex Poynting Vector.

Unit-5 (8 Hrs)

Transmission line and guided waves: Distributed parameters Model of Transmission Line, open wire and coaxial cable, Transmission line theory: line equation, lossless line, Voltage standing wave ratio (VSWR), Transmission line as circuit element, Quarter wave transformer, Impedance matching, single stub, Wave between parallel planes, TE waves, TM waves, characteristics of TE and TM waves, TEM waves and its properties.

Text/Reference Books:

1. Sadiku , Matthew N.O., Elements of Electromagnetics, Oxford University Press, 3rd Ed.
2. K. D. Prasad, Electromagnetic, Antenna, and wave Propagation,
3. Jorden &Balmein, Electromagnetic- Wave and radiating system, Tata McGraw-Hill.
4. Harington, R. F., Time Harmonic EM Fields, Tata McGraw Hill.
5. Collin, R. E, Antennas and Radio Wave Propagation, Tata McGraw Hill.
6. Pramanik, Ashutosh, Electromagnetism, Theory & Applications, Prentice Hall (India)
7. Schaum's Outlines, Electromagnetics, Tata McGraw Hill.
8. Kraus, Fleisch, Electromagnetics with Applications, 5th Ed., Tata McGraw-Hill,
9. Hayt, Engineering Electromagnetic, (sixth edition)
10. J.F.D. Kraus, Electromagnetic-Antenna

Course Outcomes: At the end of this course, student will have the ability to:

1. Understand the concepts of electromagnetic and magneto-statics
2. Understand and apply the time varying fields and Maxwell's equation to enhance various devices performance, hence upgrading its impact on society,
3. Analyse Uniform plane wave, Poynting vector and Flow of power to deign more efficient devices for improving communication capabilities in turn reduce impact of radiations.
4. Understand the basic concepts of transmission line and guided waves and apply them in designing better transmission line in terms of low power losses.

BEC 402 Microprocessors and its Applications

L-T-P-C

3-0-0-3

Unit-1 (8 Hrs)

Introduction to Microprocessor: Evolution of Microprocessors, Register structure, ALU, Bus Organization, Timing and Control.
8-bit microprocessor: 8085 Microprocessor and its Architecture, Addressing Modes, The 8085 Programming Model, Instruction Classification, Instruction Format, Overview of Instruction set- Data Transfer Operation, Arithmetic Operation, Logic Operation and Branch Operation; Introduction to Assembly language program., Assembler Directives, Parameter passing and recursive procedures.

Unit-2 (8 Hrs)

Programming Technique With Additional Instruction: Looping, Counting, Indexing, Additional data Transfer and 16 bit Arithmetic instruction, Counters and time delays, Stack and Subroutine.
16 bit Microprocessor: Architecture of 8086- Register Organization, Execution unit, Bus Interface Unit, Signal Description, Physical Memory Organization, Mode of Operation, I/O Addressing Capabilities. Features of Numeric processor 8087,Floating point representation, range resolution, normalization, representation of zero, unused codes, parity bit and error detection.

Unit-3 (7 Hrs)

Basic of Interfacing: Programmed I/O, Interrupt driven I/O, DMA(8257), Parallel I/O (8255-PPI), Serial I/O(8251/8250, RS-232 standard)8259Programmable Interrupt Controller, 8237-DMA Controller, 8253/8254 Programmable Timer/Counter,(8279) Keyboard and display interface, ADC and DAC interfacing

Unit-4 (8 Hrs)

Memory and I/O Interfacing:
Types of memory, RAM and ROM , Concepts of virtual memory, Cache memory. Advanced coprocessor Architecture-286,486, Pentium
Application: LED, LCD and Keyboard interfacing. Stepper motor interfacing, DC Motor interfacing, Sensor Interfacing.

Unit-5 (6 Hrs)

An Introduction to Microcontroller 8051: The 8051 Architecture, Instruction set, Basic Assembly language programming concept.
Introduction to Risc Processor: ARM microcontrollers Interface design.

Text/ Reference Books:

1. Douglas V.Hall, 8086 Microprocessors Architecture
2. R.S. Gaonker, Microprocessor Architecture: Programming and Applications with the 8085/8080A/ Penram Interational Publishing, 1996.
3. Kenneth J.Ayala, The 8051 Microcontroller, Penram International Publishing.
4. M.A. Mazidi, J.G. Mazidi and R.D. Mckinlay, The 8051 Microcontroller and Embedded Systems: Using Assembly and C, Pearson Education, 2007.
5. Liu Gibson, Microprocessor
6. Ray, A.K. & Burchandi, K.M., Advanced Microprocessors and Peripherals: Architecture, Programming and Interfacing, Tata McGraw Hill.
7. Brey, Barry B., INTEL microprocessors, 4th Ed, Prentice Hall (India).

Course Outcomes: At the end of this course, the students will:

1. Understand the architecture & Instruction set of 8085 microprocessor and will be able to do assembly language programming
2. Understand the architecture & Instruction set of X86 family microprocessors and will be able to do assembly language programming
3. Understand the features of advance Microprocessors
4. Be able to do interfacing design of peripherals.

BEC 452 Microprocessor and its Applications

List of Experiments: Introduction to 8085 Microprocessor

1. Signed and Unsigned binary addition.
2. Signed Multiplication.
3. Signed and Unsigned binary division
4. BCD addition and subtraction.
5. Ascending and Descending.
6. BCD and binary conversion
7. Binary to BCD conversion
8. Programs for 16 bit arithmetic operations for 8086
9. Program for sorting an array for 8086
10. Program for searching for a number or character in a string for 8086
11. Interfacing with seven segment display
12. Interfacing with 8255 in I/O mode and BSR mode
13. Interfacing with 8253
14. Interfacing with ADC/DAC
15. Look up table method for finding the ASCII of an alpha numeric code.
16. Programming using arithmetic, logical and bit manipulation instructions of 8051
17. Program and verify Timer/Counter in 8051.
18. Program and verify interrupt handling in 8051.
19. UART operation in 8051.
20. Interfacing LCD to 8051.
21. Interfacing matrix or keyboard to 8051

Course Outcomes: At the end of the course, students will demonstrate the ability to:

1. Do basic assembly language programming of 8085.
2. Do advance assembly language programming of 8086.
3. Do basic assembly language programming of 8085 for interfacing of peripherals.
4. Do advance assembly language programming of 8086 for interfacing of peripherals.

BEC 403 Signals and Systems

L-T-P-C

3-1-0-4

Unit-1 (10 Hrs)

Introduction and Classification of signals: Definition of signal and systems, communication and control systems as examples,Continuous time and discrete time signal, Classification of signals as even, odd, periodic and non-periodic, deterministic and non-deterministic, energy and power.
Elementary signals : reasons for using standard test signals, exponential, sine, impulse, step and its properties, ramp, rectangular, triangular, signum, sinc.
Operations on signals: Amplitude scaling, addition, multiplication, differentiation, integration (Accumulator for DT), time scaling, time shifting and time folding.
Systems: Definition, Classification: linear and non-linear, time variant and invariant, causal and non- causal, static and dynamic, stable and unstable, invertible.

Unit-2 (8 Hrs)

Time domain representation of LTI System: System modeling: Input-output relation, definition of impulse response, convolution sum, convolution integral, computation of convolution integral using graphical method for unit step to unit step, unit step to exponential, exponential to exponential, unit step to rectangular and rectangular to rectangular only. Computation of convolution sum. Properties of convolution. System interconnection, system properties in terms of impulse response, step response in terms of impulse response.

Unit-3 (7 Hrs)

Fourier Series: Fourier series (FS) representation of periodic Continuous Time (CT) signals, Dirichlet condition for existence of Fourier series, orthogonality, Amplitude and phase response, FS representation of CT signals using trigonometric and exponential Fourier series. Applications of Fourier series, properties of Fourier series and their physical significance, Gibbs phenomenon, Discrete Time Fourier Series, properties, convergence of DTFS.

Unit-4 (8 Hrs)

Fourier Transform: Fourier Transform (FT) representation of aperiodic CT signals, Dirichlet condition for existence of Fourier transform, evaluation of magnitude and phase response, FT of standard CT signals, FT of standard periodic CT signals, Properties and their significance, Interplay between time and frequency domain using sinc and rectangular signals, introduction to Discrete Time Fourier Transform and sampling Theorem.

Unit-5 (8 Hrs)

Laplace Transform: Definition of Laplace Transform (LT), Limitations of Fourier transform and need of Laplace transform, ROC, Laplace transform of standard periodic and aperiodic functions, properties of Laplace transform and their significance, Laplace transform evaluation using properties, Inverse Laplace transform based on partial fraction expansion, stability considerations in S domain, Application of Laplace transforms to the LTI system analysis and difference equation with zero initial condition.
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Introduction to Z transform: Region of convergence, properties of the Z transform, Inverse transform using counter, integration, complex convolution theorem, Parseval's relation. Unilateral Z transform and its application to difference equation with zero initial condition.
Introduction to Correlation: Autocorrelation, Cross correlation, and their properties.

Text/Reference Books:

1. Simon Haykins and Barry Van Veen, Signals and Systems, 2nd Edition, Wiley India.
2. Charles Phillips, Signals, Systems and Transforms, 3rd Edition, Pearson Education.
3. A.V. Oppenphim, A.S.Willsky and S.H.Nawab; Signals and Systems, Prentice Hall.
4. B.P. Lathi, Signal and Sytem, Oxford university press , New Delhi.
5. M.J. Roberts, Signal and Systems, Tata McGraw Hill, 2007.
6. Shaila Apte, "Signals and Systems-principles and applications", Cambridge University press, 2016.
7. Mrinal Mandal and Amir Asif, Continuous and Discrete Time Signals and Systems, Cambridge University Press, 2007.
8. Peyton Peebles, Probability, Random Variable, Random Processes, 4th Edition, Tata McGraw Hill.
9. Nagoor Kanni, Signals and Systems, 2nd edition, McGraw Hill.
10. NPTEL video lectures on Signals and Systems

Course Outcomes: At the end of this course students will demonstrate the ability to:

1. Understand and classify different types of signals and systems as per their properties.
2. Represent continuous and discrete time signals and systems in time and frequency domain using different transforms.
3. Understanding frequency concepts for analog and digital signals.
4. Get familiarized with the characteristics and applications of Linear Time Invariant Systems for practical applications.
5. Analyze LTI systems using Laplace/Z-Transform. Use of LTI systems for various applications.

BCS 404 JAVA

L-T-P-C

3-0-0-3

Unit-1 (7 Hrs)

Introduction to Java: Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays in java.

Unit-2 (6 Hrs)

Objects and Classes: Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, StringBuffer, File, this reference.

Unit-3 (8 Hrs)

Inheritance and Polymorphism: Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, UTIL package.

Unit-4 (8 Hrs)

Event and GUI programming: Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing.

Unit-5 (6 Hrs)

Multithreading in Java and I/O programming: Text and Binary I/O, Binary I/O classes, Object I/O, Random Access Files. Thread life cycle and methods, Runnable interface, Thread synchronization, Exception handling with try-catch-finally, Collections in java, Introduction to JavaBeans and Network Programming.

Text/Reference Books:

1. Introduction to Java Programming (Comprehensive Version), Daniel Liang, Seventh Edition, Pearson.
2. Programming in Java, Sachin Malhotra & Saurabh Chaudhary, Oxford University Press.
3. Murach's Beginning Java 2, Doug Lowe, Joel Murach and Andrea Steelman, SPD.
4. Core Java Volume-I Fundamentals, Eight Edition, Horstmann& Cornell, Pearson Education.
5. The Complete Reference, Java 2 (Fourth Edition), Herbert Schild, TMH.
6. Java Programming, D. S. Malik, Cengage Learning.

Course Outcomes: After completing this course the student must demonstrate the knowledge and ability to:

1. Able to understand the use of OOPs concepts.
2. Able to understand the use of abstraction, object, class.
3. Able to understand the concept of Inheritance and Polymorphism as well as packages and Interfaces
4. Able to design GUI based applications and develop applets for web applications.
5. Able to develop and understand exception handling, multithreaded applications with synchronization, use of collection and framework

BCS 454 JAVA Lab

List of experiments:

1. Program to define a structure of a basic JAVA program.
2. Program to define the data types, variable, operators, arrays and control structures.
3. Program to define class and constructors. Demonstrate constructors.
4. Program to define class, methods and objects. Demonstrate method overloading.
5. Program to define inheritance and show method overriding.
6. Program to demonstrate Packages.
7. Program to demonstrate Exception Handling.
8. Program to demonstrate Multithreading.
9. Program to demonstrate I/O operations.
10. Program to demonstrate Network Programming.
11. Program to demonstrate Applet structure and event handling.
12. Program to demonstrate Layout managers.

Course outcomes: The student is expected to have hands on experience with the following:

1. Basics of Java programming, multi-threaded programs and Exception handling
2. The skills to apply OOP in Java programming in problem solving
3. Use of GUI components (Console and GUI based)

MC 301/ MC 401 Environment and Ecology

L-T-P-C

2-0-0-0

Unit-1 (7 Hrs)

Nature of Environment Introduction to Environmental Science - Definition and scope and need for public awareness Ecosystems Concept, structure and functions, restoration of damaged ecosystems Biodiversity – Definition, description at national and global level, threats and conservation Natural Resources - Renewable and non-renewable and their equitable use for sustainability, Material cycles – carbon, nitrogen and sulphur cycle. Conventional and Non-conventional Energy Sources – fossil fuel-based, hydroelectric, wind, -nuclear and solar energy, biomass, biodiesel, hydrogen as an alternative fuel

Unit-2 (7 Hrs)

Impact of Human Activity on Environment Human Population and Environment – Population growth, population explosion and migration; Impact of farming, housing, mining, transportation and industrial growth Social Issues Related to Environment– Sustainable development, urban problems (related to water and energy conservation and waste management), resettlement and rehabilitation Environmental ethics.

Unit-3 (7 Hrs)

Environmental Changes and Human Health Environmental Pollution–Definition, causes and effects, control measures for water, air, soil, marine, land, noise, thermal pollution, Climate change– Greenhouse effect and global warming, acid rain, ozone layer formation and depletion Impact on human health – water and air borne diseases, diseases induced by residual impurities in drinking water (fluoride and arsenic); Toxic wastes and carcinogens; Nuclear hazards.

Unit-4 (7 Hrs)

Environmental Protection through Assessment and Education Indicators and Impact Assessment – Bio-indicators, Natural disasters and disaster management, Impact assessment through inventorying and monitoring Environmental Protection– Role of individuals, organizations and government in pollution control Laws, Conventions and Treaties–National legislation, issues in the enforcement of environmental legislation, initiatives by non- governmental organizations, global efforts in environmental protection Environmental education–women and value education Recommended

Text/Reference Books

1. Environmental Studies, J Krishnawamy , R J Ranjit Daniels, Wiley India.
2. Environmental Science, Bernard J. Nebel, Richard T. Right, 9780132854467, Prentice Hall Professional, 1993.
3. Environment and Ecology, R K Khandal, 978-81-265-4277-2, Wiley India.
4. Environmental Science, 8th Ed ISV, Botkin and Keller, 9788126534142, Wiley India.
5. Environmental Studies, R Rajagopalan, 978-0195673937, Oxford University Press
6. Textbook of Environmental Science and Technology, M.Anjireddy, BS Publications
7. Environmental Studies, Soli. J Arceivala, Shyam, R Asolekar, 9781259006050, McGrawHill India, 2012.
8. Environmental Studies, D.L. Manjunath, 9788131709122 Pearson Education India, 2007
9. Textbook of Environment Ecology, Singh, Acme Learning
10. Perspective in Environmental Studies, Kaushik, New Age International
11. Environmental Studies, B. Joseph, 2nd Ed, 978-0070648134, Tata McGraw Hill

BEC451 PCB DESIGN LAB

List of Experiments:

1. Study of CRO, DMM & Function Generator.
2. Study of various types of Active & Passive Components based on their ratings.
3. Winding shop: Step down transformer winding of less than 5VA.
4. Soldering shop: Fabrication of DC regulated power supply
5. Identification of various types of Printed Circuit Boards (PCB) and soldering Techniques.
6. Introduction to PCB Design software
7. PCB Lab: a.) Artwork & printing of a simple PCB. b.) Etching & drilling of PCB.
8. Wiring & fitting shop: Fitting of power supply along with a meter in cabinet.

Course Outcomes: At the end of the course, students will be able to:

1. Understand the basic concepts and principles to measure the different electrical signals.
2. Understand the operation and characteristics of different electrical instruments used around them
3. Understand and design the printed circuit boards.
4. Able to do the wiring with the meter in the main line efficiently