

Faculty of Engineering & Technology
P.K.University
Shivpuri (MP)



Evaluation Scheme & Syllabus for
Department of Electronics & Communication Engineering
B.Tech. First Year
(I & II Sem)
(Effective from session 2019-20)

EVALUATION SCHEME

SEMESTER I

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
BTEC-101	Engineering Mathematics-I	30	70	NA	NA	NA
BTEC -102	Engineering Physics-I	30	70	25	25	150
BTEC -103	Engineering Chemistry	30	70	25	25	150
BTEC -104	Basic Electrical Engineering	30	70	25	25	150
BTEC -105	Computer System & Programming in C	30	70	25	25	150

SEMESTER II

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
BTEC -201	Engg. Maths-II	30	70	NA	NA	100
BTEC -202	Engineering Physics-II	30	70	25	25	150
BTEC -203	Elements of Mechanical Engg	30	70	25	25	150
BTEC -204	Professional Communication	30	70	25	25	150
BTEC -205	Basic Electronics	30	70	NA	NA	100

***Department of Electronics Engineering
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I Year I Semester

BTEC -101: ENGINEERING MATHEMATICS – I

Unit - 1: Differential Calculus – I

Successive Differentiation, Leibnitz's theorem, Limit, Continuity and Differentiability of functions of several variables, Partial derivatives, Euler's theorem for homogeneous functions, Total derivatives, Change of variables, Curve tracing: Cartesian and Polar coordinates.

Unit - 2: Differential Calculus - II

Taylor's and Maclaurin's Theorem, Expansion of function of several variables, Jacobian, Approximation of errors, Extreme of functions of several variables, Lagrange's method of multipliers (Simple applications).

Unit - 3: Matrix Algebra

Types of Matrices, Inverse of a matrix by elementary transformations, Rank of a matrix (Echelon & Normal form), Linear dependence, Consistency of linear system of equations and their solution, Characteristic equation, Eigen values and Eigen vectors, Cayley-Hamilton Theorem, Diagonalization, Complex and Unitary Matrices and its properties

Unit - 4: Multiple Integrals

Double and triple integrals, Change of order of integration, Change of variables, Application of integration to lengths, Surface areas and Volumes – Cartesian and Polar coordinates. Beta and Gamma functions, Dirichlet's integral and its applications.

Unit - 5: Vector Calculus

Point function, Gradient, Divergence and Curl of a vector and their physical interpretations, Vector identities, Tangent and Normal, Directional derivatives. Line, Surface and Volume integrals, Applications of Green's, Stokes and Gauss divergence theorems (without proof).

Text Books:

1. E. Kreyszig, Advanced Engineering Mathematics, John-Wiley & Sons
2. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw- Hill Publishing Company Ltd.
3. R.K.Jain&S.R.K. Iyenger, Advance Engineering Mathematics, Narosa Publishing House.

Reference Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
2. Peter V. O' Neil, Advanced Engineering Mathematics, Thomas (Cengage) Learning.
3. Thomas & Finley, Calculus, Narosa Publishing House
4. Rukmanadachari, Engineering Mathematics – I, Pearson Education.

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I Year I Semester

BTEC -102 : ENGINEERING PHYSICS-I

Unit – I: Relativistic Mechanics

Inertial & non-inertial frames, Galilean transformations, Michelson-Morley experiment, Einstein's postulates, Lorentz transformation equations, Length contraction & Time dilation, Relativistic addition of velocities; Variation of mass with velocity, Mass energy equivalence, Concept of rest mass of photon.

Unit – II: Modern Physics: Black body radiation spectrum, Weins law and Rayleigh-Jeans law, Assumption of quantum theory of radiation, Planck's law. Wave-particle duality, de-Broglie matter waves, Bohr's quantization rule, Phase and Group velocities, Davisson-Germer experiment, Heisenberg uncertainty principle and its applications, Wave function and its significance, Schrödinger's wave equation (Time dependent and time independent) – particle in one dimensional potential box, Eigen values and Eigen function.

Unit – III: Wave Optics: Interference: Coherent sources, Interference in thin films (parallel and wedge shaped film), Newton's rings and its applications..

Diffraction: Single, double and N- Slit Diffraction, Diffraction grating, Grating spectra, dispersive power, Rayleigh's criterion and resolving power of grating.

Unit – IV: Polarization and Laser

Polarization: Phenomena of double refraction, Nicol prism, Production and analysis of plane, circular and elliptical polarized light, Retardation Plate, Optical Activity, Fresnel's theory, Specific rotation.

Laser: Spontaneous and stimulated emission of radiation, population inversion, Einstein's Coefficients, Concept of 3 and 4 level Laser, Construction and working of Ruby, He-Ne lasers and laser applications.

Unit – V: Fiber Optics and Holography : Fiber Optics: Fundamental ideas about optical fiber, Propagation mechanism, Acceptance angle and cone, Numerical aperture, Single and Multi Mode Fibers, Dispersion and Attenuation.

Holography: Basic Principle of Holography, Construction and reconstruction of Image on hologram and applications of holography.

Reference Books:

1. Concepts of Modern Physics - AurtherBeiser (Mc-Graw Hill)
2. Introduction to Special Theory of Relativity- Robert Resnick (Wielly)
3. Optics –AjoyGhatak(Tata McGraw Hill Education Private Ltd. New Delhi)
4. Optics - Brijlal& Subramanian (S. Chand)
5. Engineering Physics- C. Mani Naidu(Pearson)
6. Lasers Principles, Types and Applications- K R Nambiar (New Age)

ENGINEERING PHYSICS LAB

List of Experiments

Any ten experiments, at least four from each group:

Group -A

1. To determine the wavelength of monochromatic light by Newton's ring.
2. To determine the wavelength of monochromatic light with the help of Fresnel's biprism.
3. To determine the focal length of two lenses by nodal slide and locate the position of cardinal points.
4. To determine the specific rotation of cane sugar solution using polarimeter.
5. To determine the wavelength of spectral lines using plane transmission grating.
6. To study the polarization of light by simple reflection using laser.
7. Measurement of Wavelength of a laser (He-Ne) light using single slit diffraction.

Group – B

8. To determine the specific resistance of a given wire using Carey Foster's bridge.
9. To study the variation of magnetic field along the axis of current carrying - Circular coil and then to estimate the radius of the coil.
10. To verify Stefan's Law by electrical method.
11. To calibrate the given ammeter and voltmeter by potentiometer.
12. To study the Hall effect and determine Hall coefficient, carrier density and - mobility of a given semiconductor using Hall effect set up.
13. To determine the energy band gap of a given semiconductor material.
14. To determine E.C.E. of copper using Tangent or Helmholtz galvanometer.
15. To draw hysteresis curve of a given sample of ferromagnetic material and from - this to determine magnetic susceptibility and permeability of the given specimen.
16. To determine the ballistic constant of a ballistic galvanometer.
17. To determine the coefficient of viscosity of a liquid.
18. Measurement of fiber attenuation and aperture of fiber.
19. High resistance by leakage method.
20. Magnetic Susceptibility of paramagnetic solution.

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I Year I Semester

BTEC -103: ENGINEERING CHEMISTRY

- Unit-1** Molecular orbital theory and its applications to homo-nuclear diatomic molecules. Band theory of solids. Liquid crystals and its applications. Point defects in Solids. Structure and applications of Graphite and Fullerenes. Concepts of nano-materials and its applications
- Unit-2** Polymers: Basic concepts of polymer- blends and composites. Conducting and biodegradable polymers. Preparations and applications of some industrially important polymers (Buna N, Buna S, Neoprene, Nylon 6, Nylon 6,6, Terylene). General methods of synthesis of organometallic compound (Grignard Reagent) and their applications in polymerization.
- Unit-3** Electrochemistry: Galvanic cell, electrode potential, Lead storage battery. Corrosion, causes and its prevention. Setting and hardening of cement, applications of cement. Plaster of paris. Lubricants- Classification, mechanism and applications..
- Unit-4** Hardness of water. Disadvantage of hard water. Boiler troubles, Techniques for water softening; Lime-soda, Zeolite, Ion exchange resin, Reverse osmosis. Phase Rule and its application to water system.
- Unit-5** Fuels; Classification of fuels. Analysis of Coal. Determination of Calorific values (bomb calorimeter & Dulong's method). Biogas. Elementary ideas and simple applications of UV, Visible, IR and H1NMR spectral Techniques.

Textbook

1. Chemistry for Engineers, by S. Vairam and Suba Ramesh; Wiley India

Reference Books

1. Textbook of Engineering Chemistry by Dr. Gopal Krishna Bhatt, Acme Publishers
2. Chemistry (9th ed), by Raymond Chang, Tata McGraw-Hill
3. Chemistry Concepts and Applications by Steven S. Zumdahl; Cengage Learning
4. Engineering Chemistry, Wiley India
5. Engineering Chemistry Author: Abhijit Mallick, Viva Books
6. Text Book of Engineering Chemistry by Harsh Malhotra; Sonali Publications
7. Concise Inorganic Chemistry by J.D. Lee; Wiley India
8. Organic Chemistry (6 ed) by Morrison & Boyd; Pearson Education
9. Physical Chemistry by Gordon M. Barrow; Mc-Graw Hill
10. Organic Chemistry, Volume 1(6 ed) & 2 (5ed) by I. L. Finar; Pearson Education

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I Year I Semester

BTEC -103: ENGINEERING CHEMISTRY

LIST OF EXPERIMENTS

1. Determination of alkalinity in the given water sample.
2. Determination of temporary and permanent hardness in water sample using EDTA .
3. Determination of available chlorine in bleaching powder.
4. Determination of chloride content in water sample.
5. Determination of iron content in the given solution by Mohr's method.
6. pH- metric titration.
7. Viscosity of an addition polymer like polyester by viscometer.
8. Determination of iron concentration in sample of water by colorimetric method.
The method involves the use of KCN as a chelating agent and the measurements are carried out at 480nm.
9. Element detection and functional group identification in organic compounds.
10. Preparation of Bakelite and Urea formaldehyde resin.

Note: Institute can replace two experiments from the aforesaid experiments as per

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I Year I Semester

BTEC -104 BASIC ELECTRICAL ENGINEERING

DETAILED SYLLABUS

Unit-I : Electrical Circuit Analysis:

Introduction, Circuit Concepts: Concepts of network, Active and passive elements, Voltage and current sources, Concept of linearity and linear network, Unilateral and bilateral elements, Source transformation, Kirchhoff's laws, Loop and nodal methods of analysis, Star-delta transformation, AC fundamentals: Sinusoidal, square and triangular waveforms – Average and effective values, Form and peak factors, Concept of phasors, phasor representation of sinusoidally varying voltage and current.

Unit-II: Steady- State Analysis of Single Phase AC Circuits:

Analysis of series and parallel RLCCircuits, Concept of Resonance in series & parallel circuits, bandwidth and quality factor; Apparent, active & reactive powers, Power factor, Concept of power factor improvement and its improvement (Simple numerical problems)

Network theorems (AC & DC with independent sources): Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem (Simple numerical problems)

Unit-III : Three Phase AC Circuits:

Three phase system-its necessity and advantages, Star and delta connections, Balanced supply and balanced load, Line and phase voltage/current relations, Three-phase power and its measurement (simple numerical problems).

Measuring Instruments: Types of instruments, Construction and working principles of PMMC and moving iron type voltmeters & ammeters, Single phase dynamometer wattmeter, Use of shunts and multipliers (Simple numerical problems on shunts and multipliers)

Unit-IV: Magnetic Circuit:

Magnetic circuit concepts, analogy between electric & magnetic circuits, B-H curve, Hysteresis and eddy current losses, Magnetic circuit calculations (Series & Parallel).

Single Phase Transformer: Principle of operation, Construction, EMF equation, Equivalent circuit, Power losses, Efficiency (Simple numerical problems), Introduction to auto transformer.

Unit-V: Electrical Machines:

DC machines: Principle & Construction, Types, EMF equation of generator and torque equation of motor, applications of DC motors (simple numerical problems)

Three Phase Induction Motor: Principle & Construction, Types, Slip-torque characteristics, Applications (Numerical problems related to slip only)

Single Phase Induction motor: Principle of operation and introduction to methods of starting, applications.

Three Phase Synchronous Machines: Principle of operation of alternator and synchronous motor and their applications.

Text Books:

1. "Basic Electrical Engineering", S N Singh; Prentice Hall International
2. "Basic Electrical Engineering", Kuldeep Sahay, New Age International Publishers
3. "Fundamentals of Electrical Engineering", B Dwivedi, A Tripathi; Wiley India
4. "Principles of Electrical Engineering", V. Del Toro; Prentice Hall International
5. "Electrical Engineering", J. B. Gupta, Kataria and Sons

Reference Books:

1. "Electrical and Electronics Technology", Edward Hughes; Pearson
2. "Engineering Circuit Analysis", W.H. Hayt & J.E. Kimerly; McGraw Hill
3. "Basic Electrical Engineering", C L Wadhwa; New Age International
4. "Basic Electrical Engineering", T.K. Nagsarkar, M.S. Shukhija; Oxford University Press

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I Year I Semester

BTEC -104 ELECTRICAL ENGINEERING LABORATORY

LIST OF EXPERIMENTS

Note: A minimum of ten experiments from the following should be performed

1. Verification of Kirchhoff's laws
2. Verification of Superposition theorem
3. Verification of Thevenin's Theorem and Maximum Power Transfer Theorem.
4. Measurement of power and power factor in a single phase ac series inductive circuit and study improvement of power factor using capacitor
5. Study of phenomenon of resonance in RLC series circuit and obtain resonant frequency.
6. Connection and measurement of power consumption of a fluorescent lamp (tube light).
7. Measurement of power in 3- phase circuit by two wattmeter method and determination of its power factor for star as well as delta connected load.
8. Determination of parameters of ac single phase series RLC circuit
9. To observe the B-H loop of a ferromagnetic material in CRO.
10. Determination of (i) Voltage ratio (ii) polarity and (iii) efficiency by load test of a single phase transformer
11. Determination of efficiency of a dc shunt motor by load test
12. To study running and speed reversal of a three phase induction motor and record speed in both directions.

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I Year I Semester

BTEC -105 COMPUTER SYSTEMS AND PROGRAMMING IN C

Unit1:

Basics of Computer: Introduction to digital computer, basic operations of computer, functional components of computer, Classification of computers.

Introduction to operating system: [DOS, Windows, Linux and Android] purpose, function, services and types.

Number system: Binary, octal and hexadecimal number systems, their mutual conversions, Binary arithmetic.

Basics of programming: Approaches to Problem Solving, Concept of algorithm and flow charts, Types of computer languages:- Machine Language, Assembly Language and High Level Language, Concept of Assembler, Compiler, Loader and Linker.

Unit2:

Standard I/O in “C”, **Fundamental data types-** Character type, integer, short, long, unsigned, single and double floating point, Storage classes- automatic, register, static and external, Operators and expression using numeric and relational operators, mixed operands, type conversion, logical operators, bit operations, assignment operator, operator precedence and associativity.

Fundamentals of C programming: Structure of C program, writing and executing the first C program, Components of C language. Standard I/O in C.

Unit3:

Conditional program execution: Applying if and switch statements, nesting if and else, use of break and default with switch, program loops and iterations: use of while, do while and for loops, multiple loop variables, use of break and continue statements.

Functions: Introduction, types of functions, functions with array, passing values to functions, recursive functions.

Unit 4:

Arrays: Array notation and representation, manipulating array elements, using multi dimensional arrays. Structure, union, enumerated data types

Unit 5:

Pointers: Introduction, declaration, applications File handling, standard C preprocessors, defining and calling macros, conditional compilation, passing values to the compiler.

Reference:

1. The C programming by Kernighan Brain W. and Ritchie Dennis M., Pearson Education .
2. Computer Basics and C Programming by V.Rajaraman , PHI Learning Pvt. Limited – 2015.
3. Programming in C by Kochan Stephen G. Pearson Education – 2015.
4. Computer Concepts and Programming in C by D.S. Yadav and Rajeev Khanna, New Age International Publication .
5. Computer Concepts and Programming in C by Vikas Gupta, Wiley India Publication
6. Computer Fundamentals and Programming in C. ReemaThareja, Oxford Publication
7. Computer Concepts and Programming in C, E Balaguruswami, McGraw Hill
8. Computer Science- A Structured Programming Approach Using C, by Behrouz A. Forouzan, Richard F. Gilberg, Thomson, Third Edition , Cengage Learning - 2007.
9. Problem Solving and Program Design in C, by Jeri R. Hanly, Elliot B. Koffman, Pearson Addison-Wesley, 2006.
10. Computer Concepts and Programming by Anami, Angadi and Manvi, PHI Publication
11. Computer Fundamental and C programming by K K Gupta, Acme Learning Publication

Department of Agriculture Engineering

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I Year I Semester
BTEC -105 COMPUTER PROGRAMMING LAB

- 1.WAP that accepts the marks of 5 subjects and finds the sum and percentage marks obtained by the student.
- 2.WAP that calculates the Simple Interest and Compound Interest. The Principal , Amount, Rate of Interest and Time are entered through the keyboard.
- 3.WAP to calculate the area and circumference of a circle.
- 4.WAP that accepts the temperature in Centigrade and converts into Fahrenheit using the formula $C/5=(F-32)/9$.
- 5.WAP that swaps values of two variables using a third variable.
- 6.WAP that checks whether the two numbers entered by the user are equal or not.
- 7.WAP to find the greatest of three numbers.
- 8.WAP that finds whether a given number is even or odd.
- 9.WAP that tells whether a given year is a leap year or not.
- 10.WAP that accepts marks of five subjects and finds percentage and prints grades according to the following criteria:
Between 90-100%-----Print 'A'
80-90%-----Print 'B'
60-80%-----Print 'C'
Below 60%-----Print 'D'
- 11.WAP that takes two operands and one operator from the user and perform the operation and prints the result by using Switch statement.
- 12.WAP to print the sum of all numbers up to a given number.
- 13.WAP to find the factorial of a given number.
- 14.WAP to print sum of even and odd numbers from 1 to N numbers.
- 15.WAP to print the Fibonacci series.
- 16.WAP to check whether the entered number is prime or not.
- 17.WAP to find the sum of digits of the entered number.
- 18.WAP to find the reverse of a number.
- 19.WAP to print Armstrong numbers from 1 to 100.
- 20.WAP to convert binary number into decimal number and vice versa.
- 21.WAP that simply takes elements of the array from the user and finds the sum of these elements.
- 23.WAP to find the minimum and maximum element of the array.

24. WAP to search an element in an array using Linear Search.
25. WAP to sort the elements of the array in ascending order using Bubble Sort technique.
26. WAP to add and multiply two matrices of order $n \times n$.
27. WAP that finds the sum of diagonal elements of a $m \times n$ matrix.
28. WAP to implement `strlen()`, `strcat()`, `strcpy()` using the concept of Functions.
29. Define a structure data type `TRAIN_INFO`. The type contains Train No.: integer type Train name: string Departure Time: aggregate type `TIME` Arrival Time: aggregate type `TIME` Start station: string End station: string The structure type `Time` contains two integer members: hour and minute. Maintain a train timetable and implement the following operations:
- (i) List all the trains (sorted according to train number) that depart from a particular section.
 - (ii) List all the trains that depart from a particular station at a particular time.
 - (iii) List all the trains that depart from a particular station within the next one hour of a given time.
 - (iv) List all the trains between a pair of start station and end station.
30. WAP to swap two elements using the concept of pointers.
31. WAP to compare the contents of two files and determine whether they are same or not.
32. WAP to check whether a given word exists in a file or not. If yes then find the number of times it occurs.

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I Year II Semester

BTEC -201 ENGINEERING MATHEMATICS – II

Unit - 1: Ordinary Differential Equations

Linear differential equations of n th order with constant coefficients, Complementary function and Particular integral, Simultaneous linear differential equations, Solution of second order differential equations by changing dependent & independent variables, Method of variation of parameters, Applications to engineering problems (without derivation).

Unit - 2: Series Solution and Special Functions

Series solution of second order ordinary differential equations with variable coefficient (Frobenius method), Bessel and Legendre equations and their series solutions, Properties of Bessel function and Legendre polynomials.

Unit - 3: Laplace Transform

Laplace transform, Existence theorem, Laplace transforms of derivatives and integrals, Initial and final value theorems, Unit step function, Dirac- delta function, Laplace transform of periodic function, Inverse Laplace transform, Convolution theorem, Application to solve simple linear and simultaneous differential equations.

Unit - 4: Fourier Series and Partial Differential Equations

Periodic functions, Dirichlet's Conditions, Fourier series of arbitrary periods, Euler's Formulae, Even and odd functions, Half range sine and cosine series, Gibbs Phenomena.

Solution of first order Lagrange's linear partial differential equations, Second order linear partial differential equations with constant coefficients.

Unit - 5: Applications of Partial Differential Equations

Classification of second order partial differential equations, Method of separation of variables for solving partial differential equations, Solution of one and two dimensional wave and heat conduction equations, Laplace equation in two dimension, Equation of transmission lines.

Text Books:

1. E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.
2. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw- Hill Publishing Company Ltd.
3. R.K.Jain&S.R.K. Iyenger, Advance Engineering Mathematics, Narosa Publishing House.

Reference Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
2. Peter V. O' Neil, Advanced Engineering Mathematics, Thomas (Cengage) Learning.
3. Chandrika Prasad, Advanced Mathematics for Engineers, Prasad Mudranalaya
4. A. C. Srivastava& P. K. Srivastava, Engineering Mathematics, Vol. – II, PHI Learning Pvt. Ltd.
5. Rukmangadachari, Engineering Mathematics – II, Pearson Education.

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I Year II Semester

BTEC -202 ENGINEERING PHYSICS- II

Unit – I: Crystal Structures and X-ray Diffraction

Space lattice, basis, Unit cell, Lattice parameter, Seven crystal systems and Fourteen Bravais lattices, Co-ordination number, Atomic radius and Packing factor of different cubic structures, Crystal structure of NaCl and diamond, Lattice planes and Miller Indices, Diffraction of X-rays by crystal, Laue's experiment, Bragg's Law, Bragg's spectrometer. Compton Effect.

Unit – II: Dielectric and Magnetic Properties of Materials

Dielectric Properties: Dielectric constant and Polarization of dielectric materials, Relation between E, D and P, Types of Polarization (Polarizability). Equation of internal fields in liquid and solid (One-Dimensional), Clausius-Mossotti equation, Frequency dependence of dielectric constant, Dielectric Losses, Important applications of dielectric material, Ferroelectricity, Piezoelectricity.

Magnetic Properties: Magnetization, Origin of magnetic moment, Dia, para and ferro magnetism, Langevin's theory for diamagnetic material, Phenomena of hysteresis and its applications.

Unit – III: Electromagnetic Theory

Equation of continuity, Maxwell's Equations (Integral and Differential Forms) and its derivations, Displacement Current, Poynting vector and Poynting theorem, EM - Wave equation and its propagation characteristics in free space, non-conducting and conducting media, energy density of electromagnetic wave, Skin depth.

Unit – IV: Band Theory of Solids

Free electron Theory, Formation of bands in Solids, Classification of solids on band theory, Density of states, Fermi-Dirac distribution, Concept of effective mass, Charge carrier density (electrons and holes), Conductivity of semiconductors, carrier concentrations Fermi energy, Position of Fermi level in intrinsic and in extrinsic semiconductors. Temperature dependence of conductivity in semiconductors.

Unit – V: Physics of some technologically important Materials

Superconductors: Temperature dependence of resistivity in superconducting materials, Effect of magnetic field (Meissner effect), Temperature dependence of critical field, London equations, Josephson theory, persistent currents, Type I and Type II superconductors, BCS theory (Qualitative), High temperature superconductors and Applications of Super-conductors.

Nano-Materials: Basic principle of nanoscience and technology, structure, properties and uses of Fullerene, Carbon nanotubes Single and double walled nanotubes, synthesis of nanotubes, Properties and Applications of nanotubes.

Reference books:

1. Concept of Modern Physics - by Beiser (Tata Mc-Graw Hill)
2. Solid State Physics - by C. Kittel, 7th edition (Wiley Eastern)
3. Materials Science and Engineering - by V. Raghavan (Prentice- Hall India)
4. Solid State Physics - by S.O. Pillai, 5th edition (New Age International)
5. Introduction to Electrodynamics - by David J. Griffith (PH I)
6. Engineering Physics- C. Mani Naidu(Pearson)
7. Applied Physics for Engineers- Neeraj Mehta (PHI Learning, New D

**PROFESSIONAL COMMUNICATION
LABORATORY PRACTICALS****LTP-**

Interactive and Communicative Practical with emphasis on Oral Presentation/Spoken Communication based on International Phonetic Alphabets (I.P.A)

LIST OF PRACTICAL'S

1. Group Discussion: Practical based on Accurate and Current Grammatical Patterns.
2. Conversational skills for Interviews under suitable Professional Communication Lab conditions with emphasis on Kinesics.
3. Communication Skills for Seminars/Conferences/Workshops with emphasis on Paralinguistics / Kinesics.
4. Presentation Skills of Technical Paper/Project Reports/Professional Reports based on proper Stress and Intonation Mechanics.
5. Official /Public Speaking based on Rhythmic Patterns.
6. Theme-Presentation /Key-Note Presentation based on correct argumentation methodologies.
7. Individual Speech Delivery/Conferences with skills to defend Interjections/Quizzes.
8. Argumentative Skills/Role Play Presentation with Stress and Intonation.
9. Comprehensions Skills based on Reading and Listening Practical on a model Audio-Visual Usage.

Reference Books

1. BansalR.K.& Harrison: Phonetics in English, Orient Longman , New Delhi.
2. Sethi&Dhamija: A Course in Phonetics and Spoken English, Prentice Hall, New Delhi.
3. L.U.B. Pandey&R.P.Singh, A Manual of Practical Communication, A.I.T.B.S. Pub. India Ltd. Krishan Nagar, Delhi.
4. Joans Daniel, English Pronouncing Dictionary, Cambridge Univ. Press.

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BTEC -203 ELEMENTS OF MECHANICAL ENGINEERING

UNIT-I:

Force System: Force, Parallelogram Law, Lami's theorem, Principle of Transmissibility of forces. Moment of a force, Couple, Varignon's theorem, Resolution of a force into a force and a couple. Resultant of coplanar force system. Equilibrium of coplanar force system, Free body diagrams, Determination of reactions.

Concept of Centre of Gravity and Centroid and Area Moment of Inertia, Perpendicular axis theorem and Parallel axis theorem

UNIT-II:

Plane Truss: Perfect and imperfect truss, Assumptions and Analysis of Plane Truss by Method of joints and Method of section.

Beams: Types of beams, Statically Determinate Beams, Shear force and bending moment in beams, Shear force and bending moment diagrams, Relationships between load, shear and bending moment.

UNIT-III:

Simple stress and strain: Normal and shear stresses. One Dimensional Loading; members of varying cross section, bars in series. Tensile Test diagram for ductile and brittle materials, Elastic constants, Strain energy.

Bending (Flexural) Stresses: theory of pure bending, neutral surface and neutral axis, stresses in beams of different cross sections.

Engineering Materials: Importance of engineering materials, classification, mechanical properties and applications of Ferrous, Nonferrous and composite materials.

UNI-IV:

Basic Concepts and Definitions of Thermodynamics: Introduction and definition of thermodynamics, Microscopic and Macroscopic approaches, System, surrounding and universe, Concept of continuum, Thermodynamic equilibrium, Thermodynamic properties, path, process and cycle, Quasi static process, Energy and its forms, Work and heat. Thermodynamic definition of work.

Zeroth law of thermodynamics: Temperature and its' measurement.

First law of thermodynamics: First law of thermodynamics, Internal energy and enthalpy. First law analysis for non-flow processes. Non-flow work Steady flow energy equation; Boilers, Condensers, Turbine, Throttling process, Pumps etc.

UNIT-V:

Second law: Thermal reservoir, Kelvin Planck statement, Heat engines, Efficiency; Clausius' statement Heat pump, refrigerator, Coefficient of Performance. Carnot cycle, Carnot theorem and its corollaries. Clausius inequality, Concept of Entropy.

Properties of pure substances: P-v, T-s and h-s diagram, dryness fraction and steam tables. Rankine Cycle.

Internal Combustion Engines: Classification of I.C. Engines and their parts, working principle and comparison between 2 Stroke and 4 stroke engine, difference between SI and CI engines. P-v and T-s diagrams of Otto and Diesel cycles, comparison of efficiency.

Books & References:

1. Engineering Mechanics: Statics by J.L Meriam, Wiley
2. Engineering Mechanics : Statics and Dynamics by R. C. Hibbler, Pearson
3. Strength of Materials by Timoshenko & Young
4. Mechanics of Solid by R. C. Hibbler, Pearson
5. Engineering Thermodynamics by P.K.Nag, McGraw Hill
6. Thermodynamics An Engineering Approach by Cengel & Boles, McGraw Hill
7. Engineering Thermodynamics by P. Chattopadhyay, OXFORD Publication
8. Internal Combustion Engine by V Ganesan, McGraw Hill Pub .
9. An Introduction to Mechanical Engineering by Wickert & Lewis, Cengage Learning
10. Engineering Mechanics By S. S. Bhavikatti, K. G. Rajashekarappa, New Age International
11. Engineering Mechanics by R K Bansal, Laxmi Publications
12. Fundamentals of Mechanical Engineering by Sawhney, PHI
13. Basic Mechanical Engineering by Pravin Kumar, Pearson

***Department of Electronics Engineering
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P.K. University, Shivpuri (MP)***

I Year II Semester

ELEMENTS OF MECHANICAL ENGINEERING LAB

Note: Any 10 experiments (Minimum of 3 from each module) are to be conducted.

Module 1:

1. To conduct the tensile test and determine the ultimate tensile strength, percentage elongation for a mild steel specimen.
2. To conduct the Impact-tests (Izod / Charpy) on Impact-testing machine to find the Impact Strength of the specimen.
3. To determine the hardness of the given specimen using Vicker/Brinell/Rockwell hardness testing machine.
4. To conduct experiment on Torsion of Rod/wire.

Module 2:

1. To Study the working of 2 stroke Diesel/Petrol engine.
2. To Study and working of 4 stroke Petrol/Diesel engine.
3. To Study the model of Babcock and Wilcox and Lancashire boiler.
4. To Study various types of Mounting and Accessories of Boilers.

Module 3:

1. To verify the parallelogram, and Triangle law.
2. To verify the polygon law of force.
3. To determine the coefficient of friction on inclined surface.
4. To determine the efficiency and Mechanical Advantage of Worm & Worm-wheel.
5. To conduct experiment on Force Analysis on simple truss and Jib-crane Apparatus.
6. To conduct friction experiment on screw-jack.

***Department of Electronics Engineering
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I Year II Semester

BTEC -204 PROFESSIONAL COMMUNICATIONS

Unit-1 Fundamentals of Communications	Technical Communication: features: Distinction between General And Technical Communication; Language as a tool of communications; Levels of communication: Interpersonal, Organizational, Mass communication; The flow of communication: Downward, Upward, Lateral/Horizontal (Peer group) : Importance of technical communication; Barriers to Communication.
Unit-II Written Communication	Words and Phrases: Word formation, Synonyms and Antonyms; Homophones; Select vocabulary of about 500-1000 New words; correct Usage: all Parts of Speech; Modals; Concord; Articles; Infinitives; Transformation of sentences; Requisites f Sentence Construction: Paragraph Development: Techniques and Methods- Inductive, Deductive, Spatial , Linear, Chronological etc.
Unit-III Business Communication	Principles, Sales & Credit letters; Claim and Adjustment Letters; Job Application and Resumes. Reports: Types; Significance; Structure, Style & Writing of Reports. Technical Proposal; Parts; Types; Writing of Proposal; Significance; Negotiation skills.
Unit-IV Presentation Strategies and Soft Skills.	Nuances and Modes of Delivery; Body Language; Dimensions of Speech: Syllable; Accent; Pitch; Rhythm; Intonation; Paralinguistic features of voice; Interpersonal communication: Definition; Types; Team work; Attitude; Way to improve Attitude Listening Skills : Types; Methods for improving Listening Skills.
Unit –V Value- Based	Following essays from the prescribed text book with emphasis on Mechanics of writing.

Text Readings

- (i) Humanistic and Scientific Approaches to Human Activity by Moody E. Prior
- (ii) The Language of Literature and Science by A. Huxley
- (iii) Man and Nature by J. Bronowski
- (iv) Science and Survival by Barry Commoner
- (v) The Mother of the Sciences by A.J. Bahm.

Text Book

1. Improve your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, New Delhi.
2. Technical Communication- Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2007, New Delhi.
3. Functional skills in Language and Literature, by R.P. Singh, Oxford Univ. Press, 2005, New Delhi.

Reference Books

1. Communication Skills for Engineers and Scientists, Sangeeta Sharma et.al. PHI Learning Pvt. Ltd, 2011, New Delhi.
2. Business Correspondence and Report Writing by Prof. R.C., Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd. , 2001, New Delhi.
3. Word Power Made Easy by Norman Lewis, W.R. Goyal Pub. & Distributors, 2009, Delhi.

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I Year II Semester

BTEC -205 BASIC ELECTRONICS

- Unit I PNP-N junction diode:** Introduction of Semiconductor Materials Semiconductor Diode: Depletion layer, V-I characteristics, ideal and practical, diode resistance, capacitance, Diode Equivalent Circuits, Transition and Diffusion Capacitance, Zener Diodes breakdown mechanism (Zener and avalanche) Diode Application: Series, Parallel and Series, Parallel Diode Configuration, Half and Full Wave rectification, Clippers, Clampers, Zener diode as shunt regulator, Voltage-Multiplier Circuits Special Purpose two terminal Devices :Light-Emitting Diodes, Varactor (Varicap) Diodes, Tunnel Diodes, Liquid-Crystal Displays.
- Unit-II Bipolar Junction Transistors and Field Effect Transistor:** Bipolar Junction Transistor: Transistor Construction, Operation, Amplification action. Common Base, Common Emitter, Common Collector Configuration DC Biasing BJTs: Operating Point, Fixed-Bias, Emitter Bias, Voltage-Divider Bias Configuration. Collector Feedback, Emitter-Follower Configuration. Bias Stabilization. CE, CB, CC amplifiers and AC analysis of single stage CE amplifier (re Model). Field Effect Transistor: Construction and Characteristic of JFETs. AC analysis of CS amplifier, MOSFET (Depletion and Enhancement)Type, Transfer Characteristic,
- Unit- III Operational Amplifiers :** Introduction and Block diagram of Op Amp, Ideal & Practical characteristics of Op Amp, Differential amplifier circuits, Practical Op-Amp Circuits (Inverting Amplifier, Non inverting Amplifier, Unity Gain Amplifier, Summing Amplifier, Integrator, Differentiator).
- OPAMP Parameters:** Input offset voltage, Output offset voltage, Input biased current, Input offset current Differential and Common-Mode Operation
- Unit- IV Electronic Instrumentation and Measurements:** Digital Voltmeter : Introduction, RAMP Techniques Digital Multimeters: Introduction Oscilloscope: Introduction, Basic Principle, CRT , Block Diagram of Oscilloscope, Simple CRO, Measurement of voltage, current phase and frequency using CRO, Introduction of Digital Storage Oscilloscope and Comparison of DSO with Analog Oscilloscope.
- Unit- V Fundamentals of Communication Engineering:** Elements of a Communication System, Need of Modulation, Electromagnetic spectrum and typical applications. Basics of Signal Representation and Analysis, Introduction of various analog modulation techniques, Fundamentals of amplitude modulation, Modulation and Demodulation Techniques of AM.

Text Books:

1. Robert L. Boylestand / Louis Nashelsky "*Electronic Devices and Circuit Theory*", Latest Edition, Pearson Education.
2. H S Kalsi, "Electronic Instrumentation", Latest Edition, TMH Publication,.
3. George Kennedy, "Electronic Communication Systems", Latest Edition, TMH,

Reference Books:

1. David A. Bell, "*Electronic Devices and Circuits*", Latest Edition, Oxford University Press.
2. Jacob Millman, C.C. Halkias, StayabrataJit, "*Electronic Devices and Circuits*", Latest Edition ,TMH.
3. David A. Bell, Electronic Instrumentation and Measurements, Latest Edition, Oxford University Press India.

Department of Agriculture Engineering

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Evaluation Scheme & Syllabus
Department of Electronics & Communication Engineering
B.Tech. Second Year
(III & IV Sem)
(Effective from session 2019-20)

SEMESTER-III

		THEORY		PRACTICAL		TOTAL
SUBJECT CODE	SUBJECT NAME	SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
BTEC-301	Mathematics-III	30	70	NA	NA	100
BTEC-302	Network Analysis & Synthesis	30	70	NA	NA	100
BTEC-303	Digital Logic Design	30	70	25	25	150
BTEC-304	Signal & Systems	30	70	25	25	150
BTEC-305	Electronic Devices and Circuits	30	70	25	25	150
BTEC-306	Environment & Ecology	30	70	NA	NA	100
	Electronic Workshop & PCB Design Lab	NA	NA	25	25	50

SEMESTER-IV

		THEORY		PRACTICAL		TOTAL
SUBJECT CODE	SUBJECT NAME	SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
BTEC-401	Nano Science	30	70	NA	NA	100
BTEC-402	Data Structure & Algorithms	30	70	25	25	150
BTEC-403	Microprocessors & Microcontrollers	30	70	25	25	150
BTEC-404	Electronic Measurements & Instrumentation	30	70	25	25	150
BTEC-405	Electromagnetic Field Theory	30	70	NA	NA	100
BTEC-406	Universersal Human Value & Prof. Ethics	30	70	NA	NA	100
	AES Lab	NA	NA	25	25	50

***Department of Electronics Engineering
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II Year Semester-III***

BTEC-301: ENGINEERING MATHS–III

UNIT - I

Numerical Techniques – I: Zeroes of transcendental and polynomial equations, Bisection method, Regula-falsi method, Newton-Raphson method, Rate of convergence of above methods.

Interpolation: Finite differences, Newton's forward and backward interpolation. Lagrange's and Newton's divided difference formula for unequal intervals.

UNIT- II

Numerical Techniques –II: Solution of system of linear equations, Matrix Decomposition methods, Jacobi method, Gauss- Seidal method.

Numerical differentiation & Integration: Trapezoidal rule, Simpson's one third and three- eight rules, Solution of ordinary differential equations (first order, second order and simultaneous) by Euler's, Picard's and fourth-order Runge- Kutta methods.

UNIT- III

Statistical Techniques: Moments, Moment generating functions, Skewness, Kurtosis, Curve fitting, Method of least squares, Fitting of straight lines, Polynomials, Exponential curves, Correlation, Linear, non – linear and multiple regression analysis, Binomial, Poisson and Normal distributions. Tests of significations: Chi-square test, t-test.

UNIT- IV

Function of Complex variable: Analytic function, C-R equations, Harmonic Functions, Cauchy's integral theorem, Cauchy's integral formula, Derivatives of analytic functions, Taylor's and Laurent's series, Singularities, Zeroes and Poles, Residue theorem.

UNIT -V

Integral Transforms: Fourier integral, Complex Fourier transform, Inverse Transforms, Convolution Theorems, Fourier sine and cosine transform, Applications of Fourier transform to simple one dimensional heat transfer equations, wave equations and Laplace equations, Z- Transform and its application to solve difference equation.

Text Books:

1. Peter V. O'Neil, Advance Engineering Mathematics Thomson (Cengage) Learning, 2007.
2. Jain, Iyenger Jain, Numerical Methods for Scientific and Engineering Computation, New Age International, New Delhi
3. J.N. Kapur, Mathematical Statistics, S. Chand & company Ltd.
4. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers

Reference Books:

1. R.K. Jain & S.R.K. Iyenger, Advance Engineering Mathematics, Narosa Publication House.
2. Chandrika Prasad, Advanced Mathematics for Engineers, Prasad Mudralaya, 1996.
3. S.S. Sastry, Introductory Methods of Numerical Analysis, PHI Learning Private Limited, New Delhi.
4. E. Balagurusamy, Numerical Methods, Tata McGraw-Hill Publishing Company Limited, New Delhi
5. T. Veerajan & T. Ramchandrandran, Theory & Problems in Numerical Methods, TMH, New Delhi

***Department of Electronics Engineering
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II Year Semester-III***

BTEC-302: NETWORK ANALYSIS & SYNTHESIS

UNIT I

Signal Analysis, Complex Frequency, General Characteristics and Descriptions of Signals, Node Voltage Analysis, Mesh Current Analysis, Step Function and Associated Wave Forms, The Unit Impulse, Initial and final conditions, Step and Impulse Response, Response of Source Free Circuits, Forced Response, Phasor and Steady State Responses of Circuits to Sinusoidal Functions, Resonance in AC Circuits.

UNIT II

Review of Laplace Transforms, Poles and Zeroes, Initial and Final Value theorems, The transform circuit, Superposition Theorem, Thevenin's and Norton's theorems, Maximum Power Transfer Theorem, Convolution Integral, Amplitude and phase responses. Network functions.

UNIT III

Graph Theory fundamentals, Matrix Representation of Graphs, Formulation of Network Response Equations using Incidence Matrix, Duality in Networks. Computation of Ladder and Non-Ladder Networks, Routh-Hurwitz Stability Criterion, Bode Diagrams.

UNIT IV

Parameters of Two Port Networks, Correlation between Two Port Parameters, Two Port, Relation between Port Parameters, Transfer Functions using Two Port Parameters, Interconnection of TwoPorts , Reciprocal and Symmetric Networks, Terminated Two Port Networks, Interconnections of Two Port Networks, Image Impedance, Iterative Impedance. Harmonics and Dirichlet's Conditions, Waveform Symmetry and Fourier Coefficients. Filter Networks.

UNIT V

Active Network Synthesis and Realizability: Elements of Relizability Theory, Hurwitz Polynomial, Positive Real Functions (PRF), Characteristics of PRF, Methodology for Simple Network Synthesis, Synthesis of Two Element Type One Port Network.

Text Book:

1. Franklin F. Kuo, "Network Analysis and synthesis", Wiley India Pvt Ltd.
2. MS Sukhija, T.K. Nagsarkar, "Circuits and Networks", Oxford University Publication.

1. ME Van Valkenberg, "Network Analysis", Prentice Hall of India Ltd.
2. Ghosh, "Network Theory: Analysis and Synthesis", PHI Learning Pvt. Ltd

***Department of Electronics Engineering
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II Year Semester-III***

BTEC-303: DIGITAL LOGIC DESIGN

UNIT I

Digital System And Binary Numbers: Number System and its arithmetic, Signed binary numbers, Binary codes, Cyclic codes, Hamming Code, the map method up to five variable, Don't care conditions, POS simplification, NAND and NOR implementation, Quine Mc-Clusky method (Tabular method).

UNIT II

Combinational Logic: Combinational Circuits: Analysis Procedure, Design procedure, Binary adder-subtractor, Decimal adder, Binary multiplier, Magnitude comparator, Multiplexers, Demultiplexers, Decoders, Encoders.

UNIT III

Sequential Logic And Its Applications: Storage elements: latches & flip flops, Characteristic Equations of Flip Flops, Flip Flop Conversion, Shift Registers, Ripple Counters, Synchronous Counters, Other Counters: Johnson & Ring Counter.

UNIT IV

Synchronous & Asynchronous Sequential Circuits: Analysis of clocked sequential circuits with state machine designing, State reduction and assignments, Design procedure. Analysis procedure of Asynchronous sequential circuits, circuit with latches, design procedure, Reduction of state and flow table, Race-free state assignment, Hazards.

UNIT V

Memory & Programmable Logic Devices: Digital Logic Families: DTL, DCTL, TTL, ECL & CMOS etc., Fan Out, Fan in, Noise Margin; RAM, ROM, PLA, PAL; Circuits of Logic Families, Interfacing of Digital Logic Families, Circuit Implementation using ROM, PLA and PAL; CPLD and FPGA.

Text Books:

1. M. Morris Mano and M. D. Ciletti, "Digital Design", Pearson Education.
2. David J. Comer, "Digital Logic & State Machine Design", Oxford University Press.
3. RP Jain, "Modern Digital Electronics", Tata McGraw Hill Publication.

1. DP Kothari and J.S. Dhillon, "Digital Circuits and Design", Pearson Education.
2. A. Anand Kumar, "Fundamentals of Digital Circuits", PHI Lear

***Department of Electronics Engineering
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Semester-III***

BTEC-304: SIGNALS & SYSTEMS

UNIT I

Signals: Representation of Signals, Singularity Functions, Discrete Time Signals, Types of Signals, Time Scaling and Shifting, Convolution and Correlation of LTI Systems, Correlation of energy and power signals.

UNIT II

Systems and Analysis of System: System Classification, Linearity/Time Invariance, Causal System, Characterization of LTI Systems, Unit Sample Response, Generalization of D.T. Systems, Concept of Stability, Convolution Integrals/summations, Energy and Power spectral density, Properties of Power spectral Density, Analysis of First order systems, Analysis of second order systems.

UNIT III

Fourier Transforms: Properties and Significance of CTFT, CTFT of Common Signals, Inverse CTFT; Introduction to DTFT, DTFT of Common Signals, Theorems and Properties – DTFT, Inverse DTFT; Continuous Time and Discrete Time Hilbert Transform and its Properties. Introduction of Gaussian signal and its Fourier transform.

UNIT IV

Laplace Transform and Z Transform: Laplace Transforms- Introduction, Laplace Transforms of common signals, Theorems and properties of Laplace Transforms, Concept of Region of Convergence, Inverse Laplace Transforms; Z Transforms – Introduction, Z Transforms of Common Signals, Theorems and properties of Z Transforms, Inverse Z Transforms.

UNIT V

Sampling of Time Signals: Nyquist Criterion, Sampling theorem and frequency domain representation of sampling, Sampling Techniques, Reconstruction of band limited signal from its samples, Sampling of Sinusoidal and other signals.

Text Book:

1. AV Oppenheim, A.S. Willsky and S. Hamid Nawab, 'Signals and Systems', Pearson Education.
2. TK Rawat, "Signals and Systems", Oxford University Press.

1. BP Lathi, "Principals of Linear Systems and Signals", Oxford University Press.
2. P. Ramakrishna Rao, 'Signal and System', Tata McGraw Hill, New Delhi.
3. Kishore S. Trivedi, "Probability & Statistics with Reliability Queuing and Computer Science Applications", Wiley Publication.

*Department of Electronics Engineering
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II Year Semester-III*

BTEC-305: ELECTRONIC DEVICES AND CIRCUITS

UNIT I

Energy Bands and Charge Carrier in Semiconductor: Bonding forces and energy bands in solids, Charge Carriers in Semiconductors, Carrier Concentrations, Drift Mechanism.

Excess carriers in Semiconductors: Optical Absorption, Carrier Lifetime: Direct Recombination, Steady State Carrier Generation, Quasi-Fermi Level, Diffusion of carriers and Einstein relation.

UNIT II

Junctions: Equilibrium Conditions, Forward and Reverse Biased Junctions; Steady State Conditions.

Optoelectronic Devices: Photodiode V-I characteristic, Photodetector, Solar Cells, Light Emitting Diode.

UNIT III

MOSFET: Device structure and its operation in equilibrium, V-I characteristics. Circuits at DC, MOSFET as Amplifier and switch, Biasing in MOS amplifier circuits, small-signal operation and models, single stage MOS amplifier, MOSFET internal capacitances and high frequency model, frequency response of CS amplifier

UNIT IV

BJT: Review of device structure operation and V-I characteristics, BJT circuits at DC, BJT as amplifier and switch, biasing in BJT amplifier circuit, small-signal operation and models, single stage BJT amplifier, BJT internal capacitances and high frequency model, frequency response of CE amplifier.

UNIT V

Feedback: The general feedback structure, properties of negative feedback, the four basic feedback topologies, the series-shunt feedback amplifier, the series-series feedback amplifier, the shunt-shunt and shunt series feedback amplifier.

Oscillators: Basic principles of sinusoidal oscillators, op-amp RC oscillator circuits, LC oscillator.

Text Book:

1. AS Sedra and K. C. Smith, "Microelectronic Circuits", Oxford University Press.
2. Millman Jacob, Christos Halkias, Satyabrata Jit, "Electronic Devices and Circuits", Tata McGraw Hill.
3. BG Streetman and S. Banerjee "Solid State Electronics Devices", Prentice Hall of India.
4. Donald A. Neamen "Semiconductor Physics & Devices", Tata McGraw Hill.
5. Alok K. Dutta, "Semiconductor Devices and Circuits", Oxford University Press.
6. Jacob Millman and Arvin Grabel, "Microelectronics", Tata McGraw Hill.

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II Year Semester-III***

BTEC -306: ENVIRONMENT & ECOLOGY

UNIT-I

Definition, Scope & Importance, Need For Public Awareness• Environment definition, Eco system - Balanced ecosystem, Human activities - Food, Shelter, Economic and social Security. Effects of human activities on environment Agriculture, Housing, Industry, Mining and Transportation activities, Basics of Environmental Impact Assessment. Sustainable Development

UNIT-II

Natural Resources• Water Resources· Availability and Quality aspects. Water borne diseases, Water Induced diseases, Fluoride problem in drinking water. Mineral Resources, Forest Wealth, Material cycles-- Carbon, Nitrogen and Sulphur Cycles.

Energy - Different types of energy, Electro-magnetic radiation. Conventional and Non-Conventional sources – Hydro-Electric, Fossil Fuel based, Nuclear, Solar, Biomass and Bio.gas. Hydrogen as an alternative future source of Energy.

UNIT-III

Environmental Pollution and their effects. Water pollution, Land pollution. Noise pollution, Public Health aspects, Air Pollution, Solid waste management, e-waste management
Current Environmental Issues of Importance: Population Growth, Climate Change and Global warming- Effects, Urbanization, Automobile pollution. Acid Rain Ozone Layer depletion, Animal Husbandry,

UNIT-IV

V Environmental Protection- Role of Government, Legal aspects, initiatives by Non-Governmental organizations (NGO), Environmental Education, Women Education,

Text Books

1. Environmental Studies -Benny Joseph- Tata Mcgraw Hill-2005
2. Environmental Studies- Or. D.L. Manjunath, Pearson Education-2006.
3. Environmental studies - R, Rajagopalan -Oxford Publication • 2005.
4. Text book of Environmental Science & Technology- M. Anji Reddy- US Publication .

Reference Books

1. Principles of Environmental Science and Engineering -P. Venugoplan Rao, Prentice Hall of India.
2. Environmental Science and Engineering- Meenakshi, Prentice Hall India

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II Year Semester-III*

BTEC-303: DIGITAL LOGIC DESIGN LAB

1. Introduction to digital electronics lab- nomenclature of digital ICs, specifications, study of the data sheet, Concept of Vcc and ground, verification of the truth tables of logic gates using TTL ICs.
2. Implementation of the given Boolean function using logic gates in both SOP and POS forms.
3. Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.
4. Implementation and verification of Decoder using logic gates.
5. Implementation and verification of Encoder using logic gates.
6. Implementation of 4:1 multiplexer using logic gates.
7. Implementation of 1:4 demultiplexer using logic gates.
8. Implementation of 4-bit parallel adder using 7483 IC.
9. Design, and verify the 4-bit synchronous counter.
10. Design, and verify the 4-bit asynchronous counter.
11. Implementation of Mini Project using digital integrated circuit's and other components.

Department of Electronics Engineering
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II Year Semester-III

BTEC-304: SIGNALS & SYSTEMS LAB

1. Introduction to MATLAB
 - a. To define and use variables and functions in MATLAB.
 - b. To define and use Vectors and Matrices in MATLAB.
 - c. To study various MATLAB arithmetic operators and mathematical functions.
 - d. To create and use m-files.
2. Basic plotting of signals
 - a. To study various MATLAB commands for creating two- and three-dimensional plots.
 - b. Write a MATLAB program to plot the following Continuous time and discrete time signals
 1. Step Function
 2. Impulse Function
 3. Exponential Function
 4. Ramp Function
 5. Sine Function
3. Time and Amplitude transformations
 - a. Write a MATLAB program to perform amplitude-scaling, time-scaling and time-shifting on a given signal.
4. Convolution of given signals
 - a. Write a MATLAB program to obtain linear convolution of the given sequences.
5. Autocorrelation and Cross-correlation
 - a. Write a MATLAB program to compute autocorrelation of a sequence $x(n)$ and verify the property.
 - b. Write a MATLAB program to compute cross-correlation of sequences $x(n)$ and $y(n)$ and verify the property.
6. Fourier Series and Gibbs Phenomenon
 - a. To calculate Fourier Series coefficients associated with Square Wave.
 - b. To Sum the first 10 terms and plot the Fourier Series as a function of time
 - c. To Sum the first 50 terms and plot the Fourier Series as a function of time
7. Calculating transforms using MATLAB
 - a. Calculate and plot Fourier Transform of a given signal
 - b. Calculate and plot Z-transform of a given signal
8. Impulse response and Step response of a given system
 - a. Write a MATLAB program to find the impulse response and step response of a system from its difference equation
 - b. Compute and plot the response of a given system to a given input
9. Pole-zero diagram and bode diagram
 - a. Write a MATLAB program to find pole-zero diagram, bode diagram of a given system from the given system function
 - b. Write a MATLAB program to find, bode diagram of a given system from the given system function
10. Frequency response of a system
 - a. Write a MATLAB program to plot magnitude and phase response of a given system
11. Checking Linearity/Non-Linearity of a system using SIMULINK
 - a. Build a system that amplifies a sine wave by a factor of two.
Test the linearity of this system using SIMULINK

Department of Electronics Engineering
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II Year Semester-III

BTEC-305: ELECTRONIC DEVICES AND CIRCUITS LAB

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 V_{rms} , V_{dc} , 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 A_v , A_i , R_o and R_i of CE amplifier with potential divider biasing.
7. **Measurement of Operational Amplifier Parameters:** Common Mode Gain, Differential Mode Gain, CMRR, Slew Rate.
8. **Applications of Op-amp:** Op-amp as summing amplifier, Difference amplifier, Integrator and differentiator.
9. **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.
10. **Oscillators:** Sinusoidal Oscillators-
 - a. Wein's bridge oscillator
 - b. phase shift oscillator.
11. Simulation of Amplifier circuits studied in the lab using any available simulation software and measurement of bandwidth and other parameters with the help of simulation software.

BTEC--: ELECTRONICS WORKSHOP & PCB DESIGN LAB

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.

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II Year Semester-IV***

BTEC-401: NANO SCIENCE

UNIT I

Introduction: Definition of Nano-Science and Nano Technology, Applications of Nano-Technology.

Quantum Theory for Nano Science: Particle in a box, Potential step: Reflection and tunneling (Quantum leak). Penetration of Barrier, Potential box (Traped particle in 3D: Nanodot).

Physics of Solid State Structures: Size dependence of properties, crystal structures, face centered cubic nanoparticles; Tetrahedrally bounded semiconductor structures; lattice vibrations.

Energy Bands: Insulators, semiconductor and conductors; Reciprocal space; Energy bands and gaps of semiconductors; effective masses; Fermi Surfaces.

Localized Particles: Acceptors and deep taps; mobility; Excitons.

UNIT II

Quantum Nanostructure: Preparation of quantum wells, Wires and Dots, Size and Dimensionality effect, Fermi gas; Potential wells; Partial confinement; Single electron Tunneling, Infrared detectors; Quantum dot laser superconductivity.

Properties of Individual Nano Particles: Metal nano clusters; Magic numbers; Theoretical modeling of nano particles; geometric structure; electronic structure; Reactivity, Fluctuations, Magnetic clusters; Bulk to nanostructure, semiconducting nanoparticles, Optical Properties, Photo fragmentation, Coulombic Explosion. Rare Gas & Molecular clusters; Inert gas clusters; Superfluid clusters; Molecular clusters.

UNIT III

Growth Techniques of Nanomaterials: Litho and Nonlithographic techniques, RF Plasma, Chemical methods, Thermolysis, Pulsed laser method, Self-assembly, E-beam evaporation, Chemical Vapour Deposition, Pulsed Laser Deposition.

UNIT IV

Methods of Measuring Properties: Structure: X-ray Diffraction Technique, Particle size determination, surface structure. Microscopy: Scanning Probe Microscopy (SPM), Atomic Force Microscopy (AFM), Field Ion Microscopy, Scanning Electron Microscopy, Transmission Electron Microscopy(TEM). Spectroscopy: Infra red and Raman Spectroscopy, X-ray Spectroscopy, Magnetic resonance, Optical and Vibrational Spectroscopy, Luminescence.

UNIT V

Carbon Nano Materials: Bucky Ball and Carbon Nano- Tubes: Nano structures of carbon (fullerene), Fabrication, Structure. Electrical, Mechanical and Vibrational properties and applications. Nano Diamond, Boron Nitride Nano-tubes, Single Electron Transistors, Molecular Machine, Nano-Biometrics, Nano Robots.

Text/Reference Books:

1. CP Poole Jr, FJ Owens, "Introduction to Nanotechnology".

Department of Electronics Engineering
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II Year Semester-IV

BTEC-402: DATA STRUCTURE & ALGORITHMS

UNIT I : Abstract Data Types, Sequences as value definitions, Data types in C, Pointers in C, Data Structures and C, Arrays in C, Array as ADT, One Dimensional Array, Implementing one Dimensional Array, Array as parameters, Two Dimensional Array, Structures in C, Implementing Structures, Unions in C, Implementation of unions, Structure Parameters, Allocation of storage and scope of variables, Recursive Definition and Processes: Factorial Function, Fibonacci Sequence, Recursion in C, efficiency of Recursion, Hashing: Hash Function, Open Hashing, Closed Hashing: Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Extendible Hashing.

UNIT II : Stack, Queue And Linked List: Stack definition and examples, Primitive Operations, Example Representing Stacks in C, Push And Pop Operation Implementation, Queue as ADT, C Implementation of Queues, Insert Operation, Priority Queue, Array Implementation of Priority Queue, Inserting and Removing Nodes from a list-linked Implementation of stack, Queue and Priority Queue, Other List Structures, Circular Lists: Stack and Queue as Circular List -Primitive Operations on circular lists, Header Nodes, Doubly Linked Lists, Addition of Long Positive Integers on Circular and Doubly Linked List.

UNIT III : Trees: Binary trees: Operations on Binary Trees, Applications of Binary Trees, Binary Tree Representation, Node Representation of Binary Trees, Implicit Array Representation of Binary Tree, Binary Tree Traversal in C, Threaded Binary Tree, Representing List as Binary Tree, Finding the Kth element, Deleting an Element, Trees and their applications: C Representation of trees, Tree Traversals, Evaluating an Expression Tree, Constructing a Tree.

UNIT IV : Sorting And Searching: General Background of Sorting: Efficiency Considerations, Notations, Efficiency of Sorting, Exchange Sorts: Bubble Sort; Quick Sort; Selection Sort; Binary Tree Sort; Heap Sort, Heap as a Priority Queue, Sorting Using a Heap, Heap Sort Procedure, Insertion Sorts: Simple Insertion, Shell Sort, Address Calculation Sort, Merge Sort, Radix Sort, Sequential Search: Indexed Sequential Search, Binary Search, Interpolation Search.

UNIT V : Graphs: Application of Graph, C Representation of Graphs, Transitive Closure, Warshall's Algorithm, Shortest Path Algorithm, Linked Representation of Graphs, Dijkstra's Algorithm, Graph Traversal, Traversal Methods for Graphs, Spanning Forests, Undirected Graph and their Traversals, Depth First Traversal, Application of Depth First Traversal, Efficiency of Depth First Traversal, Breadth First Traversal, Minimum Spanning Tree, Kruskal's Algorithm, Round Robin Algorithm.

Text Book:

1. Aaron M. Tenenbaum, Yeediyah Langsam, Moshe J. Augenstein, "Data structures using C and C++", Pearson Education.
2. Reema Theraja, "Data Structure using C", OUP Publication.

References Books:

1. E. Balagurusamy, "Programming in ANSI C", Second Edition, Tata McGraw Hill Publication.
2. Robert L. Kruse, Bruce P. Leung Clovis L. Tondo, "Data Structures and Program Design in C", Pearson Education.
3. Lipschutz, "Data Structures With C", Tata McGraw-Hill Education.

***Department of Electronics Engineering
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II Year Semester-IV***

BTEC-403: MICROPROCESSORS & MICROCONTROLLERS

UNIT I

8085 MICROPROCESSOR: History and Evolution of Microprocessor and their Classification, Architecture of 8085 Microprocessor, Address / Data Bus multiplexing and demultiplexing. Status and Control signal generation, Instruction set of 8085 Microprocessor, Classification of instructions, addressing modes, timing diagram of the instructions.

UNIT II

Hardware Interfacing with 8085: Methods of data Transfer and Interrupts of 8085 microprocessor: Classification of interrupts, Programming using interrupts, Direct Memory Access, Serial and parallel data transfer, Interfacing of Memory Chips with 8085 Microprocessor, Interfacing of 8085 with 8155/8156 (RAM), 8355/8755 (ROM). Interfacing of Programmable Devices with 8085 Microprocessor, 8279 programmable Keyboard/Display interface, 8255A programmable Parallel interface, 8254 programmable Interval Timer, 8259A programmable Interrupt Controller, Assembly language programming.

UNIT III

16-bit low power MCU MSP430: Introduction to microcontrollers and embedded systems, Von Neumann (Princeton) and Harvard architecture, RISC and CISC machine, Introduction to MSP430: Architecture, Programming Techniques, Addressing Modes, Programming System registers and configuration I/O ports pull up/down registers concepts, Low Power aspects of MSP430: low power modes, Active vs Standby current consumption.

UNIT IV

Configuring Peripherals in MSP430: External interrupts and software interrupt, interrupt programming, Watchdog timer, Clock Tree in MSP430, Timer/ counter interrupt, Programming MSP430 timer, counter programming, Real Time Clock (RTC), PWM control, timing generation and measurements. Analog interfacing and data acquisition: ADC and Comparator in MSP430, data transfer using DMA.

UNIT V

Serial Communication Interfaces in MSP430: Basics of serial communication, mode of serial communication, RS232, serial communication issue, Serial port programming. Implementing and programming UART, I2C, SPI interface using MSP430, Interfacing external devices, external memory, keyboards, display devices, DAC/ADC, DC Motor, Stepper Motor, Servomotor, power management, Sensor Interfacing and signal conditioning. Case Study: MSP430 based embedded system application using the interface protocols for communication with external devices: “A Low-Power Battery less Wireless Temperature and Humidity Sensor with Passive Low Frequency RFID.

Text Book:

1. Ramesh Gaonkar, “Microprocessor Architecture, Programming, and Applications with the 8085”, Penram International Publication (India) Pvt. Ltd.
2. DV Hall, “Microprocessors Interfacing”, Tata McGraw Hill Publication.
3. N. Senthil Kumar, M. Saravanan, S. Jeevananthan, “Microprocessors and Microcontrollers”, Oxford University Press Publication.
4. Getting Started with the MSP430 Launchpad by Adrian Fernandez, Dung Dang, Newness publication ISBN-13: 978-0124115880

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II Year Semester-IV***

**BTEC-404: ELECTRONIC MEASUREMENT AND
INSTRUMENTATION**

UNIT I

Unit, dimensions and standards: Scientific notations and metric prefixes. SI electrical units, SI temperature scales, Other unit systems, dimensions and standards.

Measurement Errors: Gross error, systematic error, absolute error and relative error, accuracy, precision, resolution and significant figures, Measurement error combination, basics of statistical analysis.

PMMC instrument, Galvanometer, DC ammeter, DC voltmeter, series ohm meter.

UNIT II

Transistor voltmeter circuits, AC electronic voltmeter, current measurement with electronic instruments, probes, Digital voltmeter systems, Digital multimeter, digital frequency meter System.

UNIT III

Voltmeter and ammeter methods, Wheatstone bridge, low resistance measurements, Low Resistance Measuring Instruments, AC bridge theory, capacitance bridges, Inductance bridges, Q meter.

UNIT IV

CRO: CRT, Wave Form Display, Time Base, Dual Trace Oscilloscope, measurement of voltage, frequency and phase by CRO, Oscilloscope probes, Delay time based Oscilloscopes, Sampling Oscilloscope, DSO, DSO applications.

UNIT V

Instrument calibration: Comparison method, digital multimeter as standard instrument, calibration instrument, Recorders: X-Y recorders, plotters Transducers.

Text Book:

1. David A. Bell, "Electronic Instrumentation and Measurements", Oxford University Press.
1. Oliver and Cage, "Electronic Measurements and Instrumentation", Tata McGraw Hill Publication.
2. Alan S. Morris, "Measurement and Instrumentation Principles", Elsevier (Buterworth Heinmann).

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II Year Semester-IV

BTEC-405: ELECTROMAGNETIC FIELD THEORY

UNIT I

Coordinate Systems and Transformation :

Basics of Vectors: Addition, subtraction and multiplications; Cartesian, Cylindrical, Spherical transformation.

Vector calculus: Differential length, area and volume, line surface and volume integrals, Del operator, Gradient, Divergence of a vector, Divergence theorem, Curl of a vector, Stokes's theorem, Laplacian of a scalar.

UNIT II

Electrostatic fields: Coulombs law and field intensity, Electric field due to charge distribution, Electric flux density, Gauss's Law- Maxwell's equation, Electric dipole and flux line, Energy density in electrostatic fields, Electric field in material space: Properties of materials, convection and conduction currents, conductors, polarization in dielectrics, Dielectric-constants, Continuity equation and relaxation time, boundary conditions, Electrostatic boundary value problems: Poisson's and Laplace's equations., Methods of Images.

UNIT III

Magneto statics : Magneto-static fields, Biot - Savart's Law, Ampere's circuit law, Maxwell's equation, Application of ampere's law, Magnetic flux density- Maxwell's equation, Maxwell's equation for static fields, magnetic scalar and vector potential.

UNIT IV

Magnetic forces: Materials and devices, Forces due to magnetic field, Magnetic torque and moment, a magnetic dipole. Magnetization in materials, Magnetic boundary conditions, Inductors and inductances, Magnetic energy.

UNIT V

Waves and Applications: Maxwell's equation, Faraday's Law, transformer and motional electromotive forces, Displacement current, Maxwell's equation in final form

Electromagnetic wave propagation: Wave propagation in loss dielectrics, Plane waves in lossless dielectrics Plane wave in free space. Plane waves in good conductors, Power and the pointing vector, Reflection of a plane wave in a normal incidence. Transmission Lines and Smith Chart.

Text Book:

1. MNO Sadiku, "Elements of Electromagnetic", Oxford University Press.

Reference Books:

1. WH Hayt and JA Buck, "Engineering Electromagnetic", McGraw- Hill Education.

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II Year Semester-IV

BTEC - 405: Universal Human Values and Professional Ethics

[L-T-P: 3-0-0]

Course Objectives

UNIT 1: Course Introduction –

Need, Basic Guidelines, Content and Process for Value Education

1. Understanding the need, basic guidelines, content and process for Value Education
2. Self Exploration–what is it? - its content and process; ‘Natural Acceptance’ and Experiential
Validation- as the mechanism for self exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment
of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfill the above human aspirations: understanding and living in **harmony** at various levels

UNIT 2: Understanding Harmony in the Human Being - Harmony in Myself!

7. Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’
8. Understanding the needs of Self (‘I’) and ‘Body’ - *Sukh* and *Suvidha*
9. Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer)
10. Understanding the characteristics and activities of ‘I’ and harmony in ‘I’
11. Understanding the harmony of I with the Body: *Sanyam* and *Swasthya*; correct appraisal of Physical needs, meaning of Prosperity in detail
12. Programs to ensure *Sanyam* and *Swasthya*
- Practice Exercises and Case Studies will be taken up in Practice Sessions.

UNIT 3: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

13. *Understanding Harmony in the family – the basic unit of human interaction*
14. Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*;
Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship
15. Understanding the meaning of *Vishwas*; Difference between intention and competence
16. Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship
17. Understanding the harmony in the society (society being an extension of family): *Samadhan*, *Samridhi*, *Abhay*, *Sah-astitva* as comprehensive Human Goals
18. Visualizing a universal harmonious order in society- Undivided Society (*Akhand Samaj*), Universal Order (*Sarvabhaum Vyawastha*)- from family to world family!
- Practice Exercises and Case Studies will be taken up in Practice Sessions.

UNIT 4: Understanding Harmony in the Nature and Existence - Whole existence as Co-existence

19. Understanding the harmony in the Nature
20. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature
21. Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space
22. Holistic perception of harmony at all levels of existence

- Practice Exercises and Case Studies will be taken up in Practice Sessions.

UNIT 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics

23. Natural acceptance of human values

24. Definitiveness of Ethical Human Conduct

25. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order

26. 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,
- c) Ability to identify and develop appropriate technologies and management patterns for above production systems.

27. Case studies of typical holistic technologies, management models and production systems

28. Strategy for transition from the present state to Universal Human Order:

- a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers
- b) At the level of society: as mutually enriching institutions and organizations

Guidelines and Content for Practice Sessions

UNIT 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

PS 1: Introduce yourself in detail. What are the goals in your life? How do you set your goals in your life? How do you differentiate between right and wrong? What have been your achievements and shortcomings in your life? Observe and analyze them.

Expected outcome: the students start exploring themselves; get comfortable to each other and to the teacher and start finding the need and relevance for the course.

PS 2: Now-a-days, there is a lot of voice about many techno-genic maladies such as energy and natural resource depletion, environmental pollution, global warming, ozone depletion, deforestation, soil degradation, etc. – all these seem to be man-made problems threatening the survival of life on Earth – What is the root cause of these maladies & what is the way out in your opinion?

On the other hand, there is rapidly growing danger because of nuclear proliferation, arms race, terrorism, criminalization of politics, large scale corruption, scams, breakdown of relationships, generation gap, depression & suicidal attempts, etc – what do you think, is the root cause of these threats to human happiness and peace – what could be the way out in your opinion?

Expected outcome: the students start finding that technical education without study of human values can generate more problems than solutions. They also start feeling that lack of understanding of human values is the root cause of all problems and the sustained solution could emerge only through understanding of human values and value based living. Any solution brought out through fear, temptation or dogma will not be sustainable.

PS 3:

1. Observe that each one of us has Natural Acceptance, based on which one can verify right or not right for him. Verify this in case of

- i) What is Naturally Acceptable to you in relationship- Feeling of respect or disrespect?
- ii) What is Naturally Acceptable to you – to nurture or to exploit others?

Is your living the same as your natural acceptance or different?

2. Out of the three basic requirements for fulfillment of your aspirations- right understanding, relationship and physical facilities, observe how the problems in your family are related to each. Also observe how much time & effort you devote for each in your daily routine.

Expected outcome:

1. The students are able to see that verification on the basis of natural acceptance and experiential validation through living is the only way to verify right or wrong, and referring to any external source like text or instrument or any other person cannot enable them to verify with authenticity; it will only develop assumptions.

2. The students are able to see that their practice in living is not in harmony with their natural acceptance most of the time, and all they need to do is to refer to their natural acceptance to remove this disharmony.

3. The students are able to see that lack of right understanding leading to lack of relationship is the major cause of problems in their family and not the lack of physical facilities in most of the cases, while they have given higher priority to earning of physical facilities in their life ignoring relationships and not being aware that right understanding is the most important requirement for any human being.

UNIT 2: Understanding Harmony in the Human Being - Harmony in Myself!

PS 4: List down all your desires. Observe whether the desire is related to Self (I) or Body. If it appears to be related to both, see which part of it is related to Self (I) and which part is related to Body.

Expected outcome: the students are able to see that they can enlist their desires and the desires are not vague. Also they are able to relate their desires to 'I' and 'Body' distinctly. If any desire appears related to both, they are able to see that the feeling is related to I while the physical facility is related to the body. They are also able to see that 'I' and 'Body' are two realities, and most of their desires are related to 'I' and not body, while their efforts are mostly centered on the fulfillment of the needs of the body assuming that it will meet the needs of 'I' too.

PS 5:

1. a. Observe that any physical facility you use, follows the given sequence with time :

Necessary & tasteful → unnecessary & tasteful → unnecessary & tasteless → intolerable

b. In contrast, observe that any feeling in you is either naturally acceptable or not acceptable at all. If naturally acceptable, you want it continuously and if not acceptable, you do not want it any moment!

2. List down all your activities. Observe whether the activity is of 'I' or of Body or with the participation of both 'I' and Body.

3. Observe the activities within 'I'. Identify the object of your attention for different moments (over a period of say 5 to 10 minutes) and draw a line diagram connecting these points. Try to observe the link between any two nodes.

Expected outcome:

1. The students are able to see that all physical facilities they use are required for a limited time in a limited quantity. Also they are able to see that in case of feelings, they want continuity of the naturally acceptable feelings and they do not want feelings which are not naturally acceptable even for a single moment.

2. the students are able to see that activities like understanding, desire, thought and selection are the activities of 'I' only, the activities like breathing, palpitation of different parts of the

body are fully the activities of the body with the acceptance of 'I' while the activities they do with their sense organs like hearing through ears, seeing through eyes, sensing through touch, tasting through tongue and smelling through nose or the activities they do with their work organs like hands, legs etc. are such activities that require the participation of both 'I' and body.

3. The students become aware of their activities of 'I' and start finding their focus of attention at different moments. Also they are able to see that most of their desires are coming from outside (through preconditioning or sensation) and are not based on their natural acceptance.

PS 6:

1. Chalk out programs to ensure that you are responsible to your body- for the nurturing, protection and right utilisation of the body.

2. Find out the plants and shrubs growing in and around your campus. Find out their use for curing different diseases.

Expected outcome: The students are able to list down activities related to proper upkeep of the body and practice them in their daily routine. They are also able to appreciate the plants wildly growing in and around the campus which can be beneficial in curing different diseases.

UNIT 3: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

PS 7: Form small groups in the class and in that group initiate dialogue and ask the eight questions related to trust. The eight questions are :

1a. Do I want to make myself happy?

2a. Do I want to make the other happy?

3a. Does the other want to make him happy?

4a. Does the other want to make me happy?

What is the answer?

Intention (Natural Acceptance)

1b. Am I able to make myself always happy?

2b. Am I able to make the other always happy?

3b. Is the other able to make him always happy?

4b. Is the other able to make me always happy?

What is the answer?

Competence

Let each student answer the questions for himself and everyone else. Discuss the difference between intention and competence. Observe whether you evaluate your intention & competence as well as the others' intention & competence.

Expected outcome: The students are able to see that the first four questions are related to our Natural Acceptance i.e. Intention and the next four to our Competence. They are able to note that the intention is always correct, only competence is lacking! We generally evaluate ourselves on the basis of our intention and others on the basis of their competence! We seldom look at our competence and others' intention as a result we conclude that I am a good person and other is a bad person.

PS 8:

1. Observe on how many occasions you are respecting your related ones (by doing the right evaluation) and on how many occasions you are disrespecting by way of under-evaluation, over-evaluation or otherwise evaluation.

2. Also observe whether your feeling of respect is based on treating the other as yourself or on differentiations based on body, physical facilities or beliefs.

Expected outcome: The students are able to see that respect is right evaluation, and only right evaluation leads to fulfillment in relationship. Many present problems in the society are an outcome of differentiation (lack of understanding of respect), like gender biasness, generation gap, caste conflicts, class struggle, dominations through power play, communal

violence, clash of isms, and so on so forth. All these problems can be solved by realizing that the other is like me as he has the same natural acceptance, potential and program to ensure a happy and prosperous life for him and for others though he may have different body, physical facilities or beliefs.

PS 9:

1. Write a note in the form of story, poem, skit, essay, narration, dialogue to educate a child. Evaluate it in a group.
2. Develop three chapters to introduce 'social science- its need, scope and content' in the primary education of children

Expected outcome: The students are able to use their creativity for educating children. The students are able to see that they can play a role in providing value education for children. They are able to put in simple words the issues that are essential to understand for children and comprehensible to them. The students are able to develop an outline of holistic model for social science and compare it with the existing model.

Module 4: Understanding Harmony in the Nature and Existence - Whole existence as Co-existence

PS 10: List down units (things) around you. Classify them in four orders. Observe and explain the mutual fulfillment of each unit with other orders.

Expected outcome: The students are able to differentiate between the characteristics and activities of different orders and study the mutual fulfillment among them. They are also able to see that human beings are not fulfilling to other orders today and need to take appropriate steps to ensure right participation (in terms of nurturing, protection and right utilization) in the nature.

PS 11:

1. Make a chart for the whole existence. List down different courses of studies and relate them to different units or levels in the existence.
2. Choose any one subject being taught today. Evaluate it and suggest suitable modifications to make it appropriate and holistic.

Expected outcome: The students feel confident that they can understand the whole existence; nothing is a mystery in this existence. They are also able to see the interconnectedness in the nature, and point out how different courses of study relate to the different units and levels. Also they are able to make out how these courses can be made appropriate and holistic.

UNIT 5: Implications of the above Holistic Understanding of Harmony at all Levels of Existence

PS 12: Choose any two current problems of different kind in the society and suggest how they can be solved on the basis of natural acceptance of human values. Suggest steps you will take in present conditions.

Expected outcome: The students are able to present sustainable solutions to the problems in society and nature. They are also able to see that these solutions are practicable and draw roadmaps to achieve them.

PS 13:

1. Suggest ways in which you can use your knowledge of Technology/Engineering/ Management for universal human order, from your family to the world family.
2. Suggest one format of humanistic constitution at the level of nation from your side.

Expected outcome: The students are able to grasp the right utilization of their knowledge in their streams of Technology/Engineering/ Management to ensure mutually enriching and recyclable productions systems.

PS 14: The course is going to be over now. Evaluate your state before and after the course in terms of a. Thought b. Behavior and c. Work d. Realization

Do you have any plan to participate in the transition of the society after graduating from the institute? Write a brief note on it.

Expected outcome: The students are able to sincerely evaluate the course and share with their friends. They are also able to suggest measures to make the course more effective and relevant. They are also able to make use of their understanding in the course for a happy and prosperous society.

Reference Material

The primary resource material for teaching this course consists of

a. The text book

R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174-46781-2

b. The teacher's manual

R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics – Teachers Manual, Excel books, New Delhi, 2010

c. A set of DVDs containing

- Video of Teachers' Orientation Program
- PPTs of Lectures and Practice Sessions
- Audio-visual material for use in the practice sessions

In addition, the following reference books may be found useful for supplementary reading in connection with different parts of the course:

1. B L Bajpai, 2004, *Indian Ethos and Modern Management*, New Royal Book Co., Lucknow. Reprinted 2008.
2. PL Dhar, RR Gaur, 1990, *Science and Humanism*, Commonwealth Purblishers.
3. Sussan George, 1976, *How the Other Half Dies*, Penguin Press. Reprinted 1986, 1991
4. Ivan Illich, 1974, *Energy & Equity*, The Trinity Press, Worcester, and HarperCollins, USA
5. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, *limits to Growth*, Club of Rome's Report, Universe Books.
6. Subhas Palekar, 2000, *How to practice Natural Farming*, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
7. A Nagraj, 1998, *Jeevan Vidya ek Parichay*, Divya Path Sansthan, Amarkantak.
8. E.F. Schumacher, 1973, *Small is Beautiful: a study of economics as if people mattered*, Blond & Briggs, Britain.
9. A.N. Tripathy, 2003, *Human Values*, New Age International Publishers.

Relevant websites, movies and documentaries

1. Value Education websites, <http://uhv.ac.in>, <http://www.uptu.ac.in>
2. Story of Stuff, <http://www.storyofstuff.com>
3. Al Gore, *An Inconvenient Truth*, Paramount Classics, USA
4. Charlie Chaplin, *Modern Times*, United Artists, USA
5. IIT Delhi, *Modern Technology – the Untold Story*
6. *Gandhi A., Right Here Right Now*, Cyclewala Productions

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BTEC-402: DATA STRUCTURE AND ALGORITHMS LAB

1. Run time analysis of Fibonacci Series
2. Study and Application of various data Structure
3. Study and Implementation of Array Based Program
 - a. Searching (Linear Search, Binary Search)
 - b. Sorting (Bubble, Insertion, Selection, Quick, Merge etc)
 - c. Merging
4. Implementation of Link List
 - a. Creation of Singly link list, Doubly Linked list
 - b. Concatenation of Link list
 - c. Insertion and Deletion of node in link list
 - d. Splitting the link list into two link list
5. Implementation of STACK and QUEUE with the help of
 - a. Array
 - b. Link List
6. Implementation of Binary Tree, Binary Search Tree, Height Balance Tree
7. Write a program to simulate various traversing Technique
8. Representation and Implementation of Graph
 - a. Depth First Search
 - b. Breadth First Search
 - c. Prim's Algorithm
 - d. Kruskal's Algorithms
9. Implementation of Hash Table

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BTEC-403: MICROPROCESSORS AND MICROCONTROLLERS LAB

1. To study 8085 microprocessor system.
2. i) Write a program using 8085 Microprocessor for Decimal, Hexadecimal addition and subtraction of two Numbers.
ii) Write a program using 8085 Microprocessor for addition and subtraction of two BCD numbers.
iii) To perform multiplication and division of two 8 bit numbers using 8085.
3. Learn and understand how to configure MSP-EXP430G2 Launchpad digital I/O pins. Write a C program for configuration of GPIO ports for MSP430 (blinking LEDs, push buttons interface).

Exercises:

- a) Modify the delay with which the LED blinks.
 - b) Modify the code to make the green LED blink.
 - c) Modify the code to make the green and red LEDs blink:
 - i. Together
 - ii. Alternately
 - d) Alter the code to turn the LED ON when the button is pressed and OFF when it is released.
 - e). Alter the code to make the green LED stay ON for around 1 second every time the button is pressed.
 - f). Alter the code to turn the red LED ON when the button is pressed and the green LED ON when the button is released.
4. Usage of Low Power Modes:
Configure the MSP-EXP430G2 Launchpad for Low Power Mode (LPM3) and measure current consumption both in active and low power modes. Use MSPEXP430FR5969 as hardware platform and measure active mode and standby mode current.

a) How many Low power modes are supported by the MSP430G2553 platform?

- b) Measure the Active and Standby Current consumption in LPM3 mode for the same application using MSP430F5529 LaunchPad
5. Learn and understand GPIO based Interrupt programming. Write a C program and associated GPIO ISR using interrupt programming technique.

Exercises:

- a) Write the code to enable a Timer interrupt for the pin P1.1.
 - b) Write the code to turn on interrupts globally
6. Implement Pulse Width Modulation to control the brightness of the on-board, green LED. This experiment will help you to learn and understand the configuration of PWM and Timer peripherals of the MSP430G2553.

Exercises:

- a) Observe the PWM waveform on a particular pin using CRO.
- b) What is the maximum resolution of PWM circuitry in MSP430G2 Launchpad?
- c) Change the above code to create a PWM signal of 75% duty cycle on particular PWM pin.

7. The main objective of this experiment is to control the on-board, red LED by the analog input from a potentiometer. This experiment will help you to learn and understand how to configure an ADC to interface with a potentiometer.

Exercises:

- a) Alter the threshold to 75% of Vcc for the LED to turn on.
- b) Modify the code to change the Reference Voltage from Vcc to 2.5V.

8. Learn and understand how to configure the PWM and ADC modules of the MSP-EXP430G2 Launchpad to control the DC motor using external analog input.

Exercises:

- a) What is the maximum resolution of PWM circuitry in MSP430G2 LaunchPad and how it can be achieved using program?
- b) Create a PWM signal of 75% duty cycle on particular PWM pin.
- c) Create Switch case code from the example code to run the DC Motor in 3 set of speeds.

9. Understand the ULP Advisor capabilities and usage of ULP Advisor to create optimized, power-efficient applications on the MSP-EXP430G2 Launchpad.

Exercises:

- a) How does the ULP Advisor software help in designing power-optimized code?
- b) Which ULP rule violation helps us to detect a loop counting violation?
- c) Connect the MSP430 to terminal on PC and echo back the data

10. Configure of Universal Serial Communication Interface (USCI) module of MSP430G2553 for UART based serial communication. The main objective of this experiment is to use UART of the MSP430G2553 to communicate with the computer.

Exercise:

Modify the above code to transmit the set of strings to the serial terminal via UART as shown below:

```
char str1[]="MSP430G2 launchpad"  
char str2[]="Ultra low power mixed signal processing  
applications"
```

11. Understand and Configure 2 MSP430F5529 Launchpads in master-slave communication mode for SPI protocol.

Exercises:

- a) Which port pins of MSP430 can be configured for SPI communication?
- b) What is the data transfer rate supported by MSP430 for SPI communication?

***Department of Electronics Engineering
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P.K. University, Shivpuri (MP)
II Year Semester-IV***

**BTEC-404: ELECTRONIC MEASUREMENT & INSTRUMENTATION
LAB**

1. Study of semiconductor diode voltmeter and its use as DC average responding AC voltmeter.
2. Study of L.C.R. Bridge and determination of the value of the given components.
3. Study of distortion factor meter and determination of the % distortion of the given scillator.
4. Study of the transistor tester and determination of the parameters of the given transistors.
5. Study of the following transducer (i) PT-100 transducer (ii) J- type transducer (iii) K-type transducer (iv) Pressure transducer
6. Measurement of phase difference and frequency using CRO (Lissajous Figure)
7. Measurement of low resistance Kelvin's double bridge.
8. To measure unknown capacitance of small capacitors by using Schering's bridge.
9. To measure unknown Inductance using Hay's bridge.
10. To measure unknown frequency using Wein's frequency bridge.

BTEC-452: ADVANCED ELECTRONICS SYSTEM LAB

Transistor Modeling and Circuits

- Metal Oxide Semiconductor Field Effect Transistors (MOSFETs)
 - *DC biasing of Common Source
 - *MOSFET Common Source Amplifier
 - *MOSFET Source Follower *Current Mirror
- SPICE parameters for MOSFET transistors.
- Step-Down (Buck) DC-DC Converters.
- Step-Up (Boost) DC-DC Converter
- CMOS Amplifier design.

- MOSFET based Ring oscillators
- MOSFET based Relaxation oscillators
 - MOSFET based Voltage-controlled oscillators
- Integration of crystal oscillator into circuits

Data Conversion

- Analog to Digital Conversion
 - * Successive Approximation ADC
- Digital to Analog Conversion
 - * Scaled Resistor Network

- System-level stability: decoupling, ground loops
- Basics of EMC and screening
- Examples of complete electronic systems.

Faculty of Engineering & Technology
P.K.University
Shivpuri (MP)



Evaluation Scheme & Syllabus
Department of Electronics & Communication Engineering
B.Tech. Third Year
(V & VI Sem)
(Effective from session 2019-20)

SEMESTER-V

		THEORY		PRACTICAL		TOTAL
SUBJECT CODE	SUBJECT NAME	SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
BTEC-501	Managerial Economics	30	70	NA	NA	100
BTEC-502	Integrated Circuits	30	70	25	25	150
BTEC-503	Sociology	30	70	NA	NA	100
BTEC-504	Principles of Communication	30	70	25	25	150
BTEC-505	Digital Signal Processing	30	70	25	25	150
BTEC-506	Antenna and Wave Propagation	30	70	NA	NA	100
	CAD of Electronics Lab	NA	NA	25	25	50

SEMESTER- VI

		THEORY		PRACTICAL		TOTAL
SUBJECT CODE	SUBJECT NAME	SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
BTEC-601	Industrial Management	30	70	NA	NA	100
BTEC-602	Microwave Engineering	30	70	25	25	150
BTEC-603	Digital Communication	30	70	25	25	150
BTEC-604	Industrial Electronics	30	70	NA	NA	100
BTEC-605	Control System-I	30	70	25	25	150
	Micro Controller for Embedded System Lab	NA	NA	25	25	50

Department of Electronics Engineering
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III Year Semester-V
BTEC - 501: MANAGERIAL ECONOMICS

L-T-P: 3-0-0

Unit- I : Introduction of Engineering Economics and Demand Analysis: Meaning and nature of Economics, Relation between science, engineering, technology and economics; Meaning of Demand, Determinants of Demand, Shifts in demand, Law of Demand, Price Elasticity of Demand & Types, Income Elasticity, Cross price Elasticity, Determinants of Elasticity, uses and importance of elasticity.

Unit- II : Concept of Supply: Law of Supply, Factors affecting Supply, Elasticity of supply.

Demand Forecasting: Introduction, Meaning and Forecasting, Methods or Techniques of Demand Forecasting, Criteria for Good Demand Forecasting, Demand Forecasting for a New Product;

Unit- III: Cost Analysis- Introduction, Types of Costs, Cost-Output Relationship: Cost Function, Cost-Output Relationships in the Short Run, and Cost-Output Relationships in the Long Run; Short run and long run, Break- Even Analysis; Production functions: laws of variable proportions, law of returns; Economies of scale: Internal and external.

Unit- IV: Market Structure: Market Structure Perfect Competition, Imperfect competition – Monopolistic, Oligopoly, duopoly sorbent features of price determination and various market conditions.

Unit V : Nature and characteristics of Indian economy, concepts of LPG, elementary concepts of National Income, Inflation and Business Cycles ,Concept of N.I. and Measurement., Meaning of Inflation, Types and causes , Phases of business cycle .Investment decisions for boosting economy(National income and per capital income)

References:

1. Premvir Kapoor, Sociology and Economics for Engineers, Khanna Publishing House (Edition 2018)
2. Salvatore D, “Principles of Microeconomics”, Oxford University Press.
3. Koutsoyiannis A, “Modern Microeconomic”, Macmillan Education Ltd.
4. Dwivedi DN, “Principles of Microeconomics”, Pearson Education.
5. Cowell, FA, “Microeconomic Principles and Analysis”, Oxford University Press.

***Department of Electronics Engineering
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P.K. University, Shivpuri (MP)
III Year Semester-V***

BTEC-502: INTEGRATED CIRCUITS

Unit- I: Analog Integrated circuit Design: an overview: Current Mirrors using BJT And MOSFETs, Simple current Mirror, Base current compensated current Mirror, Wilson and Improved Wilson Current Mirrors, Widlar Current source and Cascode current Mirror The 741 IC Op-Amp: Bias circuit, short circuit protection circuitry, the input stage, the second stage, the output stage, and device parameters; DC Analysis of 741: Small Signal Analysis of input stage, the second stage, the output stage; Gain, Frequency Response of 741; a Simplified Model, SlewRate, Relationship Between f_t and SR

Unit- II : Linear Applications of IC op-amps: An Overview of Op-Amp (ideal and non-ideal) based Circuits V-I and I-V converters, generalized Impedance converter, simulation of inductors. **Filters:** First and second order LP, HP, BP BS and All pass active filters, KHN.

Unit- III: Digital Integrated Circuit Design- An Overview: CMOS Logic Gate Circuits: Basic Structure CMOS realization of Inverters, AND, OR, NAND and NOR Gates **Latches and Flip flops:** The Latch, The SR Flip-flop, CMOS Implementation of SR Flip- flops, A Simpler CMOS Implementation of the Clocked SR Flip-flop, D Flip- flop Circuits.

Unit-IV : Non-Linear applications of IC Op-amps: Log–Anti Log Amplifiers, Precision Rectifiers, Peak Detectors, Simple and Hold Circuits, Analog Multipliers and their applications. Op- amp as a comparator, Zero crossing detector, Schmitt Trigger, Astable multi vibrator, Mono stable multi vibrator, Generation of Triangular Waveforms D/A and A/D converters Integrated Circuit Timer: The 555 Circuit, Implementing a Mono stable Multi-vibrator Using the 555 IC, Astable Multi vibrator Using the 555 IC. Phase locked loops (PLL): Ex-OR Gates and multipliers as phase detectors, Block Diagram of IC PLL, Working of PLL and Applications of PLL.

*Department of Electronics Engineering
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III Year Semester-V*

BTEC-503: SOCIOLOGY

Unit- I: Industrial Sociology: Nature, Scope and Importance of Industrial Sociology. Social Relations in Industry, Social Organisation in Industry- Bureaucracy, Scientific Management and Human Relations.

Unit- II: Rise and Development of Industry: Early Industrialism – Types of Productive Systems – The Manorial or Feudal system. The Guild system, The domestic or putting-out system, and the Factory system. Characteristics of the factory system. Causes and Consequences of industrialization. Obstacles to and Limitations of Industrialization.

Unit- III: Industrialization in India. Industrial Policy Resolutions – 1956. Science. Technology and Innovation Policy of India 2013.

Unit- IV: Contemporary Issues: Grievances and Grievance handling Procedure. Industrial Disputes: causes, Strikes and Lockouts. Preventive Machinery of Industrial Disputes: Schemes of Workers Participation in Management- Works Committee, Collective Bargaining, Bi-partite & Tri-partite Agreement, Code of Discipline, Standing Orders. Labour courts & Industrial Tribunals.

Unit-V: Visualizing the future: Models of industrialization- Collectivist, anarchist, free market, environmentalist, etc. Cultural issues, consumer society and sociological concerns.

***Department of Electronics Engineering
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III Year Semester-V***

BTEC-504: PRINCIPLES OF COMMUNICATION

Unit-I: Introduction: Overview of Communication system, Communication channels, Need for modulation, Baseband and Pass band signals, Modulation: Double Amplitude sideband with Carrier (DSB-C), Double side band without Carrier DSB-SC, Single Side Band Modulation SSB, Modulators and Demodulators, Vestigial Side Band (VSB), Quadrature Amplitude Modulator, Radio Transmitter and Receiver.

Unit-II: Angle Modulation, Tone Modulated FM Signal, Arbitrary Modulated FM Signal, Bandwidth of FM Signals using Bessel's functions FM modulators and demodulator approximately Compatible SSB system, Stereophonic FM Broadcasting.

Unit-III: Pulse Modulation, Digital Transmission of Analog Signals: Sampling Theorem and its applications, Pulse Amplitude Modulation (PAM), Pulse Width Modulation, Pulse and digital Position Modulation, Their generation Demodulation, 1 Representation of Analog Signals Pulse Code Modulation (PCM), PCM System Issues in digital transmission: Frequency Division Multiplexing Time Division Multiplexing, T1 Digital System, TDM Hierarchy.

Unit-IV: Differential Pulse Code Modulation, Delta Modulation. Adaptive Delta Modulation, Voice Coders, Sources of Noises, Frequency domain representation of Noise, Super position of Noises, Linear filtering of Noises, Mathematical Representation of Noise.

Text Book:

1. Herbert Taub and Donald L. Schilling, "Principles of Communication Systems", Tata McGraw Hill.
2. Rishabh Anand, Communication Systems, Khanna Publishing House, Delhi

Reference Books:

1. B.P.Lathi, "Modern Digital and Analog Communication Systems", 3rd Edition, Oxford University Press.
2. Simon Haykin, "Communication Systems", 4th Edition, Wiley India.
3. H.P.Hsu & D. Mitra "Analog and Digital Communications", 2nd Edition, Tata McGraw-Hill.

Department of Electronics Engineering
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III Year Semester-V
BTEC-505: DIGITAL SIGNAL PROCESSING

Unit-I: Realization of Digital Systems: Introduction, direct form realization of IIR systems, cascade realization of an IIR systems, parallel form realization of an IIR systems, Ladder structures: continued fraction expansion of $H(z)$, example of continued fraction, realization of a ladder structure, example of a ladder realization, FIR Filter Realization: Direct & Cascade, FIR Linear Phase Realization.

Unit-II: Design of Infinite Impulse Response Digital Filters: Introduction to Filters, Impulse Invariant Transformation, Bi-Linear Transformation, All-Pole Analog Filters: Butterworth and Chebyshev, Design of Digital Butterworth and Chebyshev Filters, Frequency Transformations

Unit-III: The Kaiser Window, Finite Word length effects in digital filters. Finite Impulse Response Filter Design: Windowing and the Rectangular Window, Other Commonly Used Windows, Examples of Filter Designs Using Windows,

Unit-IV: DFT & FFT: Definitions, Properties of the DFT, Circular Convolution, Linear Convolution using Circular Convolution, Decimation in Time (DIT) Algorithm, Decimation in Frequency (DIF) Algorithm.

Unit-V: Multirate Digital Signal Processing: Introduction, Decimation, Interpolation, Sampling rate conversion: Single and Multistage, SubbandCoding of Speech signals, Quadrature mirror filters.

Text Book:

1. Johnny R. Johnson, .Digital Signal Processing., PHI Learning Pvt Ltd., 2009.

Reference Books:

1. John G Prokias, Dimitris G Manolakis, .Digital Signal Processing. Pearson Education.
2. Oppenheim & Schaffer, . Digital Signal Processing. PHI

***Department of Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
III Year Semester-V***

BTEC-506: ANTENNA AND WAVE PROPAGATION

Unit-I: Antennas Basics: Introduction, Basic Antenna Parameters, Patterns, Beam Area (or Beam Solid Angle) Ω_A , Radiation Intensity, Beam Efficiency, Directivity D and Gain G, Directivity and Resolution, Antenna Apertures, Effective Height, The radioCommunication link, Fields from Oscillating Dipole, Single-to-Noise Ratio(SNR), Antenna Temperature, Antenna Impedance.

Unit-II: Application to an Isotropic Source, Radiation Intensity, Arrays of Two Isotropic PointSources, Non-isotropic but Similar Point Sources and the Principle of PatternMultiplication, Pattern Synthesis by Pattern Multiplication, Linear Arrays of n IsotropicPoint Sources of Equal Amplitude and Spacing, Linear Broadside Arrays with Non-uniform Amplitude Distributions. General Considerations.

Unit-III: Electric Dipoles, Thin Liner Antennas and Arrays of Dipoles and Apertures: The Short Electric Dipole, The Fields of a Short Dipole, Radiation Resistance of Short Electric Dipole, Thin Linear Antenna, Radiation Resistance of $\lambda/2$ Antenna, Array of Two Driven $\lambda/2$ Elements: Broadside Case and End-Fire Case, Horizontal Antennas Above a Plane Ground, Vertical Antennas Above a Plane Ground, Yagi-Uda Antenna Design, Long- Wire Antennas, folded Dipole Antennas.

Unit-IV: The Loop Antenna:Design and its Characteristic Properties, Application of Loop Antennas, Far Field Patterns of Circular Loop Antennas with Uniform Current, Slot Antennas, Horn Antennas, Helical Antennas, The Log-Periodic Antenna, Micro strip Antennas. Reflector Antennas: Flat Sheet Reflectors, Corner Reflectors, The Parabola-General Properties, A Comparison Between Parabolic and Corner Reflectors, The Paraboloidal Reflector, Patterns of Large Circular Apertures with Uniform Illumination, Reflector Types (summarized), Feed Methods for Parabolic Reflectors.

Unit-V: Ground Wave Propagation: Plane Earth Reflection, Space Wave and Surface Wave.Space Wave Propagation: Introduction, Field Strength Relation, Effects of ImperfectEarth, Effects of Curvature of Earth.Sky wave Propagation: Introduction structural Details of the ionosphere, Wave Propagation Mechanism, Refraction and Reflection of Sky Waves by ionosphere, Ray Path, Critical Frequency, MUF, LUF, OF, Virtual Height and Skip Distance, Relation Between MUF and the Skip Distance, Multi-Hop Propagation, Wave Characteristics

1. John D Krauss, Ronald J Marhefka and Ahmad S. Khan, “Antennas and Wave Propagation”, Fourth Edition, Tata McGraw Hill.

Reference Books:

1. A. R. Harish, M. Sachidananda, “Antennas and Wave Propagation”, Oxford University Press.
2. Edward Conrad Jordan and Keith George Balmain, “Electromagnetic Waves and Radiating Systems”, PHI.
3. R.L. Yadava, Electromagnetic Waves, Khanna Publishing House, Delhi.
4. A. Das, Sisir K. Das, “Microwave Engineering”, Tata McGraw Hill.

***Department of Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
III Year Semester-V***

BTEC502: INTEGRATED CIRCUIT LAB

Objective: - To design and implement the circuits to gain knowledge on performance of the circuit and its application. These circuits should also be simulated on Pspice and implemented using TL082, LM741, NE555, ASLK, MPY634 KP connecting wires, Power Supply, function generator and oscilloscope.

1. Design and test a function generator that can generate square wave and triangular wave output for a given frequency and cascade a multiplier MPY634KP in feedback loop to form VCO
2. Voltage to current and current to voltage convertors.
3. Second order filters using operational amplifier in universal active filter topology for-
 - a) Low pass filter of specified cut off frequency.
 - b) High pass filter of specified frequency.
 - c) Band pass filter with unit gain of specified pass band
 - d) Design a notch filter to eliminate 50Hz power line frequency.
4. Wien bridge oscillator using operational amplifier.
5. Astable and mono-stable multivibrators using IC 555.
6. Design the following amplifiers:
 - a) A unity gain amplifier.
 - b) A non-inverting amplifier with a gain of "A".
 - c) An inverting amplifier with a gain of "A".
 - d) Log and antilog amplifiers.
 - e) Voltage comparator and zero crossing detectors.
7. Design and test a PLL to get locked to a given frequency „f”. Measure the locking range of the system and also measure the change in phase of the output signal as input frequency is varied within the lock range.
8. Design and test the integrator for a given time constant. Design and test a high-Q Band pass self-tuned filter for a given center frequency.
9. Design and test an AGC system for a given peak amplitude of sine-wave output.
10. Design and test a Low Dropout regulator using op-amps for a given voltage regulation characteristic and compare the characteristics with TPS7250IC.
11. Design of a switched mode power supply that can provide a regulated output voltage for a given input range using the TPS40200 IC.

Department of Electronics Engineering
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III Year Semester-V

BTEC-504: PRINCIPLES OF COMMUNICATION LAB

List of Experiments

1. To study DSB/ SSB amplitude modulation & determine its modulation factor & power in side bands.
2. To study amplitude demodulation by linear diode detector.
3. To study frequency modulation and determine its modulation factor.
4. To study PLL 565 as frequency demodulator.
5. To study sampling and reconstruction of Pulse Amplitude modulation system.
6. To study the Sensitivity, Selectivity, and Fidelity characteristics of super heterodyne receiver.
7. To study Pulse Amplitude Modulation.
 - a) using switching method
 - b) by sample and hold circuit
8. To demodulate the obtained PAM signal by 2nd order LPF.
9. To study Pulse Width Modulation and Pulse Position Modulation.
10. To study Pulse code modulation and demodulation technique.
11. To study Delta modulation and demodulation technique.
12. Design and implement an FM radio receiver in 88-108 MHz

***Department of Electronics Engineering
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Semester-V***

BTEC-505: DIGITAL SIGNAL PROCESSING LAB

List of Experiments

1. To study about DSP Processors and architecture of TMS320C6713 DSP processor.
2. Introduction to MATLAB and Code Composer Studio or its equivalent open source software.

OR

3. Write a Program for the generation of basic signals such as unit impulse, unit step, ramp, exponential, sinusoidal and cosine.
4. To study matrix multiplication using code composer studio.
5. Evaluate 4 point DFT of and IDFT of $x(n) = 1, 0 \leq n \leq 3; 0$ elsewhere.
6. To implement FFT algorithm.
7. Verify Blackman and Hamming windowing techniques.
8. Implement IIR Butterworth analog Low Pass for a 4 KHz cut off frequency.
9. Verify Circular Convolution using code composer studio.
10. Verify Linear convolution of two sequence using code composer studio.
11. To implement Tone Generation.
12. To implement floating point arithmetic.

Spoken Tutorial (MOOCs):

Spoken Tutorial MOOCs, ' Course on Scilab', IIT Bombay (<http://spoken-tutorial.org/>)

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III Year Semester-V***

CAD OF ELECTRONICS LAB

PSPICE Experiments

1. (a) Transient Analysis of BJT inverter using step input.
(b) DC Analysis (VTC) of BJT inverter with and without parameters.
2. (a) Transient Analysis of NMOS inverter using step input. (b) Transient Analysis of NMOS inverter using pulse input.
(c) DC Analysis (VTC) of NMOS inverter with and without parameters.
3. (a) Analysis of CMOS inverter using step input.
(b) Transient Analysis of CMOS inverter using step input with parameters.
(c) Transient Analysis of CMOS inverter using pulse input.
(d) Transient Analysis of CMOS inverter using pulse input with parameters.
(e) DC Analysis (VTC) of CMOS inverter with and without parameters.
4. Transient & DC Analysis of NOR Gate inverter.
5. Transient & DC Analysis of NAND Gate.
6. Design and Simulation of a Differential Amplifier (with Resistive Load, Current Source Biasing)
7. Analysis of frequency response of Common Source amplifiers.
8. Analysis of frequency response of Source Follower amplifiers.
9. Analysis of frequency response of Cascode amplifiers.
10. Analysis of frequency response of Differential amplifiers.

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III Year Semester-VI*

BTEC-601: INDUSTRIAL MANAGEMENT

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

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

Unit-V: Project Management: Project network analysis, CPM, PERT and Project crashing and resource Leveling

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III Year Semester-VI***

BTEC- 602: MICROWAVE ENGINEERING

Unit-I: Rectangular & circular wave guides:

Introduction to microwave communication and EM spectrum, Rectangular wave guide: Field Components, TE, TM Modes, Dominant TE₁₀ mode, Field Distribution, Power, Attenuation. Circular waveguides: TE, TM modes. Wave velocities, Microstrip transmission line (TL), Coupled TL, Strip TL Coupled strip line, Coplanar TL, Microwave cavities.

Unit-II: Passive microwave devices: Scattering matrix, Passive microwave devices: Microwave hybrid circuits, Terminations, Attenuators, Phase Shifters, Directional couplers: Two-hole directional couplers, S- Matrix of a directional coupler, Hybrid couplers, Microwave propagation in ferrites, Faraday rotation, Isolators, Circulators. S-parameter analysis of all components.

Unit-III: Microwave tubes : Microwave tubes: Limitations of conventional active devices at microwave frequency, Two cavity Klystron, Reflex Klystron, Magnetron, Traveling wave tube, Backward wave oscillators, Gyro Devices: Their schematic, Principle of operation, Performance characteristic and their application.

Unit-IV: Solid state amplifiers and oscillators: Transferred electron devices: Gunn- effect diodes & modes of operation. Avalanche transit – time devices: IMPATT diode, TRAPPAT diode, BARITT diode.

Unit-V: Microwave Measurements: VSWR meter, Frequency meter, Spectrum analyser, Network analyser, Tunable detector, Slotted line carriage, Power meter, Microwave power measurement Insertion loss and attenuation measurement, VSWR measurement, Return loss measurement by a reflectometer, Frequency measurement, measurement of cavity Q, Dielectric constant measurement of a solid, EM radiation & measurement.

Text Books:

1. G. S. Raghuvanshi, Microwave Engineering; Cengage
2. S.Y. Liao, Microwave Devices & Circuits; PHI 3rd Ed.

Reference Books:

1. A Das and S.K. Das, Microwave Engineering; McGraw Hill Education
2. S. Vasuki, D Margaret Helena, R Rajeswari, Microwave Engineering; MHE
3. M.I. Skolnik, Introduction to Radar Engineering ; TMH

Department of Electronics Engineering
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III Year Semester-VI

BTEC- 603: DIGITAL COMMUNICATION

Unit I: Principles of digital data transmission: Digital Data transmission, Line coding review, Pulse Digital receivers, Eye Digital carrier system. Method shaping, Scrambling, diagram, of generation and detection of coherent & non-coherent binary ASK, FSK & PSK, Differential phase shift keying, Quadrature modulation techniques. (QPSK and MSK), M-ary Digital carrier Modulation.

Unit-II: Fundamentals of probability theory & random process : Concept of Probability, Random variable, statistical average, correlation, sum of central limit Theorem, Random Process classification of Random Processes Power spectral density, Multiple random processes.

Unit-III: Performance Analysis of Digital communication system: Optimum linear Detector for Binary polar signaling, General Binary Signaling, Coherent Receivers for Digital Carrier Modulations, Signal Space Analysis of Optimum Detection, Vector Decomposition of white noise Random processes, general Expression for Probability of optimum receivers.

Unit-IV: Spread spectrum Communications: Frequency Hopping Spread Spectrum(FHSS) systems, Direct Sequence Spread Spectrum, Code Division Multiple Access of DSSS, Multiuser Detection, OFDM Communications
Introduction to information theory: Measure of Information, Source Encoding, Error Free Communication over a Noisy Channel. Capacity of a discrete and Continuous Memory less channel.

Unit-V: Error Correcting codes: Hamming sphere, hamming distance and Hamming bound, relation between minimum distance and error detecting and correcting capability Linear block codes: encoding and syndrome decoding. Cyclic codes: encoder and decoder for systematic cyclic codes. Convolution codes, code tree and Trellis diagram, Viterbi and sequential decoding, Burst error correction, Turbo codes.

Text Book:

1. B.P. Lathi, "Modern Digital and Analog communication Systems", 4th Edition, Oxford University Press, 2010.
2. RishabhAnand, Communication Systems, Khanna Publishing House, Delhi.

Reference Books:

1. H. Taub, D L Schilling, GautamSaha, "Principles of Communication", 3rd Edition, Tata McGraw-Hill Publishing Company Ltd.
2. John G. Proakis, "Digital Communications", 4th Edition, McGraw-Hill International.
3. Simon Haykin, "Communication Systems", 4th Edition, Wiley India.
4. H P HSU & D Mitra, "Analog and Digital Communications", 2nd Edition, Tata McGraw-Hill Publishing Company Ltd.

***Department of Electronics Engineering
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P.K. University, Shivpuri (MP)
III Year Semester-VI***

BTEC-604: INDUSTRIAL ELECTRONICS

Unit-I: Power Semiconductor Devices: Power semiconductor devices their symbols and static characteristics and specifications of switches, types of power electronic circuits Operation, steady state & switch characteristics & switching limits of Power Transistor Operation and steady state characteristics of Power MOSFET and IGBT Thyristor – Operation V- I characteristics, two transistor model, methods of turn-on Operation of GTO, MCT and TRIAC.

Unit-II: Phase Controlled Rectifiers: Phase Angle Control, Single-phase Half-wave Controlled Rectifier (One quadrant), Single-phase Full-wave Controlled Rectifier (Two quadrant Converters), Performance Factors of Line-commutated Converters, The Performance Measures of Two-pulse Converters, Three phase Controlled Converters Inverters: Introduction Thyristor Inverter Classification, Series Inverters, Parallel Inverter, Three-phase Bridge Inverters, Three-phase Bridge Inverter with Input-circuit Commutation.

Unit-III: Choppers: Introduction, Principle of Chopper Operation, Control Strategies, stepup/Down Chopper, Jones Chopper. Introduction to basic Cycloconverters. Control of D.C. Drives: Introduction, Basic Machine Equations, Braking Modes, Schemes for D.C. Motor Speed Control, Single-phase Separately Excited Drives, Braking Operation of Rectifier Controlled Separately excited Motor, Single-phase Separately Excited Drives, Power Factor Improvement, Three-phase Separately Excited Drives, D.C. Chopper Drives

Unit-IV: Rotor Design, Speed Control of Induction Motors, stator Voltage Control, Variable Frequency control, Rotor Resistance Control, Slip Power Recovery Scheme, Synchronous Motor Drives

Unit-V: Protection of device and circuits: Introduction, Cooling and heat sinks, Thermal Modeling of Power Switching devices, Snubber Circuits, Reverse Recovery Transients, Supply- and Load- side Transients, Voltage Protection, Current Protections, Electromagnetic Interference.

Text Books:

1. M. H. Rashid, "Power Electronics", 3rd Edition, Pearson Education.
2. M. D. Singh & K. Khanchandani, "Power Electronics", Tata McGraw Hill.

Reference Books:

1. V.R. Moorthy, "Power Electronics: Devices, Circuits and Industrial Applications", Oxford University Press, 2007.
2. M.S. Jamil Asghar, "Power Electronics", PHI.
3. Chakrabarti & Rai, "Fundamentals of Power Electronics & Drives" Dhanpat Rai & Sons.
4. Ned Mohan, T.M. Undeland and W.P. Robbins, "Power Electronics: Converters, Applications and Design", Wiley India.
5. S.N. Singh, "A Text Book of Power Electronics", Dhanpat Rai & Sons.

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III Year Semester-VI***

BTEC-605: CONTROL SYSTEM-I

Unit-I: Basic Components of a control system, Feedback and its effect, types of feedback control systems. Block diagrams Reduction and signal flow graphs, Modeling of Physical systems: electrical networks, mechanical systems elements, equations of mechanical systems, sensors and encoders in control systems, DC motors in control systems, Analogous Systems.

Unit-II: State-Variable Analysis: Vector matrix representation of state equation, state transition matrix, state-transition equation, relationship between state equations and high-order differential equations, relationship between state equations and transfer functions. Similarity Transformation, Decomposition of transfer functions, Controllability and observability, Eigen Value and Eigen Vector, Diagonalization.

Unit-III: Time domain Analysis of Control Systems: Time response of continuous data systems, typical test signals for the time response of control systems, the unit step response and time-domain specifications, Steady-State error, time response of a first order system, transient response of a prototype second order system.

Unit-IV: Stability of Linear Control Systems: Bounded-input bounded-output stability continuous data systems, zero-input and asymptotic stability of continuous data systems, Routh Hurwitz criterion. Root-Locus Technique: Introduction, Properties of the Root Loci, Design aspects of the Root Loci

Unit-V: Frequency Domain Analysis: M_r (resonant peak) and ω_r (resonant frequency) and bandwidth of the prototype Second order system, effects of adding a zero to the forward path, effects of adding a pole to the forward path, Polar Plot, Nyquist stability criterion, relative stability: gain margin and phase margin, stability analysis with the Bode plot.

Text Book:

1. B.C. Kuo & Farid Golnaraghi, "Automatic Control Systems", 8th Edition, John Wiley India, 2008.

Reference Books:

1. I. J. Nagrath & M. Gopal, "Control System Engineering", New Age International Publishers
2. A. Ambikapathy, Control Systems, Khanna Publishing House, Delhi.
2. Joseph J. Distefano III, Allen R. Stubberud, Ivan J. Williams, "Control Systems" Schaums Outlines Series, 3rd Edition, Tata McGraw Hill, Special Indian Edition 2010.
3. William A. Wolovich, "Automatic Control Systems", Oxford University Press, 2010.

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BTEC- MICROWAVE ENGINEERING LAB

List of Experiments

1. To study microwave test bench.
2. To study the characteristics of reflex klystron tube and to determine its electronic tuning range.
3. To determine the frequency and wavelength in a rectangular waveguide working on TE₀₁ mode.
4. To study measurement of reflection coefficient and standing wave ratio using double minima method.
5. To study V-I characteristic of Gunn diode.
6. To measure an unknown impedance with Smith chart.
7. Study of Circulator/Isolator.
8. Study of Attenuator (Fixed and Variable type).
9. To study simple dipole antenna and to calculate beam-width, front / back ratio, and gain of the antenna.
10. To study folded dipole antenna and to calculate beam-width, front / back ratio, and gain of the antenna.
11. To study 2 phase array end-fire antenna and to calculate beam-width, front / back ratio, and gain of the antenna.
12. To study broadside array antenna and to calculate beam-width, front / back ratio, and gain of the antenna.

BTEC- DIGITAL COMMUNICATION LAB

List of Experiments

1. To construct a Square wave with the help of Fundamental Frequency and its Harmonic component
2. Study of pulse data coding & decoding techniques for NRZ and RZ formats.
3. Study of Manchester coding and Decoding.
4. Study of Amplitude shift keying modulator and demodulator.
5. Study of Frequency shift keying modulator and demodulator.
6. Study of Phase shift keying modulator and demodulator.
7. Study of single bit error detection and correction using Hamming code.
8. Study of Quadrature Phase shift keying modulator and demodulator.
9. To simulate Differential Phase shift keying technique using MATLAB software.
10. To simulate M-ary Phase shift keying technique using MATLAB software (example 8PSK, 16PSK) and perform BER calculations.
11. To simulate convolutional coding using MATLAB software.
12. Design a front end BPSK modulator and demodulator.

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BTEC-CONTROL SYSTEM - I LAB

List of Experiments:

1. Different Toolboxes in MATLAB, Introduction to Control Systems Toolbox or its equivalent open source freeware software like Scilab using Spoken Tutorial MOOCs.
2. Determine transpose, inverse values of given matrix.
3. Plot the pole-zero configuration in s-plane for the given transfer function.
4. Determine the transfer function for given closed loop system in block diagram representation.
5. Plot unit step response of given transfer function and find delay time, rise time, peak time and peak overshoot.
6. Determine the time response of the given system subjected to any arbitrary input.
7. Plot root locus of given transfer function, locate closed loop poles for different values of k . Also find out ω_d and ω_{nat} for a given root.
8. Create the state space model of a linear continuous system.
9. Determine the State Space representation of the given transfer function.
10. Plot bode plot of given transfer function. Also determine the relative stability by measuring gain and phase margins.
11. Determine the steady state errors of a given transfer function.
12. Plot Nyquist plot for given transfer function and to discuss closed loop stability. Also determine the relative stability by measuring gain and phase margin.

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BTEC- MICROCONTROLLERS FOR EMBEDDED SYSTEMS LAB

1. Write a program of Flashing LED connected to port 1 of the 8051 Micro Controller
2. Write a program to generate 10 kHz square wave using 8051.
3. Write a program to show the use of INT0 and INT1 of 8051.
4. Write a program for temperature & to display on intelligent LCD display.
5. Write a program to generate a Ramp waveform using DAC with micro controller.
6. Write a program to Interface GPIO ports in C using MSP430 (blinking LEDs , push buttons)
7. Write a program Interface potentiometer with GPIO.
8. Write a program of PWM based Speed Control of Motor controlled by potentiometer connected to GPIO.
9. Write a program of PWM generation using Timer on MSP430 GPIO.
10. Write a program to Interface an accelerometer.
11. Write a program using USB (Sending data back and forth across a bulk transfer-mode USB connection.)
12. Write a program for Master Slave Communication between 2 MSP430s using SPI
13. Write a program of basic Wi-Fi application – Communication between two MSP430 based sensor nodes.
14. Setting up the CC3100 as a HTTP server.

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Evaluation Scheme & Syllabus
Department of Electronics & Communication Engineering
B.Tech. Forth Year
(VII & VIII Sem)
(Effective from session 2019-20)

SEMESTER-VII

		THEORY		PRACTICAL		TOTAL
SUBJECT CODE	SUBJECT NAME	SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
BTEC-701	Entrepreneurship Development	30	70	NA	NA	100
BTEC-702	Digital Image Processing	30	70	NA	NA	100
BTEC-703	Optical Communication	30	70	25	25	150
BTEC-704	Data Communication Networks	30	70	NA	NA	100
BTEC-705	VLSI Design	30	70	NA	NA	100
	Electronic Circuit Design Lab	NA	NA	25	25	50
	Mini project	NA	NA	25	25	50
	Industrial training	NA	NA	25	25	50

SEMESTER- VIII

		THEORY		PRACTICAL		TOTAL
SUBJECT CODE	SUBJECT NAME	SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
BTEC-801	Non-Conventional Energy Resources	30	70	NA	NA	100
BTEC-802	Satellite & RADAR systems	30	70	NA	NA	100
BTEC-803	Wireless & Mobile Communication	30	70	NA	NA	100
BTEC-804	Optical Network	30	70	NA	NA	100
	Project	NA	NA	25	25	50

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BTEC-701: ENTREPRENEURSHIP DEVELOPMENT

UNIT -I

Entrepreneurship- definition. growth of small scale industries in developing countries and their positions vis-a-vis large industries; role of small scale industries in the national economy; characteristics and types of small scale industries; demand based and resources based ancillaries and sub-control types. Government policy for small scale industry; stages in starting a small scale industry.

UNIT -II

Project identification- assessment of viability, formulation, evaluation, financing, field-study and collection of information, preparation of project report, demand analysis, material balance and output methods, benefit cost analysis, discounted cash flow, internal rate of return and net present value methods.

UNIT -III

Accountancy- Preparation of balance sheets and assessment of economic viability, decision making, expected costs, planning and production control, quality control, marketing, industrial relations, sales and purchases, advertisement, wages and incentive, inventory control, preparation of financial reports, accounts and stores studies.

UNIT -IV

Project Planning and control:

The financial functions, cost of capital approach in project planning and control. Economic evaluation, risk analysis, capital expenditures, policies and practices in public enterprises. profit planning and programming, planning cash flow, capital expenditure and operations. control of financial flows, control and communication.

UNIT -V

Laws concerning entrepreneur viz, partnership laws, business ownership, sales and income taxes and workman compensation act. Role of various national and state agencies which render assistance to small scale industries.

Text / Reference Books:

- I Forbat, John, "Entrepreneurship" New Age International.
- J Havinal, Veerbhadrapa, "Management and Entrepreneurship" New Age International
- K Joseph, L. Massod, "Essential of Management", Prentice Hall of India.

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BTEC-702: DIGITAL IMAGE PROCESSING

- I. **Introduction:** Overview of Image Processing, Nature of Image Processing, & Application area of image processing, Digital Image Representation, Types of images, Digital Image Processing Operations, Fundamental steps in DIP, Overview of Digital Image Systems, Physical Aspect of Image Acquisition, and biological Aspect of Image Acquisition, sampling & quantization, Digital Halftone Process, Image storage and File formats.
- II **Image Transforms:** Need for image transforms, Properties of Fourier & transform, Discrete cosine transform, Discrete sine transform, Hadamard transform, Haar transform, Slant transform, SVD and KL transforms, Comparison between transforms.
Image Enhancement: Image Quality and Need for image enhancement, Image enhancement operations, Image enhancement in spatial domain, histogram based techniques, Spatial Filtering concepts, Image smoothing spatial filters, Image Sharpening spatial filters, Image smoothing in frequency domain filtering, Image sharpening in frequency domain, Homomorphism filtering.
- III **Image Restoration:** Introduction to degradation, Types of Image & degradations, image degradation models, noise modeling, Estimation of degradation functions, Image restoration in presence of noise only, Periodic noise and band – pass and band reject filtering, difference between enhancement & restoration, Image restoration techniques.
- IV **Image Compression:** Image compression model, Compression algorithms & and its types, Type of redundancy, lossless compression algorithms, Lossy compression algorithms, Image and video compression standards.
- V **Image Segmentation:** Introduction, Detection of Discontinuities, Edge & Detection, Hough Transforms and Shape Detection, corner detection, Principle of thresholding, Principle of region - growing.

Text Books:

1. S. Sridhar, “Digital Image Processing”, OXFORD University Press, Second Edition.
2. Rafael C. Gonzalez Richard E woods Steven L. Eddins, “Digital Image”, Pearson.
3. Rafael C. Gonzalez Richard E woods Steven L. Eddins, “Digital Image Processing Using MATLAB”, Mc Graw Hill, 2nd Edition.
4. Anil K Jain, “Fundamentals of Digital Image Processing”, Pearson.

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BTEC- 703: OPTICAL COMMUNICATION

Unit-I: Overview of optical fiber communication: The general system, Advantages of optical fiber communication. Optical spectral band. Optical Fiber waveguides: Introduction, Ray theory transmission Total internal reflection, acceptance angle, numerical aperture, skew rays. Electromagnetic mode theory for optical propagation: Electromagnetic waves, modes in a planar guide, phase and group velocity, phase shift with total internal reflection and the evanescent field, Goos-Hänchen shift.

Unit-II: Cylindrical Fiber: modes, mode coupling, step index fibers Graded index fibers, Single mode Fiber: Cut-off wavelength, Mode field diameter and spot size, effective refractive index, Group delay and mode delay factor, The Gaussian approximation, equivalent step index methods. Signal distortion in optical fibers - Attenuation, Material Absorption, losses in silica glass fibers; Intrinsic absorption, Extrinsic absorption. Linear scattering losses; Ray light scattering, Mie scattering. Non linear Scattering losses: fiber bending losses; Dispersion, Chromatic dispersion: material dispersion, waveguide dispersion. Intermodal dispersion: Multimode step index fiber, Multimode graded index fiber. Overall fiber dispersion Multimode fiber, Dispersion modified single mode fibers, Dispersion-shifted fiber, dispersion flattened fibers, nonzero-dispersion- shifted fibers (NZ-DSF), Polarization: Fiber birefringence, polarization mode dispersion, polarization- maintaining fibers, Non linear effects: Scattering effects, Kerr effects.

Unit-III: Optical sources - Light Emitting Diodes (LEDs): Structures, light source materials, Quantum Efficiency on LED Power Modulation of a LED, Laser Diodes- models and threshold conditions, laser diode rate equations, External quantum efficiency, resonant frequency, laser diode structures and radiation patterns, single mode lasers modulation of laser diodes, laser lines.

Unit-IV: Source to fiber power launching, Source Output patterns, Power coupling calculation, Power launching versus wavelength, equilibrium numerical aperture. Photo detectors: Physical principles of photodiodes: The PIN photo detector, Avalanche photodiodes. Photo detector Noise: Noise sources, signal to noise ratio.
Detector Response time: Depletion layer photocurrent, response time structure of in GaAs APDs, Temperature effect on Avalanche gain, comparison of photo detectors.

Unit-V: Optical receiver operation: Fundamental receiver operation: Digital signal transmission, error sources, front end amplifier. Digital receiver performance: Probability of error receiver sensitivity, The Quantum Unit. Eye Diagram: Eye Pattern Features, BER and Q Factor Measurement Coherent Detection: Fundamental concepts, Homodyne detection, heterodyne detection, BER comparisons. Digital links: Point to point links, power penalties.

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BTEC- 704: DATA COMMUNICATION NETWORKS

Unit-I: Communication problem and system models, components of communication systems, communication channels and their characteristics, mathematical models for communication channels, multiple access techniques, link budget analysis

Unit-II: Representation of deterministic and stochastic signals, random noise characterization in communication systems, signal-to-noise ratio, characterization of communication signals and systems: signal space representations, representation of analog and digitally modulated signals, spectral characteristics of modulated signals Coding, Channel Coding (Hamming codes)

Unit-III: Optimal receivers: Receivers for signals corrupted by AWGN, Error performance Analysis of receivers for memory-less modulation, optimal receivers for modulation methods with memory, OFDM, MIMO, Source Ethernet and Wireless LANs; Hubs, bridges and switches

Unit-IV: Error Control, Flow Control, Sliding Window Protocols, HDLC, PPP, Local area networks: Ethernet, Fast Ethernet, Token Ring, Introduction to Gigabit

Unit-V: MAC Layer

Static Channel Allocation in LANs and MANs, Dynamic Channel Allocation in LANs and MANs, ALOHA, Carrier Sense Multiple Access Protocols, Collision-Free Protocols, Limited-Contention Protocols, Wavelength Division Multiple Access Protocols, Wireless LAN Protocols, IEEE Standard 802.3

Text Books:

1. Madhow, U., (2008), Fundamentals of Digital Communication, Cambridge University Press
2. Lathi, B. P. & Ding, Z., (2010), Modern Digital and Analog Communication Systems, Oxford University Press
3. Stallings, W., (2010), Data and Computer Communications, Pearson.
4. Andrew S. Tanenbaum, "Computer Networks" Pearson.
5. Ajit Pal, "Data Communication and Computer Networks", PHI
6. Dimitri Bertsekas, Robert G. Gallager, "Data Networks", Prentice Hall, 1992

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BTEC-705 :VLSI DESIGN

Unit-I: Introduction: A Brief History, Preview, MOS Transistors, CMOS Logic, CMOS Fabrication and Layout, Design Partitioning, Logic Design, Circuit Design, Physical Design, Design Verification, Fabrication, Packaging and Testing.

Unit-II: Delay: Introduction, Transient Response, RC delay model, Linear Delay Energy – Delay Optimization, Low Power Architectures.

Interconnect: Introduction, Interconnect Modelling, Interconnect Impact, Interconnect Engineering, Logical Effort with Wires

Unit-III: Energy – Delay Optimization, Low Power Architectures. Interconnect: Introduction, Interconnect Modelling, Interconnect Impact, Interconnect Engineering, Logical Effort with Wires

Unit-IV: Dynamic logic circuits: Introduction, basic principle of pass transistor circuits, synchronous dynamic circuit techniques, dynamic CMOS circuit techniques, domino CMOS logic. Semiconductor memories: Introduction, DRAM, SRAM, ROM, flash memory.

Unit-V: Low – Power CMOS Logic Circuits: Introduction, Overview of Power Consumption, Low – Power Design through voltage scaling, Estimation and Optimization of switching activity, Reduction of Switched Capacitance and Adiabatic Logic Circuits. Design for Testability: Introduction, Fault Types and Models, Controllability and Observability, Ad Hoc Testable Design Techniques, Scan Based and BIST Techniques

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BTEC- OPTICAL COMMUNICATION LAB

Part - A

1. Familiarisation of different types of cables and different commands.
 - a) Identify Cat5 cable , RJ 45 Connector , Crimping Tool , Wire Stripper
 - b) Use Wire Stripper for Cutting wire shield and Understanding of Internal Structure of Cat 5 Cable
 - c) Finding Pin No-1 on RJ 45 Connector and Inserting Wires in connector
 - d) Crimping of RJ45 connector using Crimping tool
 - e) Preparation of Straight cable (used for Dissimilar devices such as PC to Switch , PC to router) and Cross cables (used for similar devices such as PC to PC , Router to Router , Switch to Switch)
 - f) Understand different commands like ping, tracert, ifconfig, dig etc..
2. Making a subnet and configuring router
 - a) Understand the working of a router & method to access the router via console or using telnet, different types of cables used for connectivity.
 - b) Different types of show commands & their purpose.
 - c) Assignment of IP address and enabling layer 3 connectivity.
 - d) Implement sub netting
3. Configuring web and DHCP servers
 - a) Understand Internet Information Services tool and its installation.
 - b) To configure web services using IIS tool.
 - c) Configure DHCP
4. Configuring VLAN
 - a) Understand the configuration of Vlan in a switch
 - b) How to make the port of a switch as an access port & a trunk port, purpose of the Vlan in a network
 - c) Different types of show commands & their purpose.
5. To implement a simple file transfer protocol (FTP) using connection oriented and connectionless sockets.
6. To develop a concurrent file server that spawns several threads, one for each client requesting a specific file.
7. To develop a simple chatting application using (i) Connection oriented and (ii) Connectionless sockets

Part – B (Any 4 Experiments):

1. To setting up fiber optic analog link.
2. Study and measurement of losses in optical fiber.
3. Study and measurement of numerical aperture of optical fiber.
4. Study and perform time division multiplexing (digital).
5. Study of framing in time division multiplexing.
6. Study of Manchester coding and decoding.
7. Study of voice coding and codec chip.
8. Study and measure characteristics of fiber optic LED's and photo detector.

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BTEC- ELECTRONICS CIRCUIT DESIGN LAB

In this practical course students will carry out a design oriented project work using various analog/ digital building blocks which they have already studied in their analog electronic/ digital electronic courses such as Electronic circuits, integrated circuits and filter design.

The project may include but not restricted to any of the following:

1. Universal op-amp based biquad
2. Universal OTA biquad
3. Amplitude control or stabilization applied to any sinusoidal oscillators
4. Op-amp/ OTA based function generator
5. Any application of log/antilog circuits
6. Any applications of analog multiplier/ divider
7. Any digital system design and its hardware implementation using TTL/ CMOS ICs
8. Any circuit idea (not studied in the course) using 555 Timer in conjunction with any other ICs

The above must include

1. Design the circuit.
2. Make hardware and measure various parameters.
3. Simulation in Spice of the designed circuit.
4. Comparison of measured and simulated results.

A report is to be made for evaluation.

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MINI PROJECT

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INDUSTRIAL TRAINING

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BTEC- 801: NON-CONVENTIONAL ENERGY RESOURCES

L T P 3 1 0

UNIT-I Introduction

Various non-conventional energy resources- Introduction, availability, classification, relative merits & demerits.

Solar Cells: Theory of solar cells. solar cell materials, solar cell array, solar cell power plant, limitations.

UNIT-II Solar Thermal Energy:

Solar radiation, flat plate collectors and their materials, applications and performance, focusing of collectors and their materials, applications and performance; solar thermal power plants, thermal energy storage for solar heating and cooling, limitations.

UNIT-III Geothermal Energy:

Resources of geothermal energy, thermodynamics of geo-thermal energy conversion-electrical conversion, non-electrical conversion, environmental considerations.

Magneto-hydrodynamics (MHD):

Principle of working of MHD Power plant, performance and limitations.

Fuel Cells:

Principle of working of various types of fuel cells and their working, performance and limitations.

UNIT-IV

Thermo-electrical and thermionic Conversions:

Principle of working, performance and limitations.

Wind Energy:

Wind power and its sources, site selection, criterion, momentum theory, classification of rotors, concentrations and augments, wind characteristics. performance and limitations of energy conversion systems.

UNIT-V

Bio-mass:

Availability of bio-mass and its conversion theory.

Ocean Thermal Energy Conversion (OTEC):

Availability, theory and working principle, performance and limitations.

Wave and Tidal Wave:

Principle of working, performance and limitations.

Waste Recycling Plants.

Text/References Books:

1. Raja etal, "Introduction to Non-Conventional Energy Resources" Scitech Publications.
2. John Twideu and Tony Weir, "Renewal Energy Resources" BSP Publications, 2006.
3. M.V.R. Koteswara Rao, "Energy Resources: Conventional & Non-Conventional " BSP Publications,2006.
4. D.S. Chauhan,"Non-conventional Energy Resources" New Age International.
5. C.S. Solanki, "Renewal Energy Technologies: A Practical Guide for Beginners" PHI Learning

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BTEC-802: SATELLITE & RADAR SYSTEMS

Unit-I: Introduction to radar, radar block diagram and operation, radar frequencies, Applications of radar. The Radar Equation: Detection of signals in noise, Receiver noise and the signal to noise ratio, Probabilities of detection and false alarm, Integration of Radar Pulses, Radar cross section of targets, Radar cross section fluctuations, Transmitter Power, Pulse Reception Frequency, Antenna Parameters, System Losses.

Unit-II: MTI and Pulse Doppler Radar: Introduction to Doppler and MTI Radar, Delay Line cancellers, Staggered Pulse Reception Frequencies, Doppler Filter Banks, Digital MTI Processing, Moving Target Detector, Limitations to MTI Performance.

Unit-III: Tracking Radar: sequential lobing, conical scan, monopulse Tracking, low angle tracking, tracking in range. Elements of Satellite Communications, Orbital mechanics, look angle and orbit determination, launches and launch vehicle, orbital effects. Introduction to geo-synchronous and geo-stationary satellites.

Unit-IV: Satellite sub-systems: Attitude and Orbit control systems, Telemetry, Tracking and command control system, Power supply system, Introduction to satellite link design, basic transmission theory, system noise temperature and G/T ratio, design of down link and uplink, design of satellite links for specified C/N, satellite data communication protocols.

Unit-V: Direct broadcast satellite television and radio, satellite navigation and the global positioning systems, GPS position location principle, GPS receivers and codes, Satellite Signal Acquisition, GPS navigation Message, GPS Signal Levels, Timing Accuracy, GPS Receiver Operation.

Text / Reference Books:

1. Merrill I. Skolnik "Introduction to Radar Systems", Mc Graw- Hill.
2. J.C.Toomay, Paul J. Hannen "Principles of Radar", PHI Learning.
3. B.Pratt, A.Bostian, "Satellite Communications", Wiley India.
4. D.Roddy, "Satellite Communications", TMH.

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BTEC- 803: WIRELESS & MOBILE COMMUNICATION

Unit-I: Evolution of mobile radio communication fundamentals. General Model of Wireless Communication Link, Types of Signals, Cellular Infrastructure, Cellular System Components, Antennas for Cellular Systems, Operation of Cellular Systems, Channel Assignment, Frequency reuse, Channel Assignment strategies, Handoff Strategies Cellular Interferences, Sectorization; Wireless Channel and Radio Communication, Free Space Propagation Model, Channel Noise and Losses, Fading in Land Mobile Systems, Multipath Fading, Fading Effects on Signal and Frequency, Shadowing; Wireless Channel Modeling: AWGN Channel, Rayleigh Channel, Rician Fading Channel, Nakagami Fading Channel, Ocumura and Hata Path Loss Model; Channel Modelling: Stochastic, Flat Fading, Wideband Time-Dispersive Channel Modelling.

Unit-II: Theory of Vocoders, Types of Vocoders; Spread Spectrum Modulation, Pseudo-Noise Codes with Properties and Code Generation Mechanisms, DSSS and FHSS Systems, Time Hopping and Hybrid Spread Systems; Multicarrier Modulation Techniques, Zero Inter Symbol Interference Communication Techniques, Detection Strategies, Diversity Combining Techniques: Selection Combining, Threshold Combining, Equal Gain Combining, Maximum Ratio Combining; Spatial Diversity and Multiplexing in MIMO Systems, Channel Estimation.

Unit-III: Equalization Techniques: Transversal Filters, Adaptive Equalizers, Zero Forcing Equalizers, Decision Feedback Equalizers, and related algorithms; Multiplexing and Multiple Access: FDMA, TDMA, CDMA, OFDMA, SC-FDMA, IDMA Schemes and Hybrid Method of Multiple Access Schemes, RAKE Receiver; Multiple Access for Radio Packet Systems: Pure ALOHA, Slotted ALOHA, CSMA and their versions; Packet and Pooling Reservation Based Multiple Access Schemes.

Unit-IV: GSM system for mobile Telecommunication, General Packet Radio Service, Edge Technology; CDMA Based Standards: IS 95 to CDMA 2000, Wireless Local Loop, IMT 2000 and UMTS, Long Term Evolution (LTE), Mobile Satellite Communication.

Unit-V: Introduction to Mobile Adhoc Networks, Bluetooth, Wi-Fi Standards, WiMax Standards, Li-Fi Communication, Ultra-Wideband Communication, Mobile data networks, Wireless Standards IMT 2000, Introduction to 4G and NGN

Text Book:

1. T.S. Rappaport, "Wireless Communication-Principles and practice", Pearson Publications, Second Edition.
2. Upena Dalal, "Wireless Communication and Networks", Oxford Press Publications.

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BTEC -804: OPTICAL NETWORK

Unit-I: Introduction to Optical Network:- Optical Networks: multiplexing techniques, second generation optical networks. The optical layer, optical packet switching. Transmission Basics: wavelength, frequencies and channel spacing, wavelength standards. Non linear Effects: Effective length and area, stimulated brillouin scattering, stimulated raman scattering, Propagation in a non linear medium, self phase modulation, cross phase modulation Four wave mixing.

Unit-II: Components:-Couplers: Principles of operation, Conservation of energy, Isolators and circulators: Principles of operation Multiplexers and filters: Gratings, diffraction pattern, Bragg grating, Fiber gratings, Fabry-perot filters, multilayers dielectric thin – film filters, Mach-Zehnder interferometers, Arrayed waveguide grating, Acousto-optic tunable filter, High channel count multiplexer Architecture. Switching : large optical switches, Optical switch Technologies, large electronic switches wavelength converters: Optoelectronic Approach , optical grating, interferometric techniques wave mixing. Crosstalk: Intra-channel crosstalk, inter-channel crosstalk, crosstalk in Networks, Bidirectional system crosstalk reduction.

Unit-III: Networks- SONET/SDH: Multiplexing, SONET/SDH layers, SONET Frame structure, SONET/SDH physical layer, Elements of a SONET/SDH infrastructure. ATM: Function of ATM, Adaptation layers, Quality of service. IP: Routing and forwarding, QOS, WDM Network elements: Optical line terminals, Optical line amplifiers,. Optical add/Drop multiplexers: Architecture, reconfigurable OADMS, Optical cross connects: All optical OXC configuration.

Unit-IV: WDM Network Design Cost Trade-offs, Light path Topology Design, and Routing and wavelength assignment problems, Dimensioning Wavelength Routing Networks, Network Survivability, Basic Concepts, Protection in SONET/SDH, Protection in client layer, Optical Layer Protection, Different Schemes, Interworking between Layers, Access Networks, Network Architecture Overview, Enhanced HFC, FTTC, PON evolution.

Unit-V: Optical Switching, OTDM, Synchronization, Header Processing, Buffering, Burst Switching, Deployment Considerations- SONET/SDH core Network

Text Books:

1. R. Ramaswami, & K. N. Sivarajan, “Optical Networks a Practical perspective”, Morgan Kaufmann Publishers, 3rd Ed.
2. U. Black, “Optical Networks: Third Generation Transport Systems”/ Pearson Educations

Reference Books:

Biswanath Mukherjee “Optical WDM Networks” Springer Pub 2006.

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PROJECT