BHARTI VISHWAVIDYALAYA, DURG

SCHEME OF TEACHING AND EXAMINATION

Courses of Study and Scheme of Examination of P 1 Group

B. Tech. (First Semester - Common to all Branches of Engineering)

S. No.	Courses (Subject)	Course Code	Period per Week			Scheme of Examination			Total Marks	Credit (L+T+P/2)
						Theory/Lab				
			L	T	P	ESE	CT	TA		
1.	Physics-I	BT00101	3	1	-	70	10	20	100	4
2.	Mathematics-I**	BT00102	3	1	-	70	10	20	100	4
3.	Basic Electrical and Electronics Engg.	BT00103	2	1	-	70	10	20	100	3
4.	Engineering Graphics and Design	BT00104	1	0	-	70	10	20	100	1
5.	Fundamentals of Computer	BT00105	2	0	-	70	10	20	100	2
6.	Physics (Lab)	BT00106	-	-	2	35	-	15	50	1
7.	Basic Electrical and Electronics Engg. (Lab)	BT00107	-	-	2	35	-	15	50	1
8.	Fundamentals of Computer (Lab)	BT00108	-	-	2	35	-	15	50	1
9.	Engineering Graphics and Design (Lab)	BT00109	-	-	4	35	-	15	50	2
10.	Value Education	BT00110	-	-	-	-	-	50	50	-
Total Marks			11	3	10	490	50	210	750	19

L-Lecture, T-Tutorial, P-Practical, ESE-End Semester Exam,

CT–Class Test, TA–Teacher's Assessment

Note: - (a) The teaching in the 1st and 2nd Semester will be divided in two groups consisting of branches as shown below:

P1–GROUP: Mechanical Engineering, Civil Engineering, Electronics and Telecommunication Engineering.

Q1–GROUP: Computer Science and Engineering, Electrical Engineering.

(b) *Mathematics–I will be taught to both the groups in the first semester.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 1st | **Branch: Common to all Branches**

Subject: Physics-I | **Course Code: BT00101**

Total Marks in End Semester Exam: 70 | **L: 3 T: 1 P: 0**

Minimum number of Class Tests: 02 | **Min. Marks - 28**

Unit-1: Physical Quantities, Motion in Two or Three dimensions (10hrs.)

Standards and Units, Unit consistency and conversions, Uncertainty and Significant figures, Position and velocity vectors, The Acceleration vector, Projectile motion, Motion in a circle, Relative velocity, Free body diagrams, Conservative and Non-conservative Forces; Central forces, No inertial frames of reference.

Unit-2: Mechanics of Solids (10hrs.)

Angular velocity and acceleration, Rotation with constant angular acceleration, Energy in rotational motion, Parallel axis theorem, Moment of Inertia calculations, Conditions for equilibrium, Bending Stress, Shear stress, Concept of strain energy, *Determination of Moment of Inertia of Fly Wheel, Young's Modulus*, Elastic Module, Concepts of elasticity and plasticity.

Unit-3: Wave Optics (10hrs.)

Superposition of waves and interference of light by wave front splitting and amplitude splitting, Fresnel bi- prism; wedge shaped film, Newton's rings, *Diffraction*, Farunhofer diffraction from a single slit, Diffraction gratings and their resolving power, *Difference between Interference and Diffraction*.

Unit-4: Electrostatics in vacuum and dielectric medium (10hrs.)

Calculation of electric field and electrostatic potential for a charge distribution, Divergence and curl of electrostatic field, Laplace's and Poisson's equations for electrostatic potential, Laws of electrostatics, Polarization, Permeability and dielectric constant, Polar and non-polar dielectrics.

Unit-5: Magneto static in a linear magnetic medium (10hrs.)

Bio-Savart law, Divergence and curl of static magnetic field, vector potential and calculating it for a given magnetic field using Stokes' theorem, Magnetization, Solving for magnetic

field due to simple magnets likea bar magnet, Permeability and Susceptibility, Classification of magnetic materials, Ferromagnetism, Paramagnetic and diamagnetic materials, Magnetic domains and hysteresis.

Unit-6: Faraday's law and Electromagnetic waves (10hrs.)

Faraday's law of electromagnetic induction, Continuity equation for current densities, Maxwell's equation in vacuum, Energy in an electromagnetic field, Flow of energy and Pointing vector, Plane electromagnetic waves in vacuum, Their transverse nature and polarization, Relation between electric and magnetic fields of an electromagnetic wave.

Unit-7: Introduction to Quantum Mechanics (10hrs.)

Wave nature of Particles, Time-dependent and time-independent Schrodinger equation for wave function, Free-particle wave function and wave-packets, Uncertainty principle, Solution of stationary-state Schrodinger equation for one dimensional problem like particle in a box.

Unit -8: Solid electronic materials (10hrs.)

Electron in periodic potential, Kronig-Penny model (only basic to introduce origin of band gap), E-k diagram, Electron conduction, Conductivity, Drift velocity, Energy bands in solids, Direct and indirect band gaps, Types of electronic materials: metals, semiconductors, and insulators, Fermi level, Effective mass, Density of states and energy band diagrams.

Unit -9: Semiconductors (10hrs.)

Intrinsic and extrinsic semiconductors, Electron and hole concentration, Concept of Fermi Level, Dependence of Fermi level on carrier-concentration and temperature, Doping, impurity states, n and p type semiconductors, Carrier generation and recombination, Law of mass action, Charge neutrality condition, Carrier transport: diffusion and drift, p-n junction, Depletion region and potential barrier, Energy band structure of PN junction in forward and reverse biasing.

Unit-10: Lasers & Fiber Optics (10hrs.)

Einstein's theory of matter radiation interaction and A & B coefficients, amplification of light by population inversion in optical resonator, different types of lasers: gas lasers (He Ne,),

solid-state lasers (ruby, Neodymium), semiconductor laser, Properties of laser beams. Fiber Optics: Introduction, Optical fiber as a dielectric wave guide, Total internal reflection, Numerical aperture, Losses associated with optical fibers, Step and graded index fibers, Application of optical fibers.

Text Books:

1. Introduction to Mechanics-Mahindra K. Verma, Universities Press, Hyderabad
2. David Griffiths, Introduction to Electrodynamics, Addison-Wesley Professional
3. H. J. Pain, The Physics of Oscillations and Waves, Wiley
4. J. Singh, Semiconductor Optoelectronics: Physics and Technology McGraw-Hill Inc
5. Quantum Mechanics, Ajay Ghatak S. Lokanathan, Trinity
6. Engineering Physics by Gaur & Gupta, Dhanpat Rai Publications

Reference Books:

1. Engineering Physics by PG Kshirsagar & M N Avadhanulu, S. Chand Publications
2. Modern Physics for Engineers, S.P. Taneja, R. Chand
3. Engineering Physics, Malik and Singh, Tata McGraw Hill
4. Sears and Zemansky's University Physics, Volume-1 Mechanics, Pearson
5. Mechanics, Mathur, S.Chand Publishing
6. Electromagnetic Theory, Prabir K. Basu & Hrishikesh Dhasmana, An eBooks
7. David Griffiths, Quantum Mechanics, Pearson Education
8. Quantum Mechanics: A Text Book for undergraduates, Mahesh C Jain, TMH
9. A. Ghatak , Optics, McGraw Hill Education
10. O. Svelto, Principles of Lasers, Springer Science & Business Media
11. The Physics of waves and Oscillations, N.K. Bajaj, TMH
12. H. C. Verma, Concepts of Physics Vol – 1&2, Bharti Bhawan Publication
13. Halliday and Resnick, Physics.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.- Ist | **Branch: Common to all Branches**

Subject: Mathematics - I | **Course Code: BT00102**

Total Marks in End Semester Exam: 70 | **Min. Marks - 28**

Minimum number of Class Tests: 02 | **L: 3 T: 1 P: 0**

UNIT I: Calculus **(8 hours)**

Evaluation of improper integrals, reduction formulae, Beta and Gamma functions and their properties; *Applications areas and volumes.*

UNIT II: Calculus **(8 hours)**

Rolle's Theorem, Mean value theorems, *Taylor's and Maclaurin's theorems*; indeterminate forms and Maxima and minima.

UNIT III: Sequences and series **(8 hours)**

Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series.

UNIT IV: Multivariable Calculus (Differentiation) **(8 hours)**

Limit continuity and partial derivatives, total derivative; Tangent plane and normal line; Maxima,minima and saddle points; Gradient, curl and divergence directional derivatives.

UNIT V: Matrices **(8 hours)**

Elementary row and column transformations, Consistency of linear system of equations; Symmetric, skew symmetric and orthogonal matrices; Eigen values and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem and Orthogonal transformation, *Complex and unitary matrixes.*

Text/Reference Books

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

3. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
4. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
5. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint,2010.
6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,Reprint, 2010.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
8. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, AffiliatedEast–West press, Reprint 2005.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.- 1st | **Branch: Common to all Branches**

Subject: Basic Electrical and Electronics | **Course Code: BT00103**

Total Marks in End Semester Exam: 70 | **Min. Marks - 28**

Minimum number of Class Tests: 02 | **L: 2 T: 1 P: 0**

Unit – I: D.C. Networks:

Introduction, Ohm's law, Kirchhoff's laws, Mesh and Nodal analysis, *Definition of Electrical Component*. Definitions of MMF, Magnetic field strength, Reluctance, Leakage flux and fringing, Core losses, Comparison of the Electric and Magnetic Circuits, Problems on Series and Parallel Magnetic Circuits.

Unit – II: A. C. Circuits:

Production of AC voltage, Basic Definitions of root mean square and average values, form factor and peak factor and *Phasor Algebra*, Analysis of ac series and Parallel Circuits, Series-Parallel Circuits.

Unit – III: Single phase Transformers:

Introduction, Principles of operation, Constructional details, Ideal Transformer and Practical Transformer, EMF equation, Rating, Phasor diagram at no load *and on load*, Losses in Transformers.

Unit-IV: Diode:

Brief Review of Semiconductors, N-Type & P-Type Semiconductors, Formation of Depletion Layer in a PN Junction, Forward & Reverse Biased, V-I Characteristic, Diode Current Equation. LED, Seven-segment displays.

Unit-V: Transistor:

BJT Construction, Junction Biasing of BJT, Operation of NPN & PNP BJT, Input and Output Characteristics of Transistor in CE configuration; *Characteristics of Transistor in CB configuration*; Transistor as an Amplifier & as a Switch.

Text Books:

1. Fundamentals of Electrical Engineering & Electronics, B.L. Theraja, S. Chand Publication.

2. Principles of Electronics by V. K. Mehta, 3rd Edition, S. Chand and Co. Ltd. (Unit-IV & V).
3. D.P. Kothari and I.J. Nagrath, "Theory and Problems of Basic Electrical Engineering", PHI.

Reference Books:

1. Fitzrald and Higgonbothom, "Basic Electrical Engineering", Fifth Edition, McGraw Hill.
2. V.N. Mittal and Arvind Mittal, "Basic Electrical Engineering", Second Edition, Tata McGraw Hill.
3. Electrical and Electronic Technology By Hughes 10th Edition, Pearson Education.
4. A textbook of Electronic Circuits. By R. S. Sedha, S. Chand Publication.
5. H. Cotton,"Advance Electrical Technology," ISSAC Pitman, London.
6. Parker Smith S. (Ed. Parker Smith N.N.), "Problems in Electrical Engineering", Tenth edition, Asia publication.
7. Del Torro, Vincent "Electrical Engineering Fundamentals", Second Edition Prentice Hall of India Pvt. Ltd.
8. Basic Electrical & Electronics Engineering 1stEdition by D. P. Kothari and I. J. Nagrath,
9. Electronics Devices and Circuits by Jacob Millman and Christos C. Halkias, 3rd Edition Mc. Grah Hill Pub.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.- 1st | **Branch: Common to all Branches**

Subject: Engineering Graphics and Design | **Course Code: BT00104**

Total Marks in End Semester Exam: 70 | **Min. Marks - 28**

Minimum number of Class Tests: 02 | **L: 1 T: 0 P: 0**

Unit I: Introduction to Engineering Drawing

Principles of Engineering drawing and their significance, Lines, Lettering, Dimensioning, Scales, *Types of Scale – Plain, Diagonal*.

Unit II: Projection

Principles of projection, Method of projection, First and third angle projections, *Traces*, Orthographic projections, Isometric projection, Projection of Plain, Solid.

Unit – III: Development of Surface

Development of Surface of Right, Regular Solids, Development of Prisms, Cylinders, Pyramids, Cone and their Parts.

Isometric Projection: Principles of Isometric Projection – Isometric View, Isometric Scale, Conventional Plane figure, Simple and Compound Solids.

Unit IV: Basic concept of drafting software

Introduction to CAD software, merits and demerits of CAD, Application of CAD, GUI, limits and units, Basic co-ordinate system, setting of status bar option-snap, grid, O-snap, Dynamic input, ortho, polar, and etc. concept of block, viewports and layer.

Unit V: Drafting using CAD software

Drawing Tools: Circle, Arcs, Rectangle, Polygon, Ellipse, Spline, Poly-Line, and Multi-Line. Editing Tools: Trim, Move, and Copy, Rotate. Geometry Modifying Tools: Fillet, Chamfer, Scale, Stretch. Copying Tools: Array, Mirror, and Offset. Dimensioning and Annotations.

Text Books:

1. Bhatt, N. D.., "Elementary Engineering Drawing", Charotar Book Stall, Anand
2. George Omura, " Mastering AutoCAD" B.P.B. Publication, New Delhi

Reference Books:

1. Engineering Graphics – Laxminarayanan & V. and Vaish Wanar, R.S. Jain Brothers, New Delhi
2. Engineering Graphics – Chandra, AM & Chandra Satish 1998.
3. Engineering Graphics – K.L. Narayan and P. Kannaih, Tata McGraw Hill
4. AutoCAD: A problem solving approach- Tickoo, S. Delmar Cengage Learning 2015.
5. Mastering AutoCAD and AutoCAD LT-George Omura, Brian C. Benton, Wiley publisher, 2018.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.- 1st | **Branch: Common to all Branches**

Subject: Fundamentals of Computer | **Course Code: BT00105**

Total Marks in End Semester Exam: 70 | **Min. Marks - 28**

Minimum number of Class Tests: 02 | **L: 2 T: 0 P: 0**

Unit I: Fundamentals of Computers

History of computer, concept of data and information, computer hardware and software components: Central Processing Unit (CPU), VDU, Keyboard and Mouse, Other input/output Devices, Computer Memory, Memory Hierarchy: Primary and Secondary Storage (Auxiliary Storage), Secondary storage; magnetic disks vs. optical disks (CD, CD-RW and DVD Memory), data – numeric data, alpha numeric data, concept of data and information: storage, seeking, processing and transmission, *and file organization*.

Unit II: Hardware and Software

Introduction of Computer Peripherals: Cables, Buses, Device drivers, installation of devices: keyboard, mouse, scanner, printer, web-camera, speakers and many more; plug-and-play devices; expansion slots……..System software, *difference between software and hardware*, Program Language Translators, application software, Programming Language Paradigms: Imperative, Object-Oriented and Logic languages, Basics of Popular Operating Systems (Windows and Linux); The User Interface, Using Mouse and Organizing Desktop components, Running an Application, File, Folders and Directory management features, Using Help; Creating Short cuts, Configuring Operating System: Windows and Ubuntu, BIOS, System Utilities and Antivirus software.

Unit III: Basic Computer Literacy

Word Processing Basics (MS Word / LibreOffice Writer): *Creating, deleting,* Opening and Closing of documents; Text creation and Manipulation; Formatting of text; Table handling; Spell check, language setting and thesaurus; Printing of word document; Using Spread Sheets (MS Excel / LibreOffice Calc) Basic operations of Spreadsheets; Manipulation of cells; Formulas and Functions; Editing of Spread Sheet, printing of Spread Sheet; Basics of presentation software (MS PowerPoint / LibreOffice Impress) Preparation and Presentation of Slides; Slide Show; *with shortcuts* How to make an effective presentation: Working with

Presentation Tools (Create, Edit, Move, Delete, Resize, Format text object), Working with Graphics tools (Creating Tables, Organization Charts, Hyperlinks), Saving, editing and closing presentation; Taking printouts of presentation / handouts.

Unit IV: Computers and Communication

WWW and Web Browsers: Basic of Computer networks; LAN, WAN, *MAN*, *PAN*, *SAN*; Networking Devices, Topologies, Cables and connectors, Connecting to internet; ISP; Basics of internet connectivity related troubleshooting, Web Browsing software, *IP Addressing, Wi-Fi and Bluetooth technology* overview Search Engines; URL; Domain Names;, Internet and Intranet: architecture, various file formats, Applications of INTERNET: Electronic mailing systems (Google Mail features): Creating and Managing mailing accounts, folders, Document collaboration, Instant Messaging, Netiquettes; Skype calling and Messenger services; functioning and features of smart gadgets: Smart phones, 4K smart television gadgets, kindle, gaming-gadgets, fitness gadgets and alike.

Unit V: Application Domains

Computer applications in office automation, *graphics and multimedia,* book publishing, data analysis, accounting, investment, inventory control, robotics, cyber security, air and railway ticket reservation sites, Audio and Video-conferencing, social networking, surveillance, Case Studies: Computer Literacy for banking, KYC, Insurance and financial transactions, operating mobile banking, Nine Pillars of Mission Digital India (DI-Initiatives) and their scheme highlights.

Text Books:

1. Computer Basics by IGNOU.
2. Suresh K Basendrea: Computers Today
3. Pradeep K. Sinha, Priti Sinha, “Computer Fundamentals”. BPB Publications.
4. Rajaraman, V., “Fundamental of Computers”. Prentice Hall India, New Delhi
5. Sanders Donald H Computers Today

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 1st | **Branch: Common to all Branches**

Subject: Physics (Lab) | **Course Code: BT00106**

Total Marks in End Semester Exam: 35 | **L: 0 T: 0 P: 2**

Min. Marks - 14

Total 36 labs. Hrs. About 10 – 12 experiments to illustrate the concepts learnt in Physics (Hrs. 3/ week).Suitable number of experiments from the following categories:

- Mechanics
- Optics and its applications
- Electromagnetic
- Semiconductor Physics
- Laser & Optical fiber

Text book:

1. A textbook of Engineering Physics Practical 2nd edition, University Science Press

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 1st **Branch: Common to all Branches**

Subject: Basic Electrical and Electronics Engineering (Lab) **Course Code: BT00107**

Total Marks in End Semester Exam: 35 **L: 0 T: 0 P: 2**

Min. Marks - 14

List of Experiments (To perform minimum 10 experiments):

1. To verify Superposition theorem.
2. To verify Kirchhoff's Current Law and Kirchhoff's Voltage Law.
3. To determine V– I characteristics of Incandescent lamp.
4. To study B-H curve.
5. To measure current, power, voltage and power factor of series RLC circuit.
6. To measure current, power, voltage of parallel RLC circuit.
7. To measure current, power, voltage of series parallel RLC circuit.
8. To measure R and L of choke coil.
9. To study construction of a single phase transformer.
10. To perform ratio test and polarity test of a single phase transformer.
11. To calculate efficiency of a single phase transformer by direct loading.
12. To verify the venin's theorem and Norton's theorem.
13. To study construction of Single Phase A.C. machines.
14. To study construction of Three Phases Induction motors.
15. To study charging and discharging of a capacitor.
16. To study types of meters in the lab.
17. To study construction of D.C. machine.
18. To plot V-I characteristics of PN Junction Diode.
19. To plot V-I characteristics of Light Emitting Diode.
20. To plot Static Characteristics of Transistor in CE configuration
21. To study the operation of transistor as a switch.
22. To study the operation of transistor as an amplifier.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.- 1st **Branch: Common to all Branches**

Subject: Fundamental of Computer (Lab) **Course Code: BT00108**

Total Marks in End Semester Exam: 35 **L: 0 T: 0 P: 2**

Min. Marks - 14

The laboratory should be preceded or followed by a Practical Lecture to explain the approach oralgorithm to be implemented for the problem given. Open Source software can be used.

Practical Lecture (L T P) – 0 0 1	**Lab. Work (L T P) – 0 0 3**
Practical Lecture 1:Introduction and workingof Hardware Components	**Lab1**: Identifying the computer hardware likeinput output devices, CPU, mother board, Buses etc.
Practical Lecture 2: Introduction and workingof Software.	**Lab 2**: Making Algorithm, DFD, ER diagram. Working of software's like system, Utility, Application software.
Practical Lecture 3: Introduction and working of Operating System	**Lab 3**: Basic operations of Operating System: creating file, Directory, Removing file, directory, date time setting, renaming etc. use internal and external connabds.
Practical Lecture 4: Introduction and working of MS Office	**Lab 4**: use the basic features of MS Office
Practical Lecture 5: Introduction of MS Word	**Lab5: Create** the document with a Alignment. Use the different properties of MSWord
Practical Lecture 6: Introduction of MS Excel	**Lab 6**: Make the use of Spreadsheet for data representations, Calculation and graphical presentations. Use properties of Excel
Practical Lecture 7: Introduction of Power presentation	Lab 7: MS-PowerPoint Make the presentation with features. Use the animation tools Multimedia
Practical Lecture 8 &9: Introduction of computer communication	**Lab 8 and 9**: *Computer communication related practical*

	1. Connect the Internet; open any website of your choice and save the WebPages. 2. Search any topic related to your syllabi using any search engine and download the relevant material. 3. Send any greeting card to your friend. 4. Create your E-Mail ID on any free E-Mail Server. 5. Login through your E-Mail ID and do the following: a. Read your mail b. Compose a new Mail c. Send the Mail to one person d. Send the same Mail to various persons e. Forward the Mail f. Delete the Mail g. Send file as attachment 6. Surf Internet using Google to find information about your state 7. Surf Internet using Google to find Tourism information about your state 8. Surf Internet using Yahoo to find Hotels around your state 9. Surf Internet using Google to find information about educational institutes for teaching M.S in comp science in India a. Surf Internet using Google to find information about Indian Compare the cost, overheads and

Practical Lecture 10: installing Computer System	**Lab 10:** Installing the working computer system
Practical Lecture 11: Different ICT use of Government Schemes	**Lab 11: Filling online AAADHAR, Voter id, PAN etc. form**
Practical Lecture 12: Applications of Computer in Digital India	**Lab 12**: online filling of different digital India applications

Laboratory Outcomes:

- To give idea about fundamentals of Computer
- To make familiar with MS Office
- To be able to write, document, present their work when developing project
- To be able to better foundations in Computer Field.
- To be able to know online applications of Digital India.

Text & Reference books:

1. Pradeep K. Sinha, Priti Sinha, "Computer Fundamentals". BPB Publications.
2. Rajaraman, V., "Fundamental of Computers". Prentice Hall India, New Delhi
3. Suresh K Basendrea: Computers Today
4. Sanders Donald H Computers Today

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.- 1st **Branch: Common to all Branches**

Subject: Engineering Graphics and Design (Lab) **Course Code: BT00109**

Total Marks in End Semester Exam: 35 **L: 0 T: 0 P: 4**

Min. Marks - 14

List of Practical:

1. Study of any drafting software- GUI, limits and units, drawing tools, editing tools, annotations, etc.
2. Study of co-ordinates systems- Cartesian and polar (absolute and relative system of measurement) and Practice drawing by using following tools: Grid, snap, O-snap, Lines, Erase, Zoom.
3. Study and create drawing by using Drawing tools: Circle, arcs, rectangle, polygon, ellipse, Editing tools: trim, move, copy, rotate and practice of drawing using these commands.
4. Study and create drawing by using Geometry modifying tools: fillet, chamfer, scale, stretch
5. Study and create drawing by using copying tools like array, mirror, block and offset.
6. Study and detailing of drawing by using dimensioning and annotations tools.
7. Study and create drawing with different types of line by using Layer command
8. Create geometry by modify it by using Scales- plane and diagonal scale and create conicssections- ellipse, parabola, hyperbola, rectangular hyperbola, involutes.
9. Draw regular solids: Cube, Prism, Pyramid, Cylinder, Cones
10. Draw sectional views of solids- Cube, Prism, Pyramid, Cylinder, Cones.

BHARTI VISHWAVIDYALAYA, DURG

SCHEME OF TEACHING AND EXAMINATION

Courses of Study and Scheme of Examination of Q1 Group

B. Tech. (Second Semester - Common to all Branches of Engineering)

S. No.	Courses (Subject)	Course Code	Period per Week			Scheme of Examination			Total Marks	Credit (L+T+P/2)
						Theory/Lab				
			L	T	P	ESE	CT	TA		
1.	Chemistry-I	BT00201	3	1	-	70	10	20	100	4
2.	Mathematics-II**	BT00202	3	1	-	70	10	20	100	4
3.	Programmingfor Problem Solving	BT00203	3	-	-	70	10	20	100	3
4.	English	BT00204	2	-	-	70	10	20	100	2
5.	Basic Civil Engineering and Mechanics	BT00205	3	-	-	70	10	20	100	3
6.	Chemistry (Lab)	BT00206	-	-	2	35	-	15	50	1
7.	Programming forProblem Solving(Lab)	BT00207	-	-	4	35	-	15	50	2
8.	Basic CivilEngg. & Mechanics(Lab)	BT00208	-	-	2	35	-	15	50	1
9.	Workshop Practice/ ManufacturingProcess(Lab)	BT00209	-	1	4	35	-	15	50	3
10.	Language (Lab)	BT00210	-	-	2	-	-	50	50	1
Total Marks			14	3	14	490	50	210	750	24

L-Lecture, T-Tutorial, P-Practical, ESE-End Semester Exam,

CT–Class Test, TA–Teacher's Assessment

Note: - (a) The teaching in the 1st and 2nd Semester will be divided in two groups consisting of branches as shown below:

P1–GROUP: Mechanical Engineering, Civil Engineering

Q1–GROUP: Computer Science and Engineering, Electrical Engineering

(b) **Mathematics–II will be taught to both the groups in the first semester.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 2nd | **Branch: Common to all Branches**

Subject: Chemistry–I | **Course Code: BT00201**

Total Marks in End Semester Exam: 70 | **L: 3 T: 1 P: 0**

Minimum number of Class Tests: 02 | **Min. Marks – 28**

Unit – I Atomic & Molecular Structure **10 hours**

Molecular orbital Theory: Equations for atomic and molecular orbitals (LCAO), Energy level diagram of homo(H2, N2, O2, Li2, F2) & hetero molecules (CO, NO, HF), Concept of bond order. Pi-molecular orbitals of butadiene, Aromaticity.

Crystal Field Theory: Splitting of d-orbital of octahedral and tetrahedral complexes, Energy level diagram of transition metal ion & magnetic property, Application of crystal field Theory.

Unit – II Spectroscopic Techniques and Applications **10 hours**

Principle of spectroscopy. Electromagnetic radiation, Spectrophotometer (line diagram) Electronic Spectroscopy (Ultraviolet–visible spectroscopy): Theory, Types of electronic transition, Chromosphere, auxo chromes , Electronic excitation in conjugated Dienes , Uses or application of Electronic Spectroscopy, Vibrational spectroscopy (Infrared spectroscopy): Molecular vibration, Selection rule, functional group region, fingerprint region and uses or application of Vibrational spectroscopy. Nuclear magnetic resonance spectroscopy: Introduction, number of signal, chemical shift, Spin-spin coupling and uses or application of Nuclear magnetic resonance spectroscopy.

Unit – III Use of free energy in Chemical Equilibriums **8 hours**

Thermodynamic Functions: Energy, Entropy, Free energy, Cell potential, Estimations of entropy and free energies, Nernst Equation & its application to voltaic cell.

Corrosion: Electrochemical theory of corrosion, galvanic series, Galvanic corrosion, Differential aeration corrosion, Pitting, and Water line corrosion, factors affecting corrosion , Cathodic Protection, *Boiler Corrosion Scale of Sludge*.

Unit –IV Periodic properties **8 hours**

Periodic table, atomic and ionic radii, ionization energies, electron affinity, electronegativity. Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of

atoms. Polari ability, Oxidation states, coordination numbers and geometries, Hard, soft acids and bases (Classification, Pearson's HSAB principle, its applications & limitations) Molecular Geometry(Valence shell electron pair repulsion theory to NH3,H3O+, SF4, CIF3, ICl2 and H2O), *Application of Molecular Geometry*.

Unit –V Organic reactions and synthesis of drug molecule 8 hours

Introduction to reactions involving substitution (free radical-Chlorination of molecule, Gomberg reaction, Wurtz reaction, Electrophilic, Nucliophilic-SN1, SN2), Addition (Electrophilic–Morkownihoff rule, Nucleophile)Elimination (α elimination , β elimination , unimolecular E1, bimolecular E2), oxidation (Baeyer villager oxidation), reduction (Clemmensen reduction, Wolff Kishner reduction), Reimer- Thiemann reaction, Canannizaro, *Condensation Reaction, Aldal Condensation*.

Synthesis of a commonly used drug molecule: General guidelines of drug making, synthesis of Aspirin, Paracetamol.

Unit – VI Introduction to quantum theory 8 hours

Schrodinger equation & its importance, Applications to hydrogen atom, Wave mechanical model for many electron atoms, radial distribution curves.

Unit –VII Chemical Bonding in Molecules 10 hours

MO theory, Structure, bonding and energy levels of bonding and shapes of many atom molecules, Coordination Chemistry, Electronics plectra and magnetic properties of complexes with relevance to bio- inorganic chemistry, organometallic chemistry.

Unit –VIII Stereochemistry: 8 hours

Introduction to Stereochemistry: Representations of 3 dimensional structures, Chirality, Optical activity. Isomerism structural isomerism, stereoisomers, enantiomers, diastereomers, Configurations (D, L & R, S), Geometrical isomerism (cis and Trans & E and Z). Racemic modification & their resolution, Isomerism in transitional metal compounds. Conformational analysis: Conformations of cyclic (cyclohexane) and acyclic compounds (ethane & butane).

Unit –IX Reactivity of organic molecules: 8 hours

Organic acids and bases: factors influencing acidity, basicity, and nucleophilicity of molecules, kinetic vs. thermodynamic control of reactions.

Unit –X Strategies for synthesis of organic compounds: 10 hours

Reactive intermediates substitution, elimination, rearrangement, kinetic and thermodynamic aspects, role of solvents.

Text Books:

1. A Text Book of Engg. Chemistry, Shashi Chawala, Dhanpat Rai &Co.(P)Ltd.
2. Engineering Chemistry by P. C. Jain (Dhanpat Rai Publishing Company.
3. Engineering Chemistry, Concept in engineering Chemistry by Satyaprakash and Manisha Agrawal by Khanna Publication.

Books for Chemical Engineering:

1. Advanced Inorganic Chemistry Vol 1 & II by Gurdeep Raj, Goel Publishing House.
2. Organic Reaction and Their Mechanism, P. S Kalsi, New Age International Publishers.

Reference Books:

1. University chemistry, by B. H. Mahan
2. Chemistry: Principles and Applications, by M. J. Sienko and A. Plane
3. Fundamentals of Molecular Spectroscopy, by C. N. Banwell
4. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamal uddin and M. S. Krishnan
5. Physical Chemistry, by P. W. Atkins
6. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5thEdition
7. Essentials of Physical Chemistry, Bahi & Tuli, S. Chand Publishing
8. Introduction to Nano science by S. M. Lindsay

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 2nd	**Branch: Common to all Branches**
Subject: Mathematics - II	**Course Code: BT00202**
Total Marks in End Semester Exam: 70	**L: 3 T: 1 P: 0**
Minimum number of Class Tests: 02	**Min. Marks – 28**

UNIT I Multivariable Calculus (Integration) (8 hours)

Double and triple integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Center of mass and Gravity (constant and variable densities); Triple integrals (Cartesian),

Orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds; Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes (without proof) & its applications.

UNIT II First Order Ordinary Differential Equations (8 hours)

Exact, linear and Bernoulli's equations, Euler's equations, *Formation of Differential Equation, Linear Equation, Equation Reducible to exact equation*, Equations of first order and higher degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut'stype.

UNIT III Ordinary differential equations of higher orders (8 hours)

Higher order linear differential equations with constant coefficients & variable coefficients, methodof variation of parameters, Cauchy-Euler equation. Power series solutions; Legendre polynomials and their properties, Bessel functions of the first kindand their properties.

UNIT IV Complex Variable – Differentiation (8 hours)

Limit of complex function, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties; Conformal mappings, Mobius transformations and their properties.

UNIT V Complex Variable – Integration (8 hours)

Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Lowville's theorem and Maximum-Modulus theorem (without proof); Taylor's series, zeros of analytic functions, singularities, Laurent's series. Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour.

Textbooks/References:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint,2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006
3. W. E. Boyce and R. C. Di Prima, Elementary Differential Equations and Boundary ValueProblems,9th Edn., Wiley India, 2009.
4. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
5. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice HallIndia, 1995.
6. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
7. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc-Graw Hill, 2004.
8. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,Reprint, 2008.
9. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 2nd	**Branch: Common to all Branches**
Subject: Programming for Problem Solving	**Course Code: BT00203**
Total Marks in End Semester Exam: 70	**L: 3 T: 0 P: 0**
Minimum number of Class Tests: 02	**Min. Marks – 28**

Unit I: Introduction **(4 lectures)**

Introduction to Programming, *Evaluation of programming language*, Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.), and Idea of Algorithm: steps to solve logical and numerical problems.

Unit II: Programming Concepts **(9 lectures)**

Algorithm: Flowchart, Pseudo code and Source code with examples. Variables, data types, memory locations, Syntax and Logical Errors in compilation, object and executable code, Arithmetic expressions and precedence, Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching, Iteration and loops, *Sub program implementing sub program.*

Unit III: Arrays **(9 lectures)**

Introduction to Arrays (1-D, 2-D), Character arrays and Strings, Basic Algorithms: Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required), *Expression statements*.

Unit IV: Function **(9 lectures)**

Function programming, prototyping, built in libraries, Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference, Recursion: Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

Unit V: Structure **(9 lectures)**

Defining structures and Array of Structures, Union, and enumeration, Pointers: Idea of pointers, Defining pointers, Use ofPointers in self-referential structures, notion of linked list (no implementation), bit-fields. File handling: concept of a file, text files and binary files, Formatted I/O, file I/O operations,example programs

Text Books:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 2nd | **Branch: Common to all Branches**

Subject: English | **Course Code: BT00204**

Total Marks in End Semester Exam: 70 | **L: 2 T: 0 P: 0**

Minimum number of Class Tests: 02 | **Min. Marks – 28**

UNIT – I

Vocabulary Building

1.1 Root words from foreign languages and their use in English

1.2 Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives.

1.3 Synonyms, antonyms, Homonyms and Homophones.

1.4 One Word Substitution

1.5 Basics of Phonetics: Definitions, Phonetic Symbols, Transcription of one and two syllablewords

1.6 Communication: Definition, Cycle, Elements, 7Cs & Barriers

UNIT – II

Basic Writing Skills

2.1 Types of Sentences and Tenses, Voices and narration

2.2 Use of phrases and clauses in sentences

2.3 Importance of proper punctuation

2.4 Creating coherence

2.5 Techniques for writing precisely

UNIT – III

Identifying Common Errors in Writing

3.1 Parts of speech, Subject-verb agreement

3.2 Noun-pronoun agreement

3.3 Misplaced modifiers

3.4 Articles

3.5 Prepositions

3.6 Redundancies

3.7 Clichés

3.8 Errors in Spelling/ Misspelled words

UNIT – IV

Writing Practices

4.1 Comprehension

4.2 Précis Writing

4.3 Essay Writing

4.4 Business Letters & Job Application

4.5 Formal Reports: Components & Characteristics

4.6 Writing e-mails

UNIT – V

Listening

5.1 Listening: Definition, purposes, types, and strategies to improve listening.

5.2 Characteristics of effective listening.

5.3 Barriers to Listening and measures to overcome barriers

5.4 Note making: types and conversion of notes into texts.

UNIT – VI

Oral Communication (This unit involves interactive practice sessions in Language Lab)

6.1 Listening Comprehension

6.2 Pronunciation, Intonation, Stress and Rhythm

6.3 Common Everyday Situations: Conversations and Dialogues

6.4 Communication at Workplace

6.5 Interviews

6.6 Formal Presentations

Suggested Books:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007

3. On Writing Well. William Zinsser. Harper Resource Book. 2001
4. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
5. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press
7. English and Communication Skills for Students of Science and Engineering. S.P. Dhanavel.Orient Blackswan Ltd.2009.
8. Scientific English: A Guide for Scientists and Other Professionals. R A Day. UniversitiesPress. 2000.
9. Word Power Made Easy. Norman Lewis. W R Goyal Publishers and Distributors. Publishers. 2009
10. Textbook of English Phonetics for Indian Students. T Balasubramaniam. MacmillanPublishers.2012
11. Technical Communication: Principles and Practice. Meenakshi Raman and SangeetaSharma. Oxford University Press. 2015.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 2nd	**Branch: Common to all Branches**
Subject: Basic Civil Engineering & Mechanics	**Course Code: BT00205**
Total Marks in End Semester Exam: 70	**L: 3 T: 0 P: 0**
Minimum number of Class Tests: 02	**Min. Marks – 28**

UNIT – I Building Material

Nominal and actual dimensions of modular and traditional bricks, Qualities of good brick, Water absorption and Compressive Strength test for bricks. Types of Cement, Ingredients of Portland cement and their functions, Fineness, Setting Times and Compressive Strength of Cement, Functions of Sand in mortar, Mortar Mix proportions for various uses.

UNIT – II Building Construction

Ingredients of Cement Concrete, *Coarse and Fine Aggregates*, Grades of Concrete, proportions for Nominal mix concrete, Workability & Compressive Strength of Concrete, Curing of Concrete.

Define Footing Foundation, Necessity of foundations, Definitions of Safe bearing capacity, Ultimate bearing capacity and factor of safety, *Relationship between SBC, UBC and FOS*, Difference between Load Bearing & framed Construction.

UNIT – III Surveying & Leveling

Principles of Surveying, Technical terms, Calculation of reduced level by Height of instrument and Rise & Fall method, Simple problems in leveling.

UNIT – IV General System of Forces

Equations of equilibrium for a system of concurrent forces in a plane. Constraint, Action and Reaction. Types of support and support reactions. Free Body Diagram – Body subjected to two forces & Body subjected to three forces. Theorem of Varigonon's, Equations of Equilibrium.

UNIT –V Analysis of Plane Trusses

Rigid or perfect Truss, Determination of Axial forces in the members of truss, Method of Joints, Method of Sections.

Text books:

1. Comprehensive Basic Civil Engineering B.C. Punmia
2. Building construction by Ahuja and Birdi
3. Engineering Mechanics by A. K. Tayal

Reference books:

1. Basic Civil Engineering by Ramamurutham
2. Engineering Mechanics by R. K. Bansal

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 2nd | **Branch: Common to all Branches**

Subject: Chemistry-I (Lab) | **Course Code: BT00206**

L: 0 T: 0 P: 2 | **Minimum number of Class Tests: 02**

Total Marks in End Semester Exam: 35 | **Min. Marks – 14**

List of Experiments:

Choice of 8 – 10 experiments from the following:

1. Determination of surface tension and viscosity.
2. Thin layer chromatography.
3. Ion exchange column for removal of hardness of water.
4. Determination of chloride content of water.
5. Colligative properties using freezing point depression.
6. Determination of the rate constant of a reaction.
7. Determination of cell constant and conductance of solutions.
8. Potentiometric - determination of redox potentials and emfs.
9. Synthesis of a polymer/drug/ organic compounds.
10. Saponification/acid value of oil.
11. Chemical analysis of salt / organic compounds.
12. Lattice structures and packing of spheres.
13. Models of potential energy surfaces.
14. Chemical oscillations- Iodine clock reaction.
15. Determination of the partition coefficient of a substance between two immiscible liquids.
16. Adsorption of acetic acid by charcoal.
17. Use of the capillary viscometers to the demonstrate of the isoelectric point as the Ph ofminimum viscosity for gelatin sols and/or coagulation of the white part of egg .
18. Spectrophotometric determination.

Text Books:

1. Laboratory Manual Engg. Chemistry, Anupama Rajput, Dhanpat Rai & Co. (P) Ltd.
2. Laboratory Manual on Engg. Chemistry, S. K. Bhasin& Sudha Rani, Dhanpat Rai & Co. (P) Ltd.

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 2nd | **Branch: Common to all Branches**

Subject: Programming for Problem Solving (Lab) | **Course Code: BT00207**

Total Marks in End Semester Exam: 35 | **L: 0 T: 0 P: 4**

Min. Marks - 14

The laboratory should be preceded or followed by a Practical Lecture to explain the approach oralgorithm to be implemented for the problem given.

Practical Lecture (L T P) – 0 0 1	**Lab. work (L T P) – 0 0 3**
Practical Lecture 1: Problem solving using computers	**Lab1**: Familiarization with programming environment
Practical Lecture 2: Variable types and type conversions	**Lab 2**: Simple computational problems using arithmetic expressions
Practical Lecture 3: Branching and logical expressions	**Lab 3**: Problems involving if-then-else structures:
Practical Lecture 4: Loops, while and for loops	**Lab 4**: Iterative problems e.g., sum of series
Practical Lecture 5: 1D Arrays: searching, sorting	**Lab 5**: 1D Array manipulation
Practical Lecture 6: 2D arrays and Strings	**Lab 6**: Matrix problems, String operation
Practical Lecture 7: Functions, call by value	**Lab 7**: Simple functions
Practical Lecture 8 & 9: Numerical methods (Root finding, numerical differentiation, numerical integration):	**Lab 8 & 9**: Programming for solving Numerical methods problems
Practical Lecture 10: Recursion, structure of recursive calls	**Lab 10**: Recursive functions
Practical Lecture 11: Pointers, structures and dynamic memory allocation	**Lab 11**: Pointers and structures
Practical Lecture 12: File handling	**Lab 12**: File operations

Text Books:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill.

Reference Books:

3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

BHARTI VISHWAVIDYALAYA, DURG

Semester: B. Tech.– 2nd | **Branch: Common to all Branches**

Subject: Basic Civil Engineering & Mechanics (Lab) | **Course Code: BT00208**

Total Marks in End Semester Exam: 35 | **L: 0 T: 0 P: 2**

Min. Marks - 14

List of Experiments:

1. Water Absorption test on bricks.
2. Compressive strength test on bricks.
3. Fineness of cement by sieve analysis.
4. Initial setting time of cement.
5. Compressive Strength test of Cement.
6. Sieve analysis and F.M. of fine aggregate.
7. Sieve analysis and F.M. of coarse aggregate.
8. Compressive strength test of Concrete.
9. Difference in level between two given stations by Height of Instrumentmethod.
10. Difference in level between two given stations by Rise & Fall method.

Semester: B. Tech.– 2nd **Branch: Common to all Branches**

Subject: Workshop Practice/Manufacturing Process (Lab) **Course Code: BT00209**

Total Marks in End Semester Exam: 35 **L: 0 T: 1 P: 4**

Min. Marks - 14

Unit I:

Forging: Introduction to manufacturing process, and its classification, use of various forging tools,forging operations, forging defects.

Suggested Jobs: Forging of chisel, forging of screw driver.

Unit II:

Carpentry: Different types of wood, carpentry tools, different joints, polishing, wood workingLathe.

Suggested Jobs: Making of name plate, stools and a small job on wood working lathe.

Unit III:

Fitting Shop: Introduction to bench working. Work holding devices, measuring instruments, fittingtools and their specification, types of joints fitting operations.

Suggested Jobs: Preparation of job by use of filling, sawing, chipping, drilling and tapping operations.

Unit IV:

Moulding: Pattern materials, allowances, moulding terminology.

Suggested Jobs: Prepare moulds of patterns, casting small household objects like paper-weight etc.

Unit V:

Welding: Study and use of gas, Arc, soldering, brazing methods. Safety precaution.

Suggested Jobs: Preparing Lap and Butt joints by gas and arc welding method.

Unit VI:

Metal Cutting: Common machining operations, different machine tools, cutting tools materials, different type of Lathes, Lathe operations, shaper and its specification. Quick return mechanism of shaper.

Suggested Jobs: Making small shaft, cutting screw thread on Lathe.

Text Books:

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2. Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGrawHill House, 2017.
3. B.S. Raghuvanshi, Workshop Technology, Vol I&II, Dhanpat Rai & Sons.

Reference Books:

1. Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.
2. Gowri P. Hariharan and A. Suresh Babu,"Manufacturing Technology – I" Pearson Education, 2008.
3. Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.
4. M.L.Begeman and B.H.Amstead, Manufacturing Process, Wiley
5. W.A.J.Chapman and E. Arnold, Workshop Technology, Vol I, II, & III, CRC Press, Prentice Hall
6. V. Narula, Workshop Technology, S.K. Kataria and sons.

BHARTI VISHWAVIDYALAYA, DURG

SCHEME OF TEACHING AND EXAMINATION
B.Tech (Third Semester – Electronics & Telecommunication Engineering)

Sl. No.	Courses(Subject)	CourseCode	Period per Week			Scheme of Examination			Total Marks	Credit
						Theory/Lab				
			L	T	P	ESE	CT	TA		
1.	Mathematics - III	BT00301	3	1	-	70	10	20	100	4
2.	Electronics Devices	BT05302	3	1	-	70	10	20	100	4
3.	Digital System Design	BT05303	2	1	-	70	10	20	100	4
4.	Network Theory	BT05304	1	0	-	70	10	20	100	3
5.	Data structures usingC++	BT05305	2	0	-	70	10	20	100	2
6.	Electronics DevicesLab	BT05306	-	-	2	35	-	15	50	1
7.	Digital System DesignLab	BT05307	-	-	2	35	-	15	50	1
8.	Electronics WorkshopLab	BT05308	-	-	2	35	-	15	50	1
9.	Software Lab	BT05309	-	-	4	35	-	15	50	1
10.	Personality Development	BT05310	-	-	-	-	-	50	50	-
Total Marks			11	3	10	490	50	210	750	21

Program / Semester: B.Tech. (III)	**Branch: Electronics & Telecommunication Engineering**
Subject: Mathematics - III	**Course Code: BT00301**
Total Theory Periods: 03	**Total Tutorial Periods: 01**
Class Tests: Two (Minimum)	**Assignments: Two**
ESE Duration: 03 Hours	**Marks: Max. – 70 Min. – 28**

UNIT-I Laplace transform: Definition, Transform of elementary functions, Properties of Laplace transform, Transform of derivatives & integrals, Multiplication by t^n, Division by t, Evaluation of integrals, Inverse Laplace Transform, Convolution theorem, Unit step function, Unit impulse function, Periodic function, Application to solution of ordinary differential equations.

UNIT- II Partial differential equation: Formation, Solution by direct integration method, Linear equation of first order, Homogeneous linear equation with constant coefficients, Non-homogeneous linear equations, Method of separation of variables.

UNIT- III Random variable: Discrete and continuous probability distributions, Mathematical expectation, Mean and Variance, Moments, Moment generating function, probability distribution, Binomial, Poisson and Normal distributions.

UNIT- IV Interpolation with equal and unequal intervals: Finite differences, Newton's Forward & Backward Difference Formulae, Central Difference Formula, Stirling's Formula, Bessel's Formula, Lagrange's Formula and Newton's Divided Difference Formula.

UNIT-V Numerical Solution of Ordinary Differential Equations: Picard's Method, Taylor's Series Method, Euler's Method, Euler's Modified Method, Runge-Kutta Methods, Predictor-corrector Methods- Milne's Method, Adams-Bashforth Method.

Text Books:

1. "Higher Engg. Mathematics", Dr. B.S. Grewal– Khanna Publishers.
2. "Advanced Engg. Mathematics" , Erwin Kreyszig – John Wiley & Sons.
3. "Numerical Methods in Engineering and Science" , Dr. B.S. Grewal, Khanna

Publishers.

4. “Numerical Methods for Scientific and Engineering Computation” , M .K. Jain, S. R. K

Reference Books:

1. “Applied Mathematics”, P. N. Wartikar& J. N. Wartikar. Vol-II Pune Vidyarthi Griha Prakashan, Pune.

2. “Applied Mathematics for Engineers & Physicists”, Louis A. Pipes- TMH.

3. “Numerical Methods for Scientists and Engineers” K. Shankar Rao, Prentice Hall of India.

4. “Numerical Methods” P. Kandasamy, K. Thilagavathy and K. Gunavathi, S. Chand publication.

Program / Semester: B.Tech. (III)	**Branch: Electronics & Telecommunication Engineering**
Subject: Electronics Devices	**Course Code: BT05302**
L: 2 T: 1 P: 0	**Total Tutorial Periods: 01**
Class Tests: Two (Minimum)	**Assignments: Two**
ESE Duration: 03 Hours	**Marks: Max. – 70 Min. – 28**

Course Objectives:

1. To study semiconductor charge carriers transport phenomena.
2. To understand practical applications of PN junction diode.
3. To understand the basic working physics of BJT and study transistor biasingarrangements.
4. To study basic principle of JFET, MOSFET their characteristics and amplifiers.

UNIT- I: Conduction in Semiconductor: Transport phenomena in semiconductors: Mobility and conductivity, Electrons and holes in an intrinsic semiconductor, Donor and acceptor impurities, *Energy Band Diagram*, Charge densities in a semiconductor, Law of mass action, Charge neutrality equation, Generation and recombination of charge carriers, Diffusion, Continuity equation, Injected minority carrier, Potential variation in a graded junction. Formation of p-n junction and its characteristics.

UNIT-II: Diode and its Application: Semiconductor Diode: Construction, current components, *Phenomenon of hole-electron pair*. V-I Characteristics, Effect of Temperature on V-I Characteristics, Ideal Diode, Diode equation, Diode Resistance, Diode Capacitance: Transition and Diffusion Capacitance. Load line analysis of diode circuit, DC analysis of diode circuits: Piecewise linear model of p-n junction diode. *Types of diode*

Rectifiers: Half wave, Full wave and Bridge rectifier: *Comparison of all three rectifiers* Voltage regulation, Ripple factor, Ratio ofrectification, PIV, Transformer Utilization factor. Filter circuits for power supply (Qualitative analysis only): Inductor filter, Capacitor filter, CLC or π filter.*Formulaes of ripple factor using filters*

Zener diode: Break down mechanism, Characteristics, Specifications, zener diode.*Zener diode as regulator*

UNIT-III: Bipolar Junction Transistor & Its Configurations: Introduction, Construction, Types: npn and pnp, Current components. Transistor as an amplifier,*CE,CB,CC Amplifier* Transistor Characteristics (input, output and transfer), Transistor Circuit Configuration: CB, CC, CE Configuration, Early Effect. Ebers-Moll Model. Transistor as a Switch.

Transistor biasing & Thermal stabilization: Concept of operating point, Thermal runway, Bias stability, *Stability factors S.S',S"*, Fixed bias, Collector to base bias, Voltage divider bias.

UNIT-IV: Junction Field Effect Transistor(JFET): *FET,*JFET Construction, Symbol, Basic Operation, V-I Characteristics, Cut-off and pinch off voltages, Trans-conductance, CS, CG and CD Configuration, FET as switch, FET as VVR.*Charecterstics & Parameters*

Biasing arrangements for JFET: Fixed bias, Self-bias and Voltage divider bias.

UNIT-V: Metal Oxide Semiconductor Field Effect Transistor (MOSFET): Introduction, Construction, Symbol, Basic Operation, V-I Characteristics. MOSFET Types: Depletion MOSFET, Enhancement MOSFET, their characteristics and parameters, Body effect, Sub threshold conduction, The MOS Switch, CMOS devices. **MOSFET Biasing:** Fixed bias, Self-bias and Voltage divider bias, Feedback bias in E-MOSFET.*Use of Mosfets*

Text Books:

1. Integrated Electronics: Analog & Digital Circuit Systems – Jacob Millman & Halkias, Tata McGraw Hill. (Unit- I, II & III)
2. Principles of Electronics by V. K. Mehta, Khanna Publication.
3. Electronic Devices and Circuit Theory – Robert L. Boylestad & L. Nashelsky, K.. L. Kishore, 9th Edition, PHI. (Unit- IV, V)
4. Electronic Devices & Circuits – Donald A Neaman, Tata McGraw Hill.

Reference Books:

1. *Electronic Devices & Circuits – Allen Mottershead, PHI.*
2. *Microelectronic Circuits - Sedra and Smith, 5th Edition, Oxford University Press.*

Course outcomes:

At the end of this course students will demonstrate the ability to

1. Understand the principles of semiconductor Physics
2. Understand and utilize the mathematical models of semiconductor junctions and MOS transistors for circuits and systems.

Program / Semester: B.Tech. (III)	**Branch: Electronics & Telecommunication Engineering**
Subject: Digital System Design	**Course Code: BT05303**
L: 2 T: 1 P: 0	**Total Tutorial Periods: 01**
Class Tests: Two (Minimum)	**Assignments: Two**
ESE Duration: 03 Hours	**Marks: Max. – 70 Min. – 28**

UNIT- I: Boolean Algebra & Minimization Techniques: Logic Simplification and Combinational Logic Design, ***Boolean Algebra:*** Logic Operations; Axioms and Laws of Boolean Algebra: Complementation Laws, AND Laws, OR Laws, Commutative Laws, Associative Laws, Distributive Laws, Absorption Laws, Transposition Theorem, De Morgan's Theorem; Duality; Reducing Boolean Expressions; Functionally Complete Sets of Operations; Boolean Functions and their Representation. ***Minimization Techniques***: Expansion of a Boolean expression to SOP form; Expansion of a Boolean expression to POS form*; K- maps* up to 4 variables, Mapping and minimization of SOP and POS expressions; Concept of Don't Care Terms; Quine – McClusky Method (Up to 5 variable); Synthesis using AND-OR, NAND-NOR and XOR forms; Design Examples; Binary codes and code conversion (BCD, Excess-3, Gray code)

UNIT-II: Combinational Circuits: MSI devices like ***Adder & Subtractor***: Half and Full Adders, Half and Full Subtractor, Serial and Parallel Adders, BCD Adder, ***Comparators***, ***Decoder:*** 3-Line to 8-Line Decoder, 8-4-2-1 BCD to Decimal Decoder, BCD to Seven Segment Decoder; ***Encoder:*** Octal to Binary and Decimal to BCD Encoder; ***Multiplexers:*** 2-Input Multiplexer,4-Input Multiplexer,16-Input Multiplexer; ***Demultiplexers***: 1-Line to 4-Line & 1- Line to 8- Line Demultiplexer; Applications of Multiplexers.*Mux. ICs*

UNIT- III: Sequential Circuits: Building blocks of ***Flip-Flops*** like S-R latch , Gated S-R Latch; D Latch, ***Edge Triggered Flip-Flops***: S-R, D, J-K and T Flips-Flops; Master-Slave J-K Flip-Flop; ***Shift registers:*** SISO, SIPO, PISO,PIPO, Bi-Directional Shift Registers, Universal Shift register; ***Counters:*** Asynchronous Counters: Design of Asynchronous Counters; Ripple Counters: Effects of Propagation Delay in Ripple Counters; Synchronous

Counters: Design of

Synchronous Counters, 3-bit Synchronous Up counter, 3-bit Synchronous Down Counter,3 bit Synchronous Up-down Counter, Design Of Synchronous BCD Counter.

UNIT-IV: Finite State Machine: Design of synchronous Finite state machine, AlgorithmicState Machines charts. Designing synchronous circuits like Pulse train generator, Pseudo Random Binary Sequence generator, Clock generation. *Waveforms with clock*

UNIT-V Digital Logic Families: Introduction; Logic Families: TTL NAND gate, *Universal gates & truth tables* Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, TTL subfamilies : IIL, ECL, MOS Logic, CMOS Logic, Comparison Among Various Logic Families, Manufacturer's Specification.

Text/Reference Books:

1. R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009.
2. W.H. Gothmann, "Digital Electronics- An introduction to theory and practice", PHI, 2nd Edition ,2006.
3. D.V. Hall, "Digital Circuits and Systems", Tata McGraw Hill, 1989
4. Digital Fundamentals: Floyd & Jain: Pearson Education.
5. Digital Electronics: A. P. Malvino: Tata McGraw Hill.

Course outcomes:

At the end of this course students will demonstrate the ability to

1. Employ Boolean algebra and circuit minimization techniques.
2. Design and analyze combinational logic circuits such as adders, subtractors, multiplexers, flip-flops, shift registers and counters.
3. Design & analyze modular combinational circuits with MUX/DEMUX, Decoder,Encoder
4. Design & analyze synchronous sequential logic circuits
5. Gain knowledge about various logic families and select a suitable one for a specific application.

Program / Semester: B.Tech. (III)	**Branch: Electronics & Telecommunication Engineering**
Subject: Network Theory	**Course Code: BT05304**
L: 2 T: 1 P: 0	**Total Tutorial Periods: 01**
Class Tests: Two (Minimum)	**Assignments: Two**
ESE Duration: 03 Hours	**Marks: Max. – 70 Min. – 28**

Course Objectives:

- To understand the basic concepts and analysis of electric circuits.
- To make the students learn how to synthesize an electrical network from a givenimpedance / admittance function.

UNIT-I: Methods of Analysing Circuits & Network Theorems: Node and Mesh Analysis, Source transformation and duality. Network theorems: Superposition, Reciprocity,Thevenin's, Norton's, Maximum power Transfer, Compensation and Tellegen's theorem as applied to AC circuits.

Input Power and Power Transfer: Energy and Power, Effective or Root- Mean Square Values, Average Power and Complex Power, Problems in Optimizing Power Transfer.

UNIT-II: Initial Conditions in Networks: Initial Conditions in Elements, Geometrical Interpretation of Derivatives, A Procedure for Evaluating Initial Conditions, Initial State of a Network.

UNIT-III: The Laplace Transformation :Introduction ,The Laplace Transformation, Basic Theorems for the Laplace Transformation, Convolution Theorem, Application of Laplace Transformation Technique in Electric Circuit Analysis. *Examples*

Transforms of Signal Waveforms: The Shifted Unit Step Function, The Ramp and Impulse Functions, *Its waveforms* Waveform Synthesis, The Initial and Final Value of f(t) from F(s).

UNIT-IV: Two Port Networks: Relationship of Two-Port Variables, Short-circuit Admittance Parameters, The Open Circuit Impedance Parameters, Transmission Parameters, The Hybrid Parameters, Relationships between Parameters Sets, Interconnection of Two-Port Networks:Series, Parallel and Cascade connection.

UNIT-V: Sinusoidal Steady State Analysis: The Sinusoidal Steady State, The Sinusoid and $e^{\pm j\omega t}$; Solution Using e±jωt; Solution Using $Re^{j\omega t}$ or $Ime^{j\omega t}$; Phasors and Phasor Diagrams.

Text/Reference Books

1. Van, Valkenburg.; "Network analysis"; Prentice hall of India, 2000
2. Sudhakar, A., Shyammohan, S. P.; "Circuits and Network"; Tata McGraw-Hill New Delhi,1994
3. A William Hayt, "Engineering Circuit Analysis" 8th Edition, McGraw-Hill Education

Course Outcomes:

At the end of this course students will demonstrate the ability to

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

Program / Semester: B.Tech. (III)	**Branch: Electronics & Telecommunication Engineering**
Subject: Data Structure using C++	**Course Code: BT05305**
L: 2 T: 1 P: 0	**Total Tutorial Periods: 01**
Class Tests: Two (Minimum)	**Assignments: Two**
ESE Duration: 03 Hours	**Marks: Max. – 70 Min. – 28**

UNIT I: Principles of Object Oriented Programming: Basic Concepts of Object Oriented Programming, Benefits of OOPs, Classes and Objects: C Structures Revisited, Specifying a Class, Defining Member Functions, Making an Outside Function Inline, Nesting of Member Functions, Private Member Functions, Arrays Within a Class, Memory Allocation for Objects, Static Data M embers, Static Member Functions, Arrays of Objects, Objects as Function Arguments, Friendly Functions, Returning Objects. Constructors and Destructors: Constructors, Parameterized Constructors, Multiple Constructors in a Class, Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructor, Destructors.

UNIT II: Operator Overloading and Inheritance: Defining Operator Overloading, Overloading Unary Operators, Overloading Binary Operators, Overloading Binary Operators Using Friends, Manipulation of Strings Using Operators, Rules for Overloading Operators, Function Overloading, Defining Derived Classes, Single Inheritance, Making a Private Member Inheritable, Multilevel Inheritance, Multiple Inheritance, Hierarchical inheritance, Virtual Base Classes, Abstract Classes.

UNIT III: Pointers and Runtime Binding: Pointers and their Binding, Address Operator &, Pointer Variables, Void Pointers, Pointer Arithmetic, Runtime Memory Management, Pointers to Pointers, This Pointer, Introduction to Virtual Functions, Need for Virtual Functions, Pointer to Derived Class Objects, Definition of Virtual Functions, Array of Pointers to Base Class Objects, Pure Virtual Functions, Abstract Classes

UNIT IV: Introduction to the data structures: Searching, Types of searching: Linear Search , Binary Search, **Sorting** ,Types of Sorting : Insertion Sort, Bubble Sort and Selection

Sort.Introduction to the Stack and Queue, Types of Queue : Simple Queue, Circular Queue and Priority Queue.

UNIT V: Linked List, Tree and Graphs: Introduction to the Linked List. **Trees:** Introduction, Different Types of Tree: Binary Tree, Binary Search Tree, Tree Traversal, AVL Tree. **Graph:** Graph Theory Terminology, Sequential Representation of Graphs, Graph Traversal.

Text Books:

1. Object oriented Programming with C++, E Balaguruswamy, 3rd Edition, Mcgraw-Hill .(UnitI, II & V)
2. Mastering C++, K.R.Venugopal, Raj Kumar and T.Ravi Shankar , Mcgraw-Hill. (Unit III)
3. Theory and Problems of Data Structures, Seymour Lipschutz, Schaum's Outline Series. (UnitIV)

Reference Books:

1. **C++ Complete Reference, H. Schildt , Mcgraw-Hill.**
2. **Object Oriented Programming in Turbo C++, Robert Lafore, Galgotia Pub.**
3. **C++ Primer plus, Stephen Prata, Galgotia Pub**

The C++ Programming Language, Bjarne Stroustrup, Pearson

Program / Semester: B.Tech. (III)	**Branch: Electronics & Telecommunication Engineering**
Subject: Electronic Devices Laboratory	**Course Code: BT05306**
Marks: Max. – 35 Min. – 14	**L: 0 T: 0 P: 2**

List of Experiments: (At least Ten experiments are to be performed by each student)

1. To draw the characteristics of a semiconductor p-n junction diode and to find cut-in voltage,reverse resistance, static resistance and dynamic resistance.
2. To simulate characteristics of pn junction using SPICE model.
3. To draw the characteristics of a zener diode and to find cut-in voltage, reverse resistance, static resistance and dynamic resistance.
4. To design a half wave rectifier and to determine its efficiency and ripple factor.
5. To design a centre tap full wave rectifier and determine the ripple factor and efficiency withand without filter.
6. To design a bridge full wave rectifier and determine the ripple factor and efficiency with andwithout filter.
7. To draw the characteristics of CE configuration of a transistor amplifier.
8. To draw the characteristics of CB configuration of a transistor amplifier.
9. To draw the characteristics of CC configuration of a transistor amplifier.
10. To simulate characteristics of BJT using SPICE model.
11. To design a Zener regulator circuit and to find the regulation characteristics.
12. To draw the load line and find Q-point of a transistor amplifier under CE configuration.

13. To design and verify the self bias circuit operation.

14. To design and verify the voltage divider biasing circuit.

15. To draw the characteristics of FET.

16. To simulate characteristics of FET using SPICE model.

17. To draw the characteristics of MOSFET.

Equipment/Machines/Instruments/Tools/Software Required:

Circuit components, Breadboard, Hook-up wire, Power supply, CRO, Function generator, Anysimulation software –Package like SPICE or MATLAB.

Recommended Books:

1. Laboratory Manual for Electronic Devices and Circuits, 4th Ed., David A. Bell, PHI
2. Lab Manual of Electronic Devices by Paul B Zbar.
3. Microelectronics' An integrated approach' by Roger T. howe and Charles G. Sodini.

Electronic Devices Systems and Applications by Robert Diffenderfer, Cengage learning.

Program / Semester: B.Tech. (III)	**Branch: Electronics & Telecommunication Engineering**
Subject: Digital System Design Laboratory	**Course Code: BT05307**
Marks: Max. – 35 Min. – 14	**L: 0 T: 0 P: 2**

List of Experiments: (At least Ten experiments are to be performed by each student)

1. To Verify The Properties of NOR & NAND Gates As Universal Building Block.
2. Realization of Boolean Expression Using NAND Or NOR Gates.
3. To design and implement an X- OR Gate Using Only NAND Or NOR Gates Only.
4. To design and implement a Half Adder Circuit using Logic Gates And Verify its Truth table.
5. To design and implement a Full Adder Circuit And Verify its truth table (Using Two X-ORAnd 3 NAND Gates).
6. To design and implement a Half Subtractor Circuit by Using Basic Gates And Verify its truthtable.
7. To design and implement a Full Subtractor Circuit by Using Basic Gates And Verify its truthtable.
8. To design and implement a Circuit of 4 -Bit Parity Generator and Checker & Verify its truthtable.
9. To design and implement a 4x1 Multiplexer using Logic Gates And Verify its truth table.
10. To design and implement a 1x4 De-Multiplexer using Logic Gates And Verify its truth table.
11. To design and implement a Programmable Inverter Using X-OR Gates & Verify its truth table.
12. To design Octal to Binary Encoder using Logic Gates and Verify its truth table.
13. To design BCD to Excess-3 Decoder using Logic Gates And Verify its truth table.
14. To design Binary to Gray Code Converter and Verify its truth table.
15. To Design A Comparator Circuit & Verify its truth table.
16. To Construct A RS Flip Flop Using Basic & Universal Gates (NOT, NOR & NAND)
17. To Construct A J.K. Master Slave Flip Flop & Verify its truth table
18. To Verify The Operation of A Clocked S-R Flip Flop And J. K. Flip Flop
19. To Construct A T & D Flip Flop Using J. K. Flip Flop And Verify Its Operations & truth

table.

20. To Construct and study the operation of a 4-bit Shift Register in following modes:

a. Serial In Serial Out

b. Serial In Parallel Out

c. Parallel In Serial Out

d. Parallel In Parallel Out

21. To Verify the Operation of 4-bit Binary Asynchronous Counter.

22. To Verify The Operation of a Synchronous Decade Counter.

23. To perform the operation of BCD Counter Using 7490.

Equipment/Machines/Instruments/Tools/Software Required:

Various ICs , Power Supply, Hook-Up Wires.

Program / Semester: B.Tech. (III)	**Branch: Electronics & Telecommunication Engineering**
Subject: Electronics Workshop Laboratory	**Course Code: BT05308**
Marks: Max. – 35 Min. – 14	**L: 0 T: 0 P: 2**

List of Experiments: (At least Ten experiments are to be performed by each student)

1.To understand the operational features of Analog and Digital Multimeter.

2.To understand the operational features of Cathode Ray Oscilloscope.(Calibration, Time/div,Volt/div, X-Y, single channel, Dual channel)

3.To understand the operational features of Function Generator (Measurement of volt and frequency, attenuation).

4.Measurement of capacitors (mica, ceramic, paper, electrolytic and variable) using CRO and LCR Meter and verify with color coding.

5.Measurement of resistors- Fixed (carbon, wire wound, metal film and variable) using CRO and Multimeter and verify with color coding and identification of special resistors like Thermistor, LDR and VDR (FET)

6.Measurement of inductors (fixed) using CRO and LCR meter.

7.Study of Diodes (Ge and Si), Zener diodes and LEDs.(terminals, resistance and capacitancein forward biased and reversed biased conditions).

8.Study of Transistors (npn, pnp) using multimeter and CRO. (terminals, forward biased and reversed biased junction conditions.)

9.To understand the types of PCB.

10. To understand PCB designing rules (Art Work and layout) using EDA tools.
11. To design and fabricate a DC power supply using bridge rectifier on PCB.
12. To learn the use of SMD rework station.
13. Mini project (compulsory)

Equipment/Machines/Instruments/Tools/Software Required:

- Film Making unit
- Deep coating machine
- UV exposure unit
- PCB curing machine

- PCB etching machine
- PCB drilling machine
- PCB tining machine
- Magnifying lamp
- Soldering &desoldering iron
- LCRQ meter
- Digital & analog multimeter
- PCB making software (ULTIBOARD, PROTEL, EXPRESS LAB, EDWin XP)
- Resistance color code chart
- Capacitor color code chart
- Transistor chart
- CRO.
- SMD work station

Recommended books:

1.A Monograph on Electronic design Principles – by N.C. Goyal& R.K. Khetan

2.Electronic Measurement and Instrumentation – by A.K. Shawney.

Program / Semester: B.Tech. (III)	**Branch: Electronics & Telecommunication Engineering**
Subject: Software Laboratory	**Course Code: BT05309**
Marks: Max. – 35 Min. – 14	**L: 0 T: 0 P: 2**

List of Experiments: (At least Ten experiments are to be performed by each student)

1. A book shop maintains the inventory of books that one being sold at the shop. He list includes details such as authors, title, price, publisher and stock position. Whenever a customer wants a book, the sales person input the title and author and the system searches the list and displays whether it is available or not. If it is not, an appropriate message is displayed. If it is then the system displays the book details and requests for the number of copies required.

2. Write a program which will show the order of execution of constructor, destructor, static data member, static function and member functions.

3. Create class Distance having private data feet(type integer), inches(type float) and function getdist() and showdist() . Overload + operator to add two distance values and > operator to compare them.

4. Create a class called employee containing protected data name(20 characters), employee number(long integer). Also write its constructor and destructor functions. Create two derived classes called hourly _employee containing private data rate and hours and salary_ employee containing basic salary and allowances as data members. The class employee is inherited as public by these derived classes. Write appropriate functions in each class to calculate total salary of each employee and to display name, number and total salary.

5. Create a class dimension containing three float type data and a constructor to accept values, also declare a pure virtual function area() in it. Now create three derived classes rectangle, square and triangle, each inheriting dimension as public.Define corresponding constructors and redefine virtual function area() in each to give area of respective figure. A main() program should createsuitable objects to implement this inheritance.

6. Create a class STRING that contains a character array as a data member. Overload + and = operators respectively to concatenate and compare strings.

7. Create two classes DM and DB respectively represent the distance in meters, centimeters and distance in feet, inches. Write a program that can read values for the class objects and add one object DM with another object of DB. Use a friend function to carry out the addition operation. The object that stores the results may be a DM object or DB object depending on the units in which the results are required. The display should be in the format of feet and inches or meters and centimeters depending on the object on display.

8. Write a program to read the contents of a text file and count the number of words present in the file.

9. Write a program that reads a text file and creates another file that is identical except that everysequence of consecutive blank spaces is replaced by single space.

10. Write a program that will ask the users to enter the details of 5 students and transfer those details into a binary file Stud.dat. Write another file that will read the details of the students and print the names of all those students who have total marks greater that a particular given value.

11. Write a program that will take the details of 10 employees as input and transfer those details into a binary file. Write another program that will provide a menu to the user for the following purpose.

a. To sort the file on the basis of their employment number.

b. To sort the file on the basis of their name.

c. To search the record for a particular employee on the basis of their employee number or name.

12. Write a program that will take two strings from the command line as argument and print theappropriate message if both the strings are same.

13. Write a program to implement a stack and it's operations.

14. Write a program to implement a linear queue, circular queue using an array.

15. Write a program to convert an infix expression into its equivalent postfix expression using astack.

16. Write a program to evaluate a postfix expression using a stack.

17. Write a program to create and display a linked list of integers.

18. Write a program to create a linked list and define functions to add a node (at the

beginning,end and middle), delete a node, search a node and display all the nodes.

19. Write a program to create two linked list and append one list at the end of another using function.

BHARTI VISHWAVIDYALAYA, DURG

SCHEME OF TEACHING AND EXAMINATION
B Tech (Fourth Semester – Electronics & Telecommunication Engineering)

Sl. No.	Courses(Subject)	CourseCode	Period per Week			Scheme of Examinationon			Total Marks	Credit
						Theory/Lab				
			L	T	P	ESE	CT	TA		
1.	Analog Communication	BT05401	3	1	-	70	10	20	100	4
2.	Analog Circuits	BT05402	3	1	-	70	10	20	100	4
3.	Electromagnetic Field Theory	BT05403	2	1	-	70	10	20	100	3
4.	Signals & Systems	BT05404	1	0	-	70	10	20	100	3
5.	Probability Theory and StochasticProcesses	BT05405	2	0	-	70	10	20	100	3
6.	Analog CommunicationLab	BT05406	-	-	2	35	-	15	50	1
7.	Analog circuits Lab	BT05407	-	-	2	35	-	15	50	1
8.	Programming using Python lab	BT05408	-	-	2	35	-	15	50	1
9.	Virtual Lab	BT05409	-	-	4	35	-	15	50	1
10.	Culture and Constitution of India	BT05410	-	-	-	-	-	50	50	
Total Marks			11	3	10	490	50	210	750	21

Program / Semester: B.Tech (IV)	**Branch: Electronics & Telecommunication Engineering**
Subject: Analog Communication	**Course Code: BT05401**
Marks: Max. – 70 Min. – 28	**L: 3 T: 1P: 0**
Class Tests & Assignments to be conducted: 2each	**Duration (End Semester Exam): 03 Hours**

Course Objectives:

1. To understand the signal analysis performed in communication.
2. To gain knowledge about various analog communication system.
3. To study about various Noise sources and its impact on analog communication system.

UNIT-1: Introduction to Communication System: Introduction: Overview of Communication system, Communication channels , Need for modulation, Baseband and Pass band signals .Classification of signals and study of Fourier transforms for standard signals, definition of signal bandwidth, Distortion less transmission, Perceval's Theorem. Introduction to Convolution and correlation of signals, comparison between correlation and convolution. Frequency division multiplexing. *Application of FDM*

UNIT-11: Amplitude Modulation: Amplitude Modulation: full carrier system and Suppressed carrier system. Double side band with full Carrier, Generation and Detection of Double side band without Carrier (DSB-SC), SSB-SC, VSB-SC, Single Side Band Modulation, Phasor representation, Bandwidth, Modulation Index Superposition Theorem of Spectra. Power Content in AM signal. Generation of AM using LTI circuits and Non-linear circuits. Demodulation of AM waves: Square law detectors and Envelope detectors.*Practical Examples of Modulations*

UNIT-III: Angle Modulation: Angle modulation, Phase & frequency modulation, Relationship between phase and frequency modulation, Phase and frequency deviation, Spectrum of an FM signal, Bandwidth and power of a sinusoidal modulated FM signal, Types of FM: Narrowband FM and Wideband FM. Phasor diagram for FM signals. FM generation: Parameter-variation method, an indirect method of frequency modulation (Armstrong system), Frequency multiplication, and Frequency multiplication applied to FM signals, FM demodulators : Slope detectors and. Comparison of AM and FM.

UNIT-1V: Transmitters and Receivers: AM Transmitters: Generation of AM, low level and high level modulation, comparison of levels, AM transmitter block diagram, collector class C modulator, Base Modulator, DSB -SC modulator. FM transmitter: Direct Method , Armstrong Indirect Method Radio Receivers and Demodulators :Introduction, Performances characteristic of receivers: Sensitivity, Selectivity, Fidelity, Image frequency and IFRR, Tracking and Double spotting, TRF, Super heterodyne receivers AGC.*PLL Block diagram and definitions* PLL for FM demodulation.

UNIT-V Noises in Analog Communication: Noise Introduction, Sources of Noise, Classification of noise, Noise calculations (thermal noise), SNR, Noise figure for cascaded amplifiers, Noise Factor, Effective input Noise Temperature. *Removal of noise*
Noise calculation (SNR, FOM) of Various AM system: DSB-SC, SSB-SC, AM-FC system(Envelope detector) Threshold Effect in Envelope detector. Noise in angle modulated system: , Capture effect, Threshold effect andits improvement in Discriminators

Text Books:

1. Principles of Communication Systems, Taub and Schilling, 2nd Edition., Tata McGraw Hill.(unit-II,III,V)
2. Electronic Communication Systems, George F Kennedy, Tata McGraw Hill. (unit-IV)
3. Communication Systems, Simon Haykins, Wiley India.
4. Communication Systems, R P singh ,S D Sapre, Tata McGraw Hill, Second Edition (unit-I)

Reference Books:

1. Communication Systems Engineering, Proakis, 2 nd Edition, Pearson Education.
2. Modern Digital and Analog Communication, B.P. Lathi, Oxford University Press.

Course outcomes:

1. The student will be able to draw spectral plots and visualize signals in frequency domain.
2. Understand the amplitude modulation process and effect of noise in AM systems.
3. Understand the angle modulation process and effect of noise in FM/PM systems.
4. Get the overview of transmitters and receivers for both AM and FM systems.

Program / Semester: B.Tech (IV)	**Branch: Electronics & Telecommunication Engineering**
Subject: Analog Circuits	**Course Code: BT05402**
Marks: Max. – 70 Min. – 28	**L: 2 T: 1P: 0**
Class Tests & Assignments to be conducted: 2each	**Duration (End Semester Exam): 03 Hours**

Course Objectives:

1. To understand Operating point calculations and working of BJTs at low and high frequencies.
2. To study Frequency response of BJT.
3. To study the design of multistage amplifiers.
4. To understand the working of different types of feedback amplifiers.
5. To understand the working of different types of oscillators.

UNIT- I: BJT AT LOW FREQUENCY: Transistor as a two port device and its Hybrid Model: Models for CB, CE, CC configurations and their Interrelationship, *Charecterstics* Analysis and Comparison of the three Configurations. Classification of Amplifiers, Amplitude and Frequency, Linear analysis of Transistor Circuits. Miller's Theorem and its dual. Cascading transistor Amplifiers. Simplified Models and Calculation of CE and CC Amplifiers. Gain (*voltage & Current & Power*) The Common Emitter Amplifier with an Emitter Resistance. Methods of increasing the input resistance of an Amplifier.

UNIT-II: BJT AT HIGH FREQUENCY: CE hybrid- π model, Hybrid –π Conductances and Capacitances. *Parameters* Validity and parameter Variation, CE Short Circuit Current Gain, Current Gain with Resistive load. Frequency response of a single stage CE Amplifier, Gain-Bandwidth product, CC stage High frequencies. *Numericals*

UNIT- III MULTISTAGE AMPLIFIERS: Introduction, Distortion in Amplifiers, Frequency Response, Step Response of an amplifier, Band Pass of Cascaded Stages.

Coupling of amplifiers: Coupling Types: Direct, RC and Transformer. RC Coupled Amplifier, Low Frequency response of an RC-coupled Stage, Effect of an Emitter bypass capacitor, High Frequency response of two cascaded CE Transistor stages.

UNIT-IV FEEDBACK AMPLIFIERS: Classification, Feedback concept, *Feedback amplifiers* Transfer gain with Feedback, Characteristics of Negative Feedback Amplifiers, Analysis of Input and output Resistance. Topologies: Method of Analysis of Feedback amplifiers, Voltage series Feedback, Voltage series Feedback pair, Current series, Current shunt and Voltage shunt feedback.

UNIT-V OSCILLATOR (BJT): Concept of positive Feedback. Barkhausen criterion for oscillation, *RC & LC Oscillators* Mechanism for start of oscillation and Stabilization of amplitude. Sinusoidal oscillator: Phase shift oscillators, Wien Bridge oscillator, Resonant circuit oscillators, Colpitts and Hartley oscillator. Amplitude Frequency and Phase stability analysis of all Oscillators, Crystal oscillator.

Text Books:

1. Integrated Electronics – Millman & Halkias, Tata McGraw Hill. (Unit I to V)
2. Microelectronics – Millman and Grabel, Tata McGraw Hill.
3. Electronic Devices & Circuits – Donald A Neaman, Tata McGraw Hill.

Reference Books:

1. Electronic devices and circuits- A.K. Maini & Varsha Agrawal, 1stEdition ,Wiley Publication.
2. Electronic Devices & Circuits – David A. Bell, PHI.
3. Microelectronic Circuits- Sedra and Smith, 5th Edition, Oxford University Press.

Course outcomes:

1. Student will be able to understand ac analysis of BJT amplifier at Low and High frequencies.
2. Understand the concepts of multistage amplifier and coupling of amplifiers.
3. Understand the concepts of feedback used in amplifier .
4. Able to understand the concepts of Oscillator.

Program / Semester: B.Tech (IV)	**Branch: Electronics & Telecommunication Engineering**
Subject: Electromagnetic Field Theory	**Course Code: BT05403**
Marks: Max. – 70 Min. – 28	**L: 3 T: 1P: 0**
Class Tests & Assignments to be conducted: 2each	**Duration (End Semester Exam): 03 Hours**

Course objective: - The students will learn and understand

1. Behavior of Electrostatic and electromagnetic field and their application in electric and electronicsEngineering fields.
2. Maxwell's equations in differential and integral form their interpretation and applications.
3. Propagation of Electromagnetic wave in free space, conductors and dielectrics.

Unit I: Coordinate Systems and Transformation: Cartesian coordinate system, circular cylindrical coordinate system, Spherical coordinates, vector calculus, Differential length area and volume, line surface and volume integral, del operator, gradient of a scalar, *divergence and curl of a vector*, divergence and stokes theorem, Laplacian form of a scalar.

Unit II: Electrostatics: Electrostatic fields, Coulombs law and field intensity, Electric field due to charge distribution, Electric flux density, Electric Potential, Relationship between E and V, Gauss law, boundary conditions, Poisson's and Laplace equations.

Unit III : Magneto statics: Biot Savart law, amperes circuit Maxwell's equations, Applications of amperes law, Maxwell's equations for static field, Magnetic scalar and vector potential. Magnetic forces, Material and Devices: Force due to magnetic field, Magnetic Torque and moment, A magnetic dipole, magnetization in Materials, Magnetic Boundary Conditions.

Unit IV: Waves and Applications: Maxwell's equations, Faradays law, Displacement current, Maxwell's Equations in Differential and Integral Form, Electromagnetic Wave Propagation: Wave propagation in lossy dielectrics, plane wave in lossless dielectric, Plane wave in free space, plane wave in good conductor, Powerand Poynting vector, Reflection of plane wave at normal and oblique incidence.

Unit V : Transmission Lines: Transmission line parameter, Transmission line equations, Lossless and distortion less Transmission line, Input impedance, Characteristics Impedance, standing wave ratio ,reflection coefficient, power, smith chart, Open circuited and short circuited transmission line, Applications of transmission Lines, introduction to wave guide.

Text Books:

1. M.N.O. Sadiku," Elements of Electromagnetic" 5th edition Oxford University Press
2. G.S.N. Raju , "Electromagnetic field theory and Transmission line" Pearson Education.

Reference Books.

1. W.H. Hayt and J A Buck," Electromagnetic field Theory" 7th Edition Tata Mcgraw Hill

Course Outcomes:

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

1. Calculate electric and magnetic field from stationary and dynamic charge and current distribution
2. Gain Knowledge of static and time varying field
3. Define electric and magnetic field and solve simple electrostatic boundary problems
4. Understand the phenomenon of wave propagation with the aid of Maxwell's equations

Program / Semester: B.Tech (IV)	**Branch: Electronics & Telecommunication Engineering**
Subject: Signals and Systems	**Course Code: BT05404**
Marks: Max. – 70 Min. – 28	**L: 2 T: 1 P: 0**
Class Tests & Assignments to be conducted: 2each	**Duration (End Semester Exam): 03 Hours**

Course Objectives:

1. To describe continuous time and discrete-time signals and systems.
2. Proficiently use various methods and approaches to solve problems with signals and systems prepared for upper-level courses in communication systems, control systems, and digital signal processing.

UNIT I: CLASSIFICATION OF SIGNALS AND SYSTEMS: Representation of signals: Graphical Representation, Functional Representation, Sequence Representation, Elementary signals: *Std.test signals* Unit Step Unit ramp, Unit Impulse, Sinusoidal Signal, Basic Operation on Signals: Time Shifting, Time Reversal, Time Scaling, Signal Addition , Signal Multiplication, Classification of Signals: Periodic and non- periodic, Energy and power, Causal and non-causal, Even and odd Signals, *Mathematical examples* Classification of Systems: Causal and non-causal, linear and non-linear, time variant and time invariant, stable and unstable.

UNIT II : FOURIER REPRESENTATION OF PERIODIC SIGNALS: Representation of Continuous time Fourier series (CTFS): Trigonometric form and Exponential form, Existence of Fourier series, Fourier spectrum, Power, Properties of CTFS: linearity, Time Shifting, Time Reversal, Time Scaling, Time Differentiation, Time Integration and Convolution Property. *Examples based on CTFS*

UNIT III: FOURIER REPRESENTATION OF APERIODIC SIGNALS: Fourier transform of non-periodic functions, Magnitude and phase representation of Fourier transform, Existence of Fourier transform, Fourier transform of standard signals: Impulse Function, Double Sided Real Exponential Function, Complex Exponential function, Signum Function, Unit Step, Rectangular Pulse and Triangular Pulse, Properties of continuous time Fourier transform: Linearity ,Time Shifting ,Frequency Shifting, Time Reversal, Time

Scaling, Differentiation in time domain and Frequency Domain, Time Integration and Convolution Property.

UNIT IV: Z-TRANSFORM: Introduction, Z transform of some common sequences: Unit Impulse , Unit Step, Unit Ramp, Exponential Sequence and Sinusoidal Sequence, Z transform and region of convergence of finite duration sequences, Properties of region of convergence, Properties of Z transform: Linearity, Time Shifting, Time Reversal, Time Expansion, Multiplication by an Exponential Sequence ,Multiplication by n ,Conjugation and Convolution Property, Initial and Final Value Theorem, Inverse Z transform: Long Division Method, Partial Fraction Expansion Method.

UNIT V: LINEAR TIME INVARIANT SYSTEMS: Response of a continuous time LTI System and Convolution integral using graphical method, Properties of continuous time LTI systems, *Stability & Causality of LTI System*. System described by Differential Equation, Response of a Discrete time LTI System and Convolution sum, Properties of discrete time LTI system, Systems described by difference equations.

Text Books:

1. Signals &Systems: A. Anand Kumar, 2nd Edition,PHI.(Unit–I, II , III and IV)
2. Signals & Systems: H. P. Hsu, McGraw-Hill Publication. (Unit- V)
3. Signals & Systems: Alan Oppenheim & Alan Wilsky, S Nawab, PHI. (Unit-V)

Reference Books:

1. Simon Haykin, Signals and Systems, 2nd Edition, Wiley India.
2. Signals, Systems and Communications: B.P. Lathi, BS Publications.

Course outcomes:

1. The student will be able to understand the classification of signals and systems.
2. Gain knowledge about the frequency domain analysis of continuous time and discrete time signals.
3. Use the Z-transform techniques to solve the system equations.

Program / Semester: B.Tech (IV)	**Branch: Electronics & Telecommunication Engineering**
Subject: Probability Theory and Stochastic Processes	**Course Code: BT05405**
Marks: Max. – 70 Min. – 28	**L: 2 T: 1 P: 0**
Class Tests & Assignments to be conducted: 2each	**Duration (End Semester Exam): 03 Hours**

Course Objectives:

1. To study basics of probability theory.
2. To understand the basic concepts of random variables & processes

UNIT-I: PROBABILITY: Sets and set operations; Probability introduced through Sets and Relative Frequency, Joint and conditional probability, Bayes' theorem, Independent events, combined experiments, Bernoulli Trials.

UNIT-II RANDOM VARIABLES: Random variable concepts, probability mass function, probability distribution function, Example random variables and distributions: Uniform, Gaussian, Poisson, Rayleigh, Exponential, Conditional distribution and density, Joint cumulative distribution and probability density functions and their properties.

UNIT-III EXPECTATION AND MOMENTS OF RANDOM VARIABLES: Average value of a random

variable, Variance of a random variable, moments of random variables, Distribution and density of sum of random variables, Mean and variance of the sum of random variables, Correlation of random variables.

UNIT-IV RANDOM PROCESSES - TEMPORAL CHARACTERISTICS: The random process concept, Stationarity and independence, Mean and covariance functions, Ergodicity, Correlation functions, Gaussianrandom process, Poisson random process.

UNIT-V SPECTRAL CHARACTERISTICS OF RANDOM PROCESSES: Power density spectrum and its properties, Relationship between power spectrum and autocorrelation function, White and colored noise, Response of a product device for random

signal input, Transmission of random process through LTI system, autocorrelation and spectral density of response.

Text Books:

1. Principles of Communication Systems by Taub and Schilling, Tata McGraw Hill.
2. Probability, Random Variables and Random Signal Principles, P. Z. Peebles, Tata McGraw Hill.

Reference Books:

1. H. Stark and J. Woods, ``Probability and Random Processes with Applications to Signal Processing,"Third Edition, Pearson Education
2. A. Papoulis and S. Unnikrishnan Pillai, ``Probability, Random Variables and Stochastic Processes,"Fourth Edition, McGraw Hill.
3. K. L. Chung, Introduction to Probability Theory with Stochastic Processes, Springer International

Course Outcomes:

At the end of this course students will be able to

1. Define probability and interpret probability by modeling sample spaces.
2. Formulate fundamental probability distribution and density functions
3. Determine various moments of one and multiple random variables.
4. Investigate temporal and spectral characteristics of random processes
5. Understand propagation of random signals in LTI systems.

Program / Semester: B.Tech (IV)	**Branch: Electronics & Telecommunication Engineering**
Subject: Analog Communication Laboratory	**Course Code: BT05406**
Marks: Max. – 35 Min. – 14	**L: 0 T: 0 P: 2**

List of Experiments: (At least Ten experiments are to be performed by each student)

1.To study Amplitude Modulation on trainer kit.

2. To study Amplitude Demodulation on trainer kit.

3. To study Frequency Modulation and to trace the frequency modulated waveform on CRO using trainer kits.

4. To study Frequency Demodulation using trainer kits.

5. Design of a Frequency Demodulator Using PLL

6. To study a radio receiver having medium frequency reception.

7. To plot amplitude modulated signal and to calculate modulation index

8. To design and obtain characteristics of a mixer Circuit.

9. To generate SSB-SC signal and to study its characteristics.

10. To generate DSB-SC signal using Balanced Modulator and to study its characteristics.

11. To design a Ring Modulator and to study its characteristics.

12. To design a Square Law Detector using diode and to study its V-I characteristics.

13. To design and study an Envelope Detector.

14. To study the Time division multiplexing and de-multiplexing.

15. To study the Frequency division multiplexing and de-multiplexing.

16. To observe the effect of pre-emphasis and de-emphasis on a given input signal.

(Along with the above experiments, Simulators may be used to give idea about various communicationtechniques.)

List of Equipments/Machine Required:

Discrete Components, Function Generator, Power Supply, CRO, Communication trainer kits, Modulated SignalGenerator, Transmission Line, related software like COMMSIM etc..

Reference Books: 1.Radio Communication by G.K Mithal, Khanna Publishers.

Program / Semester: B.Tech (IV)	Branch: Electronics & Telecommunication Engineering
Subject: Analog Circuits Laboratory	Course Code: BT05407
Marks: Max. – 35 Min. – 14	L: 0 T: 0 P: 2

List of Experiments: (At least Ten experiments are to be performed by each student)

1. To draw Static input characteristics curves of CE transistor and determine its h-parameter values.
2. To draw Static output characteristic curve CE transistor and determine its h-parameter values.
3. To draw Static input characteristic curve of CB transistor and determine its h-parameter values.
4. To draw Static output characteristic curve of CB transistor and determine its h-parameter values.
5. To design and study the frequency response of single stage CE transistor amplifier and determine itsBandwidth.(with and without bypass capacitor).
6. To find input and Output impedances of single stage CE amplifier.
7. To study the frequency response of RC coupled double stage CE transistor amplifier and determine itsBandwidth.
8. To study the frequency response of RC coupled double stage CE transistor amplifier with voltagefeedback and determine its Bandwidth.
9. To study the frequency response of RC coupled double stage CE transistor amplifier with currentfeedback and determine its Bandwidth.
10. To Design Wein Bridge Oscillator and determine the frequency of Oscillation.
11. To Design RC phase shift oscillator and determine the frequency of Oscillation.
12. Study of various topologies of feedback amplifier.
13. Experiment with Darlington pair amplifier.

List of Equipment's/Machine Required:

Circuit components, Power supply, CRO, Function generator, Multimeter, Breadboard.

Reference Books:

1. Lab Manual Of Electronic Devices by Paul B Zbar.
2. Lab Manual of Basic Electronics by David Bell.
3. Electronic Devices Systems and Applications by Robert Diffenderfer, Cengage learning.

Program / Semester: B.Tech (IV)	Branch: Electronics & Telecommunication Engineering
Subject: Programming using Python	Course Code: BT05408
Marks: Max. – 35 Min. – 14	L: 0 T: 0 P: 2

List of Experiments: (At least Ten experiments are to be performed by each student)

1. Write a program to demonstrate basic data type in python.
2. Write a program to takes 2 numbers as command line arguments and perform their arithmetic operation(addition, subtraction, multiplication, division).
3. Write a program for checking whether the given number is an even number or not.
4. Write a program to calculate the Simple Interest and Compound Interest.
5. Write a program to find the largest of three numbers. (Without MAX or MIN function call).
6. Write a Python program to convert binary to decimal and decimal to binary.
7. Write a program to compute the exponential series.
8. Write a program for checking whether a given string is palindrome or not.
9. Write a program to Compute a sine series and plot the same using matplotlib module.
10. Write a program to Compute a cosine series and plot the same using matplotlib module.
11. Write a program to find a factorial of a number.
12. Write a program to generate a Fibonacci series.
13. Write a program to calculate the GCD of two numbers.
14. Write a program to demonstrate while loop and While loop with else in python.
15. Write a program to construct a pyramid of digits.
16. Write a program to illustrate the function with no arguments and no return value.
17. Write a program to illustrate the function with arguments and no return value.
18. Write a program to illustrate the function with arguments and return value.
19. Write a program to illustrate the function to compute the standard deviation of a list of numbers.
20. Write a program to print all the odd, even and prime numbers up to 100 in a table like format.
21. Write a program to open a website.
22. Write a program to count the numbers of characters in the string and store them in a

dictionary datastructure.

23. Write a program to compute the number of characters, words and lines in a file.

24. Write a program to count frequency of characters in a given file, Can you use character frequency to tellwhether the given file is a Python program file, C program file or a text file?

25. Write a function nearly equal to test whether two strings are nearly equal. Two strings a and b are nearlyequal when a can be generated by a single mutation.

26. Write a program to implement Merge sort.

List of Equipment's/Machine/Software Required:

- **Software Tools:** Anaconda**,** Python(x,y),
- **Online Compiler**

1. **https://www.w3schools.com/python/python_compiler.asp**
2. **https://www.programiz.com/python-programming/online-compiler/**

Reference Books:

1. Beginning Python, by Peter Norton, Alex Samuel, David Aitel, Eric Foster-Johnson, Leonard Richardson, Jason Diamond, Aleatha Parker, Michael Roberts
Publisher: Wiley Publishing, Inc

2. Python For Beginners: A Crash Course Guide To Learn Python in 1 Week, by Timothy C. NeedhamPublisher: White flower publishing

Online Resources:

https://docs.python.org/3/tutorial/

BHARTI VISHWAVIDYALAYA, DURG

Program / Semester: B.Tech (IV)	**Branch: Electronics & Telecommunication Engineering**
Subject: Virtual Laboratory	**Course Code: BT05409**
Marks: Max. – 35 Min. – 14	**L: 0 T: 0 P: 2**

List of Experiments: (At least Ten experiments are to be performed by each student)

1. Washing machine control using basic AND and NOT gates
2. Basics of OR gate and its application in industrial control
3. Basics of NOT gate and its application in an eight bit ones complement circuit
4. Basic NOT gate and its application in fuel level indicator
5. Seat belt warning system using basic AND and NOT gates
6. Basics of AND gate and its application in car wiper control
7. Water level control using basic AND and NOT gates
8. Electronic lock using basic logic gates
9. Universal NAND gate and its application in level monitoring in chemical plant
10. Universal NOR gate and its application in automobile alarm system
11. XOR gate and its application in staircase light control
12. Majority circuit using basic logic gates
13. Cockpit warning light control using basic logic gates
14. DIY Build your own combinational logic circuit using generalized simulator

Program / Semester: B.Tech (IV)	**Branch: Common to All Branches**
Subject: Indian Culture and Constitution of India	**Course Code: BT054010**
Total Marks (Internal Assessment): 50	**L: 0 T: 0 P: 2**
Internal Assessments to be conducted: 02	**Duration (End Semester Exam): NA**

Objective: The Constitution is the supreme law and it helps to maintain **integrity** in the society andto promote unity among the citizens to build a great nation. The main objective of the Indian Constitution is to promote harmony throughout the nation.

Course Objectives

Upon completion of this course, the student shall be able

- To understand Meaning and concepts of Traditional and Modern of Culture
- To understand Sources of the Study of Indian Culture
- To Enable the student to understand the history and importance of constitution
- To understand philosophy of fundamental rights and duties
- To understand the powers and functions of executive, legislature and judiciary
- To understand the powers and functions of state government
- To understand the recent trends in Indian constitutional and election commission of India.

To understand the central and state relation, financial and administrative.

UNIT-I

Meaning and concepts of Culture: Traditional and Modern concepts of Culture-Notions of Culture in textual tradition, anthropological, archaeological and sociological understanding of the term culture. Elements of Culture, concept of Indianness and value system. Relation between culture and civilization. Historiography and approaches to the study of Indian Culture– Stereotypes, Objectivity and Bias, Imperialist, Nationalist, Marxist and Subaltern. Heritage of India and world's debt to Indian Culture.

UNIT–II

Sources of the Study of Indian Culture: Archaeological: cultural remains, Monuments, Numismatics, Epigraphy; Literary sources and Oral traditions; Foreign Accounts; Archival sources.

UNIT–III

History of Indian Constitution Constitutional History, Preamble salient features, citizenship, Method of Amendment and Recent Amendments. **Rights and Duties** Fundamental Rights and Directive Principles of State Policy. Fundamental Duties. Difference between Fundamental Rights and Directive Principles of State Policy

Union Government a) President-powers and functions. Vice president powers and functions, Prime Minister and council of ministers powers and functions. b) Parliament-Loksabha, Rajyasabha- composition powers and functions.

c) Judiciary (Supreme Court) composition powers and functions Judicial Activism

UNIT–IV

State Government a) Governor: powers and functions b) Chief minister: powers and functions c) State Legislative Assembly and Legislative Council- composition powers and functions. d) High Court : composition powers and functions

UNIT–V

Recent Trends in Indian Constitutional

a) Basic structure of Indian Constitution.

b) Electoral Reforms

c) PanchayatiRaj system in India.

Books of Reference

1. Dr. P. K. Agrawal **Indian Culture, Art and Heritage,**

2. P. Raghunadha Rao **Indian Heritage and Culture**

3. M.V.Pylee, An Introduction to the Constitution of India,NewDelhi,Vikas,2005.

4. Subhash C.Kashyap, Our Constitution: An Introduction to India's Constitution and constitutional Law, New Delhi,National Book Trust, 2000.

5. Durga Das Basu, Introduction to the Constitution of India ,NewDelhi,Prentice Hall of India,2001.

6. D.C.Gupta, Indian Government and Politics,VIII Edition,New Delhi, Vikas, 1994.

7. V.D.Mahajan, Constitutional Development and National Movement inIndia, New Delhi, S. Chand and Co., latestedition.

SCHEME OF TEACHING AND EXAMINATION
B.Tech (Fifth Semester – Electronics & Telecommunication Engineering)

S.no.	Courses(Subject)	Course Code	Period per Week			Scheme of Examination			Total Marks	Credit
						Theory/Lab				
			L	T	P	ESE	CT	TA		
1.	Digital Communication	BT05501	3	1	-	70	10	20	100	4
2.	Design of ElectronicsCircuit	BT05502	3	1	-	70	10	20	100	4
3.	Microcontroller &embedded system	BT05503	2	1	-	70	10	20	100	4
4.	Control Systems	BT05504	1	0	-	70	10	20	100	3
5.	Professional Elective-1 (Refer Table I)	BT05505	2	0	-	70	10	20	100	2
6.	Digital Communicationlab	BT05506	-	-	2	35	-	15	50	1
7.	Design of ElectronicsCircuit lab	BT05507	-	-		35	-	15	50	1
8.	Microcontroller & embedded system lab	BT05508	-	-	2	35	-	15	50	1
9.	Project-I based on Summer Internship/Industrial Training	BT05509	-	-	2	35	-	15	50	1
10	Environmental Studies	BT05510	-	-	-	-	-	50	50	-
Total Marks			11	3	10	490	50	210	750	21

L – Lecturer ,T – Tutorial, P – Practical , CT –Class Test ESE – End Semester Exam TA – Teacher'sAssessment

- **Note: - The students have to attend the four weeks industrial training / summer internship in**

B. Tech program after fourth semester, which will be evaluated in fifth semester.

Table I (Professional Elective I)

S.N.	Course Code	Subject
1.	BT05505(01)	Computer Network
2.	BT05505(02)	Computer organization & Architecture
3.	BT05505(03)	Nano Electronics
4.	BT05505(04)	Optoelectronic devices and circuits
5.	BT05505(01)	Advanced Data Structures and Algorithms

Note:

1. $1/4^{th}$ of total strength of students subject to minimum of 20 students is required to offer and elective in the college in a particular academic
2. Choice of elective course once made for an examination cannot be changed in future examinations.

Program / Semester: B.Tech (V)	**Branch: Electronics & Telecommunication Engineering**
Subject: Digital Communication	**Course Code: BT05501**
Marks: Max. – 70 Min. – 28	**L: 3 T: 1 P: 0**
Class Tests & Assignments to be conducted: 2 each	**Duration (End Semester Exam): 03 Hours**

Course Objectives:

1. To study signal space representation of signals and discuss the process of sampling, quantization thatare fundamental to the digital transmission of analog signals.

2. To study baseband and band pass signal transmission and reception techniques.

3. To study digital modulation methods and optimum receiver.

4. To study the noise in digital communication, correlator, optimum filter, matched filter.

Unit-1-Basics of Digital Communication: Sampling theorem: Low pass signal, Band-pass signal, Aliasing effect, Interpolation Formula, Natural sampling, Flat-top sampling, Signal recovery through holding, Generation and Detection of PAM, PWM, PPM. TDM-PAM, Aperture Effect, Channel bandwidth for PAM signal, TDM, Multiplexing T1 Lines-The T2, T3, T4 Lines. *Examples of communication systems*

Unit-11-Digital transmission of analog data: Quantization: Quantization of signals, PCM, TDM-PCM system, Commanding (u-law, A- law) DPCM, Delta modulation, Adaptive delta modulation, continuously variable slope delta modulator (CVSD). Noise in PCM and DM: PCM transmission: Calculation of SNR in PCM. Delta modulation transmission: signals to quantization noise ratio Calculation

Unit-111-Principle of digital data transmission: Digital communication system, Line coding: PSD of various line codes, Polar signaling, On-Off signaling, Bipolar signaling, Pulse shaping: Nyquist criterion for zero ISI, Scrambling, Regenerative repeater: Eye diagram, Detection error probability for polar signal, ON-Off and bipolar signals.

Unit 1V-Digital modulation techniques: Fundamentals of BASK, BPSK and BFSK, Generation, detection, spectrum and geometrical representation of BPSK and BFSK,

Fundamentals of DPSK, DEPSK and QPSK, Generation and detection of DPSK, DEPSK and QPSK, Signal space representation of QPSK. M-ary PSK.MSK Signaling Scheme.

Unit-V-Spread spectrum modulation : Introduction , Direct sequence (DS) Spread Spectrum, use of spread spectrum with CDMA, ranging using DS spread spectrum, Frequency hopping spread spectrum, generation and characteristics of PN sequences, acquisition of FH signal, tracking of FH signal, acquisition and tracking of aDS signal.

Name of Text Book:

1. Principles of communication system by Taub & Schilling, 3 rd Ed., McGraw-Hill Education (unit I,unit II, unit IV, unit V)

2. Modern Digital and Analog Communication Systems by B.P. Lathi,3 rd Ed., Oxford university press(unit III).

Reference books

1. Fundamentals of communication systems by John.G. Proakis, Pearson education, 2006.

2. Communication system by A. Bruce Carlson, Paul Crilly, Paul B. Crilly, McGraw-Hill Education

3. Digital communications by Simon Haykin, Wiley India Private Limited,2006.

Course outcome:

1. Design digital communication systems, given constraints on data rate, bandwidth, power, fidelity, andcomplexity.

2. Analyze the performance of a digital communication in terms of probability of error of digitalmodulation Technique.

Program / Semester: B.Tech (V)	**Branch: Electronics & Telecommunication Engineering**
Subject: Design of Electronics Circuit	**Course Code: BT05502**
Marks: Max. – 70 Min. – 28	**L: 3 T: 1 P: 0**
Class Tests & Assignments to be conducted: 2 each	**Duration (End Semester Exam): 03 Hours**

Course Objectives:

1. To design simple circuits like amplifiers using op-amps.
2. To design linear and non-linear applications of operational amplifiers.
3. To Gain knowledge about A/D and D/A converters
4. To gain knowledge in designing a stable voltage regulators
5. To introduce the theory and applications of analog multipliers and PLL.

UNIT I Fundamentals of differential amplifiers and operational amplifiers: Current mirror, BJT differential amplifier analysis using r-parameters. Introduction to operational amplifier :op-amp Symbol , Block schematic of op-amp, Ideal op-amp characteristics, *Practical values of parameters of IC 741* AC and DC characteristics, Open loop configuration of op- amp, Closed loop configuration of op-amp: Voltage series feedback amplifier, Voltage shunt feedback amplifier, Differential amplifier. The practical opamp: Input offset voltage, Input bias current, Input offset current, Total output offset voltage, Thermal drift. Frequency response of an op-amp: Frequency response, compensating networks, Slew rate.

UNIT II Operational amplifier applications: Basic op-amp circuits: Summing, Scaling and Averaging amplifiers. *Subtractor* Current to voltage and Voltage to current converter, Bridge amplifier, Instrumentation amplifier, Differentiator, Integrator, Non-linear Circuits: Logarithmic Amplifiers, Precision Rectifier, Peak Detector, Sample and Hold Circuits. OP-AMP as Comparator, Schmitt Trigger, Square wave generator and Triangular Wave Generator, *Astable & Monostable Multivibrator*. IC Analog Multiplier applications: Divider circuit, Square rooting circuit, RMS detector.

UNIT III Active Filters: Introduction to filtering: Frequency response, Characteristics and terminology, advantage of Active filters, Design of Low –pass Butterworth Filters, Sallen

and key Circuits, Resistive gain Enhancement, RC-CR Transformation, Design of Band – pass Butterworth Filters, Deliyannis-Friend Circuit, Stagger-Tuned Band pass filter Design, Q Enhancement of the Friend circuit. Design of Low – pass and Band- pass Chebyshev Filters, Sensitivity concepts and their Application to Sallen and key Circuits.

UNIT IV Special ICs: *IC 555 Block diagram* **&** their Applications: missing pulse detector, Pulse Width modulation, FSK Generator, Pulse position modulator. IC 565 PLL and its Applications: Phase locked loops operation, Lock and Capture range, LM565PLL-Application of PLL as AM/FM/FSK/ detectors, frequency translators, phase shifter, tracking filter, signal synchronizer and frequency synthesizer. IC 566 Voltage controlled oscillator, Voltage Regulators: OP-AMP Regulators, IC Regulators, Fixed Voltage Regulators (78/79, XX), SMPS.*Circuits using 3-pin regulator ICs*

UNIT V Analog to digital and digital to analog converters: Sample and hold circuits and sample and hold IC(LF 398), Types of D/A converter : The binary weighted resistor network, The R-2R ladder network, The inverted ladder, D/A specification. A/D converter : Parallel-comparator type, Dual slope, Successive approximation, Voltage to time and Voltage to frequency converters, A/D specification. *DC & DAC ICs*

Text Book:

1. Integrated Circuits by K. R. Botkar, 9th Ed., Khanna Publications (Unit-I,II)
2. Operational Amplifiers by R. Gayekwad, 4th Ed., Pearson Education(Unit-I, II,IV)
3. Analog Filter Design; Van –Valkenburg ; Holt –Standers International Edn. (Unit-III)
4. Linear Integrated Circuits by D.Roy Choudhary and Shail B Jain,3rd Ed., New Age International (Unit-IV)
5. Digital integrated Electronics by Herbert Taub and Donald Schilling, McGraw Hill (Unit-V)

Reference Books:

1. Integrated Electronics by Millman& Halkias,6th Ed., TMH Publishing Co.
2. Operational Amplifiers and Linear Integrated Circuits, Lal Kishore,2nd Ed., PHI
3. Operational Amplifiers and Linear Integrated Circuits, Coughlin and Driscoll, 6th Ed., PHI

Course Outcomes:

1. Gain knowledge about Differential amplifier and operational amplifier.
2. Designing circuits for op-amp applications.
3. Gain knowledge about A/D and D/A converters.
4. Get knowledge about various types of voltage regulator.
5. Understand PLL circuits and multiplier circuits.

Program / Semester: B.Tech (V)	**Branch: Electronics & Telecommunication Engineering**
Subject: Microcontroller & Embedded system	**Course Code: BT05503**
Marks: Max. – 70 Min. – 28	**L: 3 T: 1 P: 0**
Class Tests & Assignments to be conducted: 2 each	**Duration (End Semester Exam): 03 Hours**

Course objectives:

- To make students familiar with the basic blocks of microcontroller device and Embedded systemin general.
- To provide comprehensive knowledge of the architecture, features and interfacing with 8051microcontroller.
- To use assembly and high level languages to interface the microcontrollers to variousapplications.

UNIT I Introduction to Microcontroller: A brief History of Microcontrollers, Harvard Vs Von- Neumann Architecture; RISC Vs CISC, Classification of MCS-51family based on their features (8051, 8052, 8031, 8751, AT89C51), Pin configuration of 8051.*Pin configurations and block diagrams*

8051 Processor Architecture and Instruction Set: Registers of 8051, Inbuilt RAM, Register banks, stack, on-chip and external program code memory ROM, power reset and clocking circuits, I/O port structure, Addressing modes, Instruction set and programming.

UNIT II Counter/Timer and Interrupts of 8051: Introduction, Registers of timer/counter, Different modes of timer/counter, Timer/counter programming, Interrupt *Vs* Polling, Types of interrupts and vector addresses, register used for interrupts initialization, programming of external interrupts, Timer interrupts.

UNIT III Asynchronous Serial Communication and Programming: Introduction to serial communication, RS232 standard, GPIB, Max 232/233 Driver, 8051 Serial Port Programming.

UNIT IV Interfacing with 8051: Interfacing and programming of: ADC (0804,0808/0809,0848) & DAC (0808), stepper motor , 4x4 keyboard matrix, LCD, Interfacing (only) of different types of Memory , Address decoding techniques.

UNIT V Embedded Systems: Introduction to an Embedded Systems, Defining the Embedded System, Real Life Examples of Embedded Systems, Characteristics of Real-Time Embedded Systems, Basics Of Developing For Embedded Systems.

Names of Text Books:

1. The 8051 Microcontroller and Embedded Systems using Assembly and C, Mazidi, Mazidi &McKinlay, 2nd Ed., PHI.(Unit-I,II,III,IV)

2. Embedded system, Frank Vahid.(Unit-V)

Names of Reference Books:

1. 8051 Programming, Interfacing and Applications K. J. Ayala, Penram Pub.

2. 8 bit Microcontrollers & Embedded Systems Manual**.**

3. Programming and Customizing the 8051 Microcontroller, Predko; TMH

4. Microcontrollers: Architecture, Programming, Interfacing and System Design, Rajkamal, PearsonEducation.

Course Outcome:.

1. To understand Microcontroller 8051 its architecture and its instruction set.

2. Gain knowledge about Counter/timer and interrupts in 8051 Microcontroller and Programmingconcepts.

3. Students will be able to do serial communication programming and gain knowledge of serialcommunication.

4. Students will be able to understand interfacing Microcontroller 8051 with devices.

Program / Semester: B.Tech (V)	**Branch: Electronics & Telecommunication Engineering**
Subject: Control Systems	**Course Code: BT05504**
Marks: Max. – 70 Min. – 28	**L: 3 T: 1 P: 0**
Class Tests & Assignments to be conducted: 2 each	**Duration (End Semester Exam): 03 Hours**

Course Objectives:

1. To Impart the knowledge of fundamental concepts of Feedback control system
2. To develop the concept of Mathematical Modeling in control system
3. To analyze the concept of Stability Analysis in Time and Frequency Domain
4. To understand the designing concept of State Model

UNIT – I: **Representation of Control system :** Types of Control System : Open loop , Closed loop with examples. Evaluating Transfer function of a system using Block Diagram Representation and Signal Flow Graph techniques. *Transfer functions. Pole-Zeros analysis*

UNIT-II: Feedback Characteristics & Time response analysis of Control Systems: Reduction of parametervariation by use of feedback, Control over system dynamics by use of feedback, Control of the effects of disturbance signals by use of feedback.
Time Response Analysis: *Definitions of parameters of time response* Time response of second order control system, Performance specifications, steady state error and error constants. Response with P, PI, PD and PID Controllers.

UNIT – III: Stability Analysis using Routh Hurwitz & Root Locus Technique : The concept of Stability, Routh- Hurwitz stability criterion , Relative stability analysis, Introduction to The Root locus concept, Construction of Root loci, Performance analysis of control system using Root loci

UNIT – IV: Frequency Response Analysis using Polar and Bode Plot: Introduction, Correlation between Time and Frequency Response, Polar Plots, Bode Plots, Gain Margin, phase Margin ,*Stability analysis using these plots* All-Pass , Minimum and non-minimum phase System.

UNIT – V:Frequency Response Analysis and State Variable Analysis : Nyquist Stability Criteria, Assessment of stability using Nyquist Plot.

State Variable Analysis: Concepts of state, state variables and state model, State models for linear continuous time systems, Diagonalization, Solution of state equations, Concepts of controllability and observability.

Names of Text Books:

1. Control System Engineering , Nagrath and Gopal , New Age International Publications
2. Automatic Control System, B. C. Kuo, PHI publication
3. Linear Control System, B.S. Monke, Khanna Publishers

Names of Reference Books:

1. Modern Control Engineering, Ogata , Pearson Publication
2. Modern Control Engineering, Roy Choudhury, PHI publication

Course Outcome:.

On successful completion of the course, the student will be able to:

1. Model physical control systems using BDRT, SFG.
2. Analyze feedback characteristics and time response analysis of P, PI, and PD & PID Controllers.
3. Analyze the stability of control system in time domain using Routh- Hurwitz and Root-locustechniques.
4. Analyze the stability of control system in frequency domain using Polar plots, Bode plots andNyquist Plots.
5. Analyze and design the state model of feedback controllers.

Program / Semester: B.Tech (V)	**Branch: Electronics & Telecommunication Engineering**
Subject: Digital Communication Laboratory	**Course Code: BT05506**
Marks: Max. – 35 Min. – 14	**L: 2 T: 0 P: 0**
Class Tests & Assignments to be conducted: 2 each	**Duration (End Semester Exam): 03 Hours**

List of Experiments: (At least Ten experiments are to be performed by each student)

1. To study Signal sampling and reconstruction techniques.
2. To study the effect on reconstructed waveform of the use of sample / hold circuit.
3. To study the TDM Pulse Amplitude Modulation / Demodulation & to draw their waveforms.
4. To study Time Division Multiplexing of Pulse Code Modulation /Demodulation
5. To study A-Law and μ-Law Companding.
6. To perform experiment with delta modulation techniques and to study the waveforms.
7. To perform experiment with adaptive delta modulation techniques and to study the waveforms.
8. To study the Equalizers Circuits.
9. To study ASK Modulation.
10. To study FSK Modulation.
11. To study PSK Modulation.
12. To study ASK Demodulation.
13. To study FSK Demodulation.
14. To study PSK Demodulation.
15. To study DPSK generation and detection.
16. To study QPSK generation and detection.
17. To study the effect of Noise in digital modulation techniques.

List of Equipments/Machine Required:

- Communication Trainer Kits, Function Generator, Power Supply, CRO, Discrete Components.
- Experiments can be implemented in hardware circuits or Simulated using C, C++, SimulationSoftware.

Recommended Books:

1. Principles of Communication Systems –Taub and Shilling, Tata McGraw Hill.
2. Handbook of Experiments in Electronics and Communication Engineering, Rao, Vikas PublishingHouse Pvt. Ltd.

Program / Semester: B.Tech (V)	**Branch: Electronics & Telecommunication Engineering**
Subject: Design of Electronics Circuit lab	**Course Code: BT05507**
Marks: Max. – 35 Min. – 14	**L: 2 T: 0 P: 0**
Class Tests & Assignments to be conducted: 2 each	**Duration (End Semester Exam): 03 Hours**

List of Experiments: (At least Ten experiments are to be performed by each student)

1. To design an inverting and non-inverting amplifier using OPAMP (741) and study its frequencyresponse.
2. To design a summing amplifier using op-amp (741).
3. To design a differential amplifier using op-amp (741) and find its CMRR.
4. To determine SVRR and slew rate of an op-amp (741).
5. To measure the input impedance of an voltage follower using op-amp (741)
6. To measure input offset voltage, input bias current and input offset current for op-amp 741.7.To design an op-amp integrator circuit and analyze outputs for different input signals.
9. To design an op-amp Differentiator circuit and analyze outputs for different input signals.
10.To design and study comparator circuit using op-amp (741).
11.To design a Sample & Hold circuit and to study its output response12.To design a square rooting circuit using multiplier.
13. To design chebyshev filter using OPAMP and to plot its frequency response.
14. To design All Pass filter using OPAMP and to plot its frequency response.
15. To design Band-pass filter using OPAMP and to plot its frequency response.
16. To design HPF using OPAMP.
17. To design LPF using OPAMP.
18. To design an application of 555 timer in monostable mode.19.To design an application of 555 timer in astable mode.
20. To study the voltage regulation of 78XX and 79XX series of voltage regulators.
21. To design a DAC using Weighted Resistor method.
22. To design a ADC using parallel comparator method.

List of Equipments/Machine Required:

Discrete components, Power Supply, Function Generator, CRO

Recommended Books:

Laboratory Manual for Operational Amplifiers and Linear ICs, David Bell, PHI

Program / Semester: B.Tech (V)	**Branch: Electronics & Telecommunication Engineering**
Subject: Microcontroller & Embedded systems Laboratory	**Course Code: BT01508**
Marks: Max. – 35 Min. – 14	**L: 2 T: 0 P: 0**
Class Tests & Assignments to be conducted: 2 each	**Duration (End Semester Exam): 03 Hours**

List of Experiments: (At least Ten experiments are to be performed by each student)

1. Write a microcontroller 8051 program to transfer the bytes into RAM locations starting at 50H,assuming that ROM space starting at 240H contains CHHATTISGARH by using – a) Counter, b) null char. for end of string .
2. Write a microcontroller 8051 program to get hex data on the range of 00-FFh from port 0 and convert itto decimal. Save the digits in R7, R6 and R5, where the least significant digit is in R7.
3. Write a microcontroller 8051 program to add two 16 Bit unsigned numbers. Operands are two RAM variables. Results to be in R1-R0 pair.
4. Write a microcontroller 8051 program to subtract an unsigned 16 Bit number from another. Operandsaretwo RAM variables. Results to be in R1-R0 pair.
5. Write a microcontroller 8051 program to add two unsigned 32-bit numbers. Operands are two RAMvariables. Results to be in R1-R0 pair.
6. Write a microcontroller 8051 program to add two 16 Bit signed numbers.
7. Write a microcontroller 8051 program to convert a binary number to equivalent BCD
8. Write a microcontroller 8051 program to convert a packed BCD number to two ASCII numbers andplace them in R5 and R6.
9. Write a microcontroller 8051 program to calculate the square root of an 8-bit number using iterativemethod.
10. Write a microcontroller 8051 program that generates 2kHz square wave on pin P1.0, 2.5 kHz on pinP1.2and 25 Hz on pin P1.3.
11. Write a microcontroller 8051 program for counter 1 in mode 2 to count the pulses and display the stateof the TL1 count on P2. Assume that the clock pulses are fed to pin T1.
12. Write a microcontroller 8051 program to transfer letter “N” serially at 9600 baud, continuously.Assume crystal frequency to be 11.0592 MHz.
13. Write a microcontroller 8051 program to transfer word “CSVTU” serially at 4800 baud

and one stopbit, continuously. Assume crystal frequency to be 11.0592 MHz.

14. Write a microcontroller 8051 program to receive bytes of data serially, and put them in P1. Set the baudrate at 2400 baud, 8-bit data, and 1 stop bit. Assume crystal frequency to be 11.0592 MHz.

List of Equipments/Machine Required:

Microcontroller kit, Interfacing kit, Keyboard, Monitor, SMPS for Microcontroller

Program / Semester: B.Tech (V)	**Branch: Electronics & Telecommunication Engineering**
Subject: Computer Networks	**Course Code: BT05505(01)**
Marks: Max. – 70 Min. – 28	**L: 2 T: 0 P: 0**
Class Tests & Assignments to be conducted: 2 each	**Duration (End Semester Exam): 03 Hours**

Course Objectives:

1. To make students understand the basic model of data communication, OSI Model, TCP/IP suite andvarious concepts of networking.
2. To make students acquainted with Data Link Layer and various flow control and error controlprotocol.
3. To familiarize students with different LAN protocols like Ethernet, Token ring and Token Bus andFDDI.
4. To teach students about connecting devices, Network and transport layer protocols.
5. To give knowledge of the Application layer functions, protocols, switching and switched networkslike ATM.

UNIT-I Introduction to Data Communication, Data networking and Internet: Communication System Model, Data Communication Networks, Protocol, Need of Protocol, TCP/IP Protocol Suite, OSI Model, Transmission Modes, Categories of Network, Topologies of Network. Signal Encoding Techniques: Digital to Digital Conversion- Unipolar, Polar: NRZ, RZ, Biphase, Bipolar, Transmission of Digital Data: DTE DCE Interface, EIA-232D,Null Modem, Modems: Traditional Modem, 56KModem.

UNIT-II Data Link Control Protocol: Data Link Layer: Design Issues, Framing, Error Detection and Correction: CRC, Elementary Protocols-Flow Control: Stop and Wait, Sliding Window, Error Control: Stop-and-Wait, Go Back-N, Selective Repeat. HDLC: Modes, Frames, Data Transparency, Bit Stuffing.

UNIT-III Local Area Network: Project802,Basicof–IEEE802.1,LLC,MAC,PDU;ETHERNET:Access Method: CSMA/CD, Implementation: Thick Ethernet, Thin Ethernet, Twisted Pair Ethernet, Switched Ethernet, Fast Ethernet,

Gigabyte Ethernet, Token Ring, FDDI, Introduction to Wireless LAN-IEEE802.11 : Architecture, MAC: CSMA/CA.

UNIT-IV Internet and Transport Protocol: Principle of Internet working, Connecting devices: Repeaters, Hubs, Bridges, Routers. Internet Protocol: IP Addressing, IPV4Header,Comparison ofIPV4andIPV6, Sub netting, ARP,RARP, ICMP, IGMP. Transport Layer Protocols: UDP, TCP: TCP Header format, ISDN services.

UNIT-V Application layer and Wide Area Network: Application Layer: The Web and HTTP, FTP, SMTP, DNS, WAN: Circuit and Packet switching, Asynchronous Transfer Mode-ATM architecture: Virtual Connection, Identifiers, Cells, Connection Establishment and Release. Switching: VPC switch; ATM Layers: AAL

Name of Text Books:

1. DataCommunicationandComputerNetworkingbyB.A.Forouzan,3rdEd.,TataMcGrawHill.
2. DataandComputerCommunicationsbyWilliamStalling,7thEdition,PearsonEducation.

Name of Reference Books:

1. Computer Networks by Andrew S Tanenbaum, 4th Edition. Pearson Education / PHI
2. An Engineering Approach to Computer Networks- S.Keshav,2nd Edition, Pearson Education
3. Understanding communications and Networks,3rd Edition, W.A Shay, Thomson

Course Outcomes:

1. Students will be able to understand the working of internet based on OSI model and TCP/IP protocol suite.
2. Students will be able to analyze practical requirements of LAN on the basis of various topologies , signaling techniques and various interfaces.

3 Students will have deep understanding of various protocols usedat Data Link Layer and will be able to analyze the advantages and disadvantages of various available protocols for flow and error control.

4. Students will be able to analyze various Ethernet standards ,other standards and will be able to choose an appropriate standard according to requirement of LAN.
5. Students will be able to identify various internetworking devices and formation of

Headersof IP and TCP.

6. Students will get idea about various Application layer functions and some protocols alongwith switching techniques and ATM.

Program / Semester: B.Tech (V)	**Branch: Electronics & Telecommunication Engineering**
Subject: Computer organization & Architecture	**Course Code: BT05505(02)**
Marks: Max. – 70 Min. – 28	**L: 0 T: 0 P: 2**

Course objective:

- To know about Central processor organization.
- To know about Control unit organization.
- To provide an Insight into Arithmetic processor design.
- To provide an insight into Input/output organization & Memory organization.

UNIT I Central Processor organization: Bus organized computer, Memory address structure, Memory data register, program counter, Accumulator, Instruction register, Program counter, Accumulator, Instruction register, Instruction field, Micro operations, Register transfer languages, Instruction field, Decoding and execution, Instruction formats and addressing modes.

UNIT II Control unit organization : Instruction sequencing, Instruction interpretation, Hardwired control, Micro- programmed control organization, Control memory, Address sequencing, Micro-instruction, Formats, Micro-program sequence, Microprogramming.

UNIT III Arithmetic processor design: Addition and subtractions algorithm, Multiplication algorithm, Division algorithm Processor configuration, Design of control unit and floating point arithmetic.

UNIT IV Input Output organization: Programmed I/O., I/O, addressing, I/O instruction, Synchronization, I/O interfacing, Interrupt mechanism, DMA, I/O processors and data communication, RISC, CISC, Loosely Coupled & Tights Coupled system.

UNIT V Memory organization and multiprocessing: Basic concepts and terminology, Memory hierarchy, Semiconductor memories (RAM, ROM), Multiple module, Memories and interleaving (Virtual memory, Cache memory, Associative memory), Memory management hardware requirements, RISC & CISE Processor.

Name of Text Books:

1. Computer System Architecture by M. Morris Mano, PHI
2. Computer Organization Architecture by J.P. Hayes, PHI

Name of Reference Books:

1. Digital Computer Logic Design By M. Morris Mano, PHI **2.**Structured Computer Organization by Andrew S. Tanenbaum PHI **3.**Computer Organization and Design, Pal-Chauduri, PHI

Course Outcomes:

At the end of the course

- Student will be able to understand Central processor organization.
- Student will be able to understand Instruction set and micro programming.
- Student will be able to understand Algorithm in arithmetic control unit.
- Student will be able to understand Input/output and memory organization

Program / Semester: B.Tech (V)	**Branch: Electronics & Telecommunication Engineering**
Subject: Nano Electronics	**Course Code: BT05505(03)**
Marks: Max. – 70 Min. – 28	**L: 0 T: 0 P: 2**

Course Objectives

The objective of this course is to familiarize the students with the concepts of Nano electronics. The courseintends to give students a broad understanding of:

a) Fundamentals, fabrication technologies and applications of nanoscale structures.
b) Device application of nanostructures in electronics.
c) Concepts of Carbon nanotubes and their applications.
d) Fundamentals of molecular electronics and their applications.

UNIT I -INTRODUCTION TO NANOTECHNOLOGY :

Background to Nanotechnology: General concepts in Nanotechnology, Introduction to the principles of quantum mechanics, Quantization effects, Wave-particle duality, Classification of different areas of Nanotechnology, Top- down and Bottom -up approach.

Nano material preparation- Plasma Arcing, Chemical Vapor Deposition, Sol-Gels, Electro deposition, Ball Milling, Molecular Beam Epitaxy.

Characterization techniques: Electron Microscopy, Scanning Probe Microscopy, Raman Microscopy, UV-Vis absorption spectroscopy, Fourier Transform Infra- red Spectroscopy

UNIT II -FUNDAMENTALS OF NANOELECTRONICS :

Electron transport in semiconductors and nanostructures: Time and length scales of the electrons in solids, Statistics of electrons in solids and low- dimensional structures - Electron transport in nanostructures.

Two-dimensional semiconductor nanostructures, Quantum wells, wires and dots, Strained layers, Effect of strained layers, MOSFET structures, Heterojunctions, Superlattices.

Fundamentals of logic devices: requirements, dynamic properties, threshold gates, classifications of logicdevices: two terminal devices, field effect devices, coulomb blockade devices, spintronics.

UNIT III SILICON MOSFETs & QUANTUM TRANSPORT DEVICES :

Silicon MOSFETS - Novelmaterials and alternate concepts: -Scaling rules, Silicon-dioxide

based gate dielectrics, Metal gates, Junctions & contacts, Advanced MOSFET concepts. Quantum transport devices based on resonant tunneling: Electron tunneling – resonant tunneling diodes, Resonant tunneling devices;

Single electron devices for logic applications, applications of single electron devices to logic circuits.

UNIT IV-CARBON NANOTUBES :

Fullerenes, types of nanotubes, Formation of nanotubes, Assemblies, Purification of carbon nanotubes, Electronic properties, Synthesis of carbon nanotubes.

Functionalization of Carbon Nanotubes: covalent functionalization of CNTs, non-covalent functionalization of CNTs, Carbon nanotube interconnects, Carbon nanotube FETs, Nanotube for memory applications, Prospects of all carbon nanotube nanoelectronics, Graphene transistors and circuits. Sensor applications of CNTs. Computer applications (Nano chip), Optical and telecommunication applications.

UNIT V-MOLECULAR ELECTRONICS

Electrodes & contacts, Functions, Molecular electronic devices, First test systems, Simulation and circuit design, Fabrication, Future applications: MEMS, NEMS, Robots, Random access memory – mass storage devices.

Electronic Circuits & Applications**:** Vertical Transistors: Fin-FET circuits and applications, Surround Gate FET,MODFETs.

Heterojunction bipolar transistor, Hybrid Nano/CMOS circuits and applications, Nanowire arrays, Quantum dotlasers, Quantum Well modulators, OLED'S.

Text Books

1. Nanoelectronic Circuit Design, N.K Jha, D Chen, Springer 2.Nanotechnology and Nanoelectronics, W.R.Fahrner, Springer

2. Nanotechnology in Microelectronics & Optoelectronics, J.M Martine Duart, R.J Martin Palma, F.Agullo Rueda, Elsevier

Reference Books

1. Nanoelectronics, K. Iniewski, McGraw-Hill

2. Rainer Waser (Ed.), Nanoelectronics and Information Technology: Advanced Electronic Materials andNovel Devices, Wiley-VCH, 2003.

3. T. Pradeep, NANO: The Essentials – Understanding Nanoscience and Nanotechnology, TMH, 2007

Course Outcomes

Upon the successful completion of the course, students will be able to:

- Discuss the types of nanotechnology, molecular technology and the preparation of nano materials.
- Explain the fundamentals of electron transport, semiconductor nanostructures and devices such aslogic devices, field effect devices, and spintronics.
- Describe the concepts of silicon MOSFET and Quantum Transport Devices and single electrondevices.
- Explain the functionalization as well as summarize the types, synthesis, interconnects andapplications of carbon nano tubes.
- Explain the concepts, functions, fabrications and applications of molecular electronics.

Program / Semester: B.Tech (V)	**Branch: Electronics & Telecommunication Engineering**
Subject: Optoelectronic devices and circuits	**Course Code: BT05505(04)**
Marks: Max. – 70 Min. – 28	**L: 0 T: 0 P: 2**

Course Objectives

1. Explain key concepts in quantum and statistical mechanics relevant to physical, electrical and optoelectronic properties of materials and their applications to optoelectronic devices and photonic integrated circuits that emit, modulate, switch, and detect photons
2. Describe fundamental and applied aspects of optoelectronic device physics and its applications to the design and operation of laser diodes, light-emitting diodes, and photo detectors.
3. Describe techniques to improve the operation of optoelectronic devices and device characteristics that have to be optimized for new applications by employing their understanding of optoelectronic device physics

UNIT I Optical processes in semiconductors – electron hole recombination, absorption, Franz-Keldysh effect, Stark effect, quantum confined Stark effect, deep level transitions, Auger recombination

UNIT II Lasers – threshold condition for lasing, line broadening mechanisms, axial and transverse laser modes, heterojunction lasers, distributed feedback lasers, quantum well lasers, tunneling based lasers, modulation of lasers.

UNIT III Optical detection – PIN, APD, modulated barrier photodiode, Schottky barrier photodiode, wavelength selective detection, microcavity photodiodes.

UNIT IV Optoelectronic modulation - Franz-Keldysh and Stark effect modulators, quantum well electro- absorption modulators, electro-optic modulators, quadratic electro-optic effect quantum well modulators, optical switching and logic devices

UNIT V Optoelectronic ICs – hybrid and monolithic integration, materials and processing, integrated transmitters and receivers, guided wave devices

Name of Text / Reference Books:

1. Semiconductor Optoelectronic Devices, Pallab Bhattacharya, 2 nd Ed; Pearson Education, 2002

2. Photonics: Optical Electronics in modern communication, Amnon Yariv & Pochi Yeh, 6 th Ed;Oxford Univ. Press, 2006

3. Fundamentals of Photonics, B E Saleh and M C Teich, Wiley-Interscience; 1991

Course Outcomes

By the end of the course, students are expected to learn

- The skill of designing and setting up experiments to characterize LEDs, laser diodes, optical amplifiers,photodiodes, solar cells and electro-optics modulators.
- Understand the basic working mechanism of the devices,
- Have the practical knowledge and an understanding of the trade-offs when using these devices in theirrespective applications.

Program / Semester: B.Tech (V)	**Branch: Electronics & Telecommunication Engineering**
Subject: Advanced Data Structures and Algorithms	**Course Code: BT05505(05)**
Marks: Max. –70 Min. – 28	**L: 0 T: 0 P: 2**

Course Objectives:

- Understand and apply linear data structures-List, Stack and Queue.
- Understand the graph algorithms.
- Learn different algorithms analysis techniques.
- Apply data structures and algorithms in real time applications
- Able to analyze the efficiency of algorithm.

UNIT I Linear Data Structures : Introduction - Abstract Data Types (ADT) – Stack – Queue – Circular Queue - Double Ended Queue - Applications of stack – Evaluating Arithmetic Expressions - Other Applications - Applications of Queue - Linked Lists - Singly Linked List - Circularly Linked List - Doubly Linked lists – Applications of linked list – Polynomial Manipulation.

UNIT II Non - linear Tree Structures Binary Tree – expression trees – Binary tree traversals – applications of trees – Huffman Algorithm - Binary search tree - Balanced Trees - AVL Tree - B-Tree - Splay Trees – Heap operations- -Binomial Heaps - Fibonacci Heaps- Hash set.

UNIT III Graphs: Representation of graph - Graph Traversals - Depth-first and breadth-first traversal - Applications of graphs - Topological sort – shortest-path algorithms - Dijkstra‟s algorithm – Bellman-Ford algorithm – Floyd's Algorithm - minimum spanning tree – Prim's and Kruskal's algorithms.

UNIT IV Algorithm and Analysis: Algorithm Analysis – Asymptotic Notations - Divide and Conquer – Merge Sort – Quick Sort - Binary Search - Greedy Algorithms – Knapsack Problem – Dynamic Programming – Optimal Binary Search Tree - Warshall‟s Algorithm for Finding Transitive Closure.

UNIT V Advanced Algorithm Design and Analysis: Backtracking – N-Queen's Problem - Branch and Bound – Assignment Problem - P & NP problems – NP-complete problems – Approximation algorithms for NP-hard problems – Traveling salesman problem-Amortized Analysis.

Text / Reference books:

1. Anany Levitin "Introduction to the Design and Analysis of Algorithms" Pearson Education, 2015
2. E. Horowitz, S. Sahni and Dinesh Mehta, "Fundamentals of Data structures in C++", UniversityPress, 2007
3. E. Horowitz, S. Sahni and S. Rajasekaran, "Computer Algorithms/C++", Second Edition, UniversityPress, 2007
4. Gilles Brassard, "Fundamentals of Algorithms", Pearson Education 2015
5. Harsh Bhasin, "Algorithms Design and Analysis", Oxford University Press 2015
6. John R. Hubbard, "Data Structures with Java", Pearson Education, 2015
7. M. A. Weiss, "Data Structures and Algorithm Analysis in Java", Pearson Education Asia, 2013
8. Peter Drake, "Data Structures and Algorithms in Java", Pearson Education 2014
9. T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, "Introduction to algorithms", ThridEdition, PHI Learning Private Ltd, 2012
10. Tanaenbaum A.S., Langram Y. Augestein M.J, "Data Structures using C" Pearson Education ,2004.
11. V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", Pearson Education,1983

Course Outcomes:

1: Describe, explain and use abstract data types including stacks, queues and lists 2: Design and Implement Tree data structures and Sets

3: Able to understand and implement non linear data structures - graphs4: Able to understand various algorithm design and implementation

BHARTI VISHWAVIDYALAYA, DURG

Program / Semester: B.Tech (V)	**Branch: Electronics & Telecommunication Engineering**
Subject: Environmental Studies	**Course Code: BT05510**
Total Marks (Internal Assessment):50 **Min. Marks – 20**	**L: 0 T: 0 P: 2 Credit(s): 0**
Internal Assessments to be conducted: 02	**Duration (End Semester Exam): NA**

PREREQUISITE: Knowledge of basic Chemistry, Physics and Mathematics.

COURSE OBJECTIVES:

1. Basic knowledge of environment, ecology, ecosystems, biodiversity and conservation.
2. Fundamentals of natural resources, control, uses and its impact on environment.
3. Human population, growth, growing needs and its impact on society and environment.
4. Types of environmental pollution, legislations, enactment and management.

COURSE DETAILS:

UNIT I: Introduction to environmental studies, ecology and ecosystems (06 hours)

Introduction to environment; Concept and structure of ecology and ecosystem, energy flow; Community ecology; Food chains and webs; Ecological succession; Characteristic features of forest, grassland, desert and aquatic ecosystem; Multidisciplinary nature of environmental studies, scope and importance; Concept of sustainability and sustainabledevelopment.

UNIT II: Biodiversity and conservation (06 hours)

Introduction to biological diversity and levels of genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots; Threats to biodiversity, habitat loss, conflicts and biological invasions; In-situ and Ex-situ conservation of biodiversity: Ecosystem and biodiversity services.

UNIT III: Natural resources and environment (08 hours)

Concept of Renewable and non-renewable resources; Land resources, land use change, land degradation, soil erosion; Desertification; Deforestation: causes, consequences and remedial measures; Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state); Energy resources: environmental impacts of

energy generation, use of alternative and nonconventional energy sources, growing energy needs.

UNIT IV: Human communities, social issues and environment (08 hours)

Basic concept of human population, growth and communities; Impacts on environment, human health, welfare and human rights; Resettlement and rehabilitation; Environmental natural disaster: floods, earthquake, cyclones, tsunami and landslides; Manmade disaster; Environmental movements; Environmental ethics: role of gender and cultures in environmental conservation; Environmental education and public awareness; Human health risks and preventive measurements.

UNIT V: Environmental pollution, policies, legislations, assessment and practices(12 hours) Environmental pollution: Causes, effects and controls of air, water, soil, noise and marine pollution; Concept of hazardous and non-hazardous wastes, biomedical and e-wastes; Solid waste management and control measures; Climate change, global warming, ozone layer depletion, acid rain and their societal impacts; Environment laws: Wildlife Protection Act, Forest Conservation Act, Water (Prevention and control of Pollution) Act, Air (Prevention & Control of Pollution) Act, Environment Protection Act, Biodiversity Act, International agreements negotiations, protocols and practices; EIA, EMP.***On completion of each unit, students have to submit one assignment from each unit.***

COURSE OUTCOMES (CO):

On completion of the course, students will able to:

1. Interpret and demonstrate the concept of ecology and ecosystem for environmental sustainability.
2. Define and establish the diversified knowledge of biodiversity and its conservation.
3. Explain the uses of natural resources efficiently and its impact on environment.
4. Illustrate and solve the simple and complex social issues relating to human communities.
5. Exemplify and make useful solution to combat the environmental degradation with the aid of national andinternational legislations and protocols there under.
6. Demonstrate and elucidate the complicated issues and anthropological problems for

societal development.

TEXT BOOKS:

1. De, A.K., (2006).*Environmental Chemistry*, 6th Edition, New Age International, New Delhi.
2. Bharucha, E. (2013). *Textbook of Environmental Studies for Undergraduate Courses*. Universities Press.
3. Asthana, D. K. (2006).*Text Book of Environmental Studies*. S. Chand Publishing.

REFERENCE BOOKS:

1. Odum, E. P., Odum, H. T., & Andrews, J. (1971).*Fundamentals of ecology*. Philadelphia: Saunders.
2. Basu, M., Xavier, S. (2016). Fundamentals of Environmental Studies, Cambridge University Press, India.
3. Sharma, P. D., & Sharma, P. D. (2005).*Ecology and Environment*. Rastogi Publications.

OPEN SOURSE LEARNING:

http://nptel.ac.in/

BHARTI VISHWAVIDYALAYA, DURG

SCHEME OF TEACHING AND EXAMINATION
B.Tech (Sixth Semester – Electronics & Telecommunication Engineering)

Sl. No.	Courses (Subject)	CourseCode	Period per Week			Theory/Lab			TotalMarks	Credit
			L	T	P	ESE	CT	TA		
1.	VLSI Design	BT05601	3	1	-	70	10	20	100	4
2.	Antenna & Wave Propagation	BT05602	3	1	-	70	10	20	100	4
3.	Digital Signal Processing	BT05603	3	1	-	70	10	20	100	4
4.	Professional Elective-II (Refer Table I)	BT05604	2	1	-	70	10	20	100	3
5.	Open Elective – I (Refer Table II)	BT05605	2	0	-	70	10	20	100	2
6.	VLSI Design lab	BT05606	-	-	2	35	-	15	50	1
7.	Digital Signal Processing lab	BT05607	-	-	2	35	-	15	50	1
8.	Machine Learning Lab	BT05608	-	-	2	35		15	50	1
9.	Soft Computing lab	BT05609	-	-	2	35	-	15	50	1
10.	Technical Communicationand Soft Skill	BT05610	-	-	2	-	-	50	50	-
Total			13	4	10	490	50	210	750	21

L – Lecturer **T – Tutorial, TA – Teacher's Assessment**

P – Practical, **ESE – End Semester Exam,**

CT –Class Test

Table I (Professional Elective II)

S.N.	Subject	Course Code
1.	Information Theory and coding	BT05604(1)
2.	Microelectronics Technology	BT05604(2)
3.	ARM System Architecture	BT05604(3)
4.	Image Processing & remote sensing	BT05604(4)
5.	Wireless Sensor Networks	BT05604(5)

Note:

(1) 1/4th of total strength of students subject to minimum of 20 students is required to offer andelective in the college in a particular academic session.

(2) Choice of elective course once made for an examination cannot be changed in future examinations.

List of Open Elective – I (Table III) (For 6th Semester)

S.N.	Subject	Course Code
1	AI and Machine learning	BT05605(01)
2	Operating Systems	BT05605(02)
3	Internet & Web Technology	BT05605(03)
4	Database Management Systems (DBMS)	BT05605(04)
5	Device Modelling	BT05605(05)

Program / Semester: B.Tech (VI)	**Branch: Electronics & Telecommunication Engineering**
Subject: VLSI design	**Course Code: BT05601**
Max. No. – 70 Min. - 28	**L: 3 T: 1 P: 0**
Class Tests & Assignments to be conducted: 2 each	**Duration (End Semester Exam): 03 Hours**

Course Objectives:

1. To understand the IC design aspects, basic fabrication steps.
2. To study the design rules & representation of circuits at lower level of abstraction.
3. To understand the layout design of few combinational and sequential circuits.
4. To study one of the HDL (hardware description language) for front end design.
5. To study internal structure of programmable logic devices.

UNIT I An Overview & Analysis of CMOS Integrated Circuits: Complexity and Design: Design Flow, VLSI Chip Types, Moore's Law; MOSFETs as Switch: FET Threshold Voltages, Pass Characteristics; Basic Logic Gates in CMOS: NOT Gate, NOR Gate, NAND Gate; Complex Logic Gates in CMOS: Structured Logic Design, XOR and XNOR Gates; Transmission Gate Circuits: Multiplexers, OR Gate, XOR/XNOR Gate. DC characteristics of the CMOS inverter, Switching Characteristics: Fall Time, Rise Time, Propagation Delay; Power Dissipation.

UNIT II Fabrication & Physical Design of CMOS Integrated Circuits: CMOS Layers; Designing FET Arrays; Basic Gate Designs; Complex Logic Gates; Euler Graph; Overview of Silicon Processing; Material Growth and Deposition; Lithography; CMOS Process Flow; CMOS Design Rules; Layout of Basic Structures: nWell, Active Areas, Doped Silicon Regions, MOSFETs, Active Contacts, Metal, Vias; Physical Design(Stick diagram &Layout Design) of Logic Gates: NOT, NAND & NOR.

UNIT III CMOS Subsystem Design: Schematic and Layout of CMOS Combinational Circuits: Full adder circuit, Multiplexer, Parity Generator, Schematic and Layout of CMOS Sequential Circuits: SR FlipFlop, JK Flip-Flop, & D Flip-Flop, 4x4 NOR based ROM Array, 4x4 NAND based ROM Array; Schematic of SRAM Schematic and operation of DRAM: 3-T DRAM 6-T DRAM;

UNIT IV Implementation Technology & Introduction to VHDL: Implementation Technology: CPLD Architecture, FPGA Architecture, LUT Design; Brief history of VHDL, Entity Declaration, Architecture Declaration, Modeling styles: Data Flow, Structural, Behavioral and Mixed Style. Assignment Statements, Select Signal Assignment, Conditional Signal Assignment, Component Declaration, Generate Statements, Concurrent and Sequential Assignment Statement, Process Statement, Case Statement. VHDL operators. VHDL programming of Multiplexer, Decoder, Encoder, Half Adder, Full Adder, 4-bit Adder, ALU.

UNIT V Sequential Logic Design using VHDL: VHDL Programming for D-Latch, SR Flip-Flop, JK Flip-Flop, T Flip-Flop& D Flip-Flop, Shift Registers, Synchronous Counter: UP counter, Down counter, BCD counter; Moore Finite State Machine for Sequence Detector, MOD counter & Serial Adder. MealyFinite State Machine for Sequence Detector, MOD counter & Serial Adder. Test Bench design for HalfAdder, Full adder & D Flip-Flop.

Textbooks:

1. Introduction to VLSI Circuits and Systems: John P. Uyemura, John Wiley & Sons (Unit-I & II).

2. CMOS Digital Integrated Circuits: Analysis & Design; Sung-Mo Kang & Yusuf Leblebici,TMH, (Unit-III)

3. Fundamentals of Digital Logic with VHDL Design, Brown, TMH Pub. (Uni- IV & V)

4. VHDL Primer by J. Bhaskar, PHI(Unit-IV & V)

Reference Books:

1. CMOS VLSI Design: A Circuits and Systems Perspective by Weste, Pearson Education Pub.

2. Basic VLSI Design by Pucknell&Esharghian,3rd Ed., PHI Pub.

3. CMOS circuit design, layout and simulation by Jacob Baker, PHI

Course Outcomes:

1. Students are expected to understand CMOS fabrication details.

2. Students are expected to understand schematic, layout of combinational circuits.

3. Students are expected to understand schematic, layout of sequential circuits.

4. Students are expected to understand VHDL programming concepts.

Program / Semester: B.Tech (VI)	**Branch: Electronics & Telecommunication Engineering**
Subject: Antenna & Wave Propagation	**Course Code: BT05602**
Max. No. – 70 Min. - 28	**L: 3 T: 1 P: 0**
Class Tests & Assignments to be conducted: 2 each	**Duration (End Semester Exam): 03 Hours**

Course Objectives:

1. To study uniform plane wave propagation in different media and wave polarization

2. To study guided wave propagation in metallic wave guides

3. To study radio wave propagation

4. To study the concept of radiation and analyze radiation characteristics of a current element anddipole

5. To study antenna fundamentals and antenna arrays: uniform and tapered and their design

6. To study some practical antennas like Rhombic, Loop, Yagi and microstrip antenna.

UNIT – I Waveguides: Wave propagation between two infinite parallel conducting plane: TE and TM modes; Properties of TE and TM modes, TEM waves; Rectangular and Circular waveguides: TE and TM modes, dominant modes, characteristics: attenuation and phase constants, phase and group velocities, cut-off wavelengths and frequencies, guide wavelength, field pattern and wave impedance.

UNIT – II Wave Propagation: Sky wave, surface wave and space wave; Ionospheric propagation- refractive index at high frequencies; Mechanism of radio wave bending, critical frequency; effect of earth's magnetic field; Effective dielectric constants and conductivity, MUF, skip distance, optimum working frequency; Multihop propagation; Ionoshperic abnormalities; Troposhperic propagation, field strength of troposhperic wave; Effect of earth's curvature and dielectric constant; Troposhperic scatter and Duct propagation.

UNIT – III Antennas and Radiation: Electromagnetic radiation; Retarded potentials; Short electric dipole, radiation from a small current element, radiated power and radiation resistance; Radiation from ahalf wave dipole and its radiation resistance; Isotropic radiator; radiation pattern; Radiation Intensity; Antenna Gain: directive gain and power gain; Antenna

directivity; Effective length and effective aperture of antennas; Beam width; Bandwidth; Beam area; FBR, Self impedance of antennas, Antenna efficiency; Reciprocity theorem and its application.

UNIT – IV Antenna Arrays and their design: Various form of array: broadside, end fire, collinear and parasitic arrays; Arrays of two isotropic point sources; Principle of pattern multiplication; Linear arrays with 'n' isotropic point sources of equal amplitude and spacing: broadside and end fire case; *Tapering ofarrays: Binomial and Dolph Tchebysceff* array.

UNIT – V Practical Antennas: Effect of earth on antenna performance; Grounded and ungrounded antennas; Antenna top loading and tuning; Resonant and non-resonant antennas; Beverage antenna; Tower radiator; Long-wire antenna; V-antenna; Rhombic antenna; Loop antenna and Adcock antenna; Yagi antenna; Log periodic antenna; Horn and Microstrip antenna.*& its charecterstics*

Name of Text Books:

1. Engineering Electromagnetic, William H. Hyat, Jr. John A. Buck 7th Ed. TMH, 2006. (Unit: I)
2. Antennas and Wave Propagation, K. D. Prasad, Satya Prakashan, 3rd Ed., 2001.(Unit: I, II, III,IV&V)

Name of Reference Books:

1. Antenna Theory, Balanis, 2nd Edition, John Wiley & Sons, 2003.
2. Antenna and Wave Propagation, R.L. Yadava, PHI, 2011.
3. Antenna and Wave Propagation, G. S. N. Raju, , 5th Impression, Pearson, 2011.
4. Antennas and Radio Propagation, R.E. Collins, McGraw-Hill, 1987.
5. "Antennas", John D. Kraus and Ronalatory Marhefka, Tata McGraw-Hill Book, 2002.

Course outcome:

1. Students will be able to understand the guided and unguided wave propagation.
2. Students will acquire knowledge of Basic antennas, their radiation and characteristics.
3. Students will knowledge of antenna arrays and their design.
4. Students will able to understand some different practical antennas.

Program / Semester: B.Tech (VI)	**Branch: Electronics & Telecommunication Engineering**
Subject: Digital Signal Processing	**Course Code: BT05603**
Max. No. – 70 Min. - 28	**L: 3 T: 1 P: 0**
	Duration (End Semester Exam): 03 Hours

Course Objective:

- To Study the Basic Mathematical Techniques needed for analysis of discrete time Signals andSystems.
- To Study the Various Digital Filter Design Techniques.
- To Study the Multirate Digital Signal Processing Techniques.

UNIT I Analysis of Discrete Time Signals and Systems: Discrete Fourier analysis, Classification, Discrete Time Fourier Transform (DTFT) & its properties, Inverse DTFT. Discrete Fourier Transform (DFT) & its Properties, Inverse DFT. Fast Fourier Transform, Properties, Types of FFT, N-point Radix-2 FFT, Inverse FFT. Discrete Linear Convolution, Circular Convolution, Fast Convolution, Frequency Response of LTI system using Discrete Fourier Analysis.

UNIT II Implementation of Discrete-time Systems: Structures for the Realization of discrete-time systems, Structures for FIR systems: Direct, Cascade, Frequency Sampling & Lattice structures. Structures for IIR systems: Direct, Signal Flow Graphs & Transposed, Cascade, Parallel, Lattice & Lattice-Ladder structures.

UNIT III FIR Filter Design: Symmetric and Anti-symmetric FIR filters, FIR Filter design by window method (Rectangular, Bartlett, Hamming, Hanning, Blackman and Kaiser window), Frequency Sampling method, Optimum approximation of FIR filters, Design of FIR differentiators, Design of Hilbert transformers.

UNIT IV IIR Filter Design: Design of Discrete-time IIR filters from Continuous-time Filters: Filter design by Impulse invariant and bilinear transformation method: Butterworth, Chebyshev & Elliptic approximation Filter, Frequency transformation.

UNIT V Multirate Digital Signal Processing: Introduction, Decimation, Interpolation, Sampling rate conversion by rational factor, Filter design and implementation for sampling rate conversion: Direct form FIR digital filter structure, Polyphase filter structure, Time varying digital filter structure, Sampling rate conversion by an arbitrary factor.

Text Books:

1. Discrete Time Signal Processing by A.V. Oppenheim, R. W. Schafer, & John R. Buck, , 2ndEdition, Prentice Hall, 1999. (Unit I, Unit II, Unit III, Unit IV)
2. Digital Signal Processing: Principles, Algorithms and Applications by John G. Proakis &
D.G. Manolakis, Prentice Hall, 1997. (Unit II, Unit III, Unit IV, Unit V)
3. Digital Signal Processing by S. K. Mitra, 3rd edition, McGraw-Hill, 2007. (Unit V)

Reference Books:

1. Signals and Systems by A. V. Oppenheim, A. S. Willsky & S. H. NAWAB, 2nd edition,Prentice Hall, 1996.
2. Digital Signal Processing by S. Salivahanan, A. Vallavaraj, C. Gnanapriya, Tata McGraw-Hill,2000.
3. Digital Signal Processing by A. Anand Kumar, PHI Learning Pvt. Ltd, 2012.

Course Outcomes:

At the end of the course student will get the ability to

- Synthesize discrete time signals from analog signal.
- Use time domain and frequency domain analysis tools.
- Apply forward and Reverse Transformation.
- Visualize various applications of DSP and explore further possibilities.
- Design IIR and FIR filters

BHARTI VISHWAVIDYALAYA, DURG

Program / Semester: B.Tech (VI)	**Branch: Electronics & Telecommunication Engineering**
Subject: VLSI Design lab	**Course Code: BT05606**
Max. No. – 35 Min. - 14	**L: 3 T: 1 P: 0**
Class Tests & Assignments to be conducted: 2 each	**Duration (End Semester Exam): 03 Hours**

List of Experiments: (At least Ten experiments are to be performed by each student)

1. To Study Architecture of CPLD
2. To Study Architecture of FPGA
3. To Design Half Adder in Data Flow Style of Modeling and Implement it in the CPLD.
4. To Design Full Adder in Structural Style of Modeling and Implement it in the FPGA.
5. To Design 4:1 Multiplexer in Behavioral Modeling and Implementation in CPLD.
6. To Design 16:1 Multiplexer using Generate statement and Implementation in FPGA.
7. To Design 8bit adder using Generic statement and Implementation in CPLD.
8. To Design D Flip-Flop in Behavioral Modeling.
9. To Design Sequence Detector using Moore Machine in Behavioral Modeling.
10. To Design Serial Adder using Mealy Machine in Behavioral Modeling.
11. To Prepare and Verify the Layout for NOT Gate.
12. To Prepare and Verify the Layout for NAND Gate.
13. To Prepare and Verify the Layout for NOR Gate.
14. To Prepare the Layout for D-FF.
15. To Prepare the Layout for the logic equation (a * (b+c))'

EDA Tools to be used:

Front End: Modelsim, FPGA Advantage, Xilinx, EdWinXP, Active HDL. Back End: Cadence, Zeni-EDA, Calibre, Tanner, Synopsis, H-Spice CPLD: XC9572, XC95108.FPGA:XC3S400

Program / Semester: B.Tech (VI)	**Branch: Electronics & Telecommunication Engineering**
Subject: Digital Signal Processing Laboratory	**Course Code: BT05607**
Max. No. – 35 Min. - 14	**L: 3 T: 1 P: 0**
Class Tests & Assignments to be conducted: 2 each	**Duration (End Semester Exam): 03 Hours**

List of Experiments: (At least Ten experiments are to be performed by each student)

1. To generate the basic Analog and Discrete Signals.

2. Implementation of Linear convolution, Circular convolution, linear convolution using circularconvolution.

3. DFT Implementation for a given signal.

4. To plot Fourier Transform amplitude spectrum and phase spectrum for a given function.

5. To plot frequency response in Z-domain for the given transfer function.

6. To plot frequency response in S-domain for a given transfer function.

7. To plot Fast Fourier Transform (amplitude & phase).

8. To sample a sinusoidal signal at Nyquist rate, above the Nyquist Rate and below the Nyquist Rate.

9. Design & implementation of IIR filters[LPF,HPF,BPF,BSF].

10. Design & implementation of FIR filters[LPF,HPF,BPF,BSF].

11. To design various filters using Simulink.

12. To design a Graphical User Interface to display various basic signals [sinewave ,sinc wave, etc].

13. To perform Interpolation and decimation [Multirate DSP].

14. To design a digital notch filter and embed it on a digital signal processor block.

15. Experiments with application of DSP in Communication / Speech Processing / Image Processing.

(Institutes may append more programmes / Experiments based on the infrastructure available)

List of Equipments /Machine Required:

C++Compiler, Simulation Software, DSP Processor kit, Digital Storage CRO, Spectrum Analyzer.

Recommended Books:

1. Digital Signal Processing, Vallavaraj, Salivahanan, Gnanapriya, TMH
2. Stein, J. Digital Signal Processing-a computer science perspective. Wiley

Program / Semester: B.Tech (VI)	**Branch: Electronics & Telecommunication Engineering**
Subject: Machine Learning Lab	**Course Code: BT05608**
Max. No. – 35 Min. - 14	**L: 3 T: 1 P: 0**
Class Tests & Assignments to be conducted: 2 each	**Duration (End Semester Exam): 03 Hours**

List of Experiments: (At least Ten experiments are to be performed by each student)

1. Heuristics and search strategy for Travelling sales person problem.
2. Implement n-queens problem using Hill-climbing, simulated annealing, etc.
3. Tic-tac-toe game simulation using search and heuristics.
4. Solve 3-SAT, 3-CNF algorithms using agents.
5. Describe the Sudoku game and represent the actions using First-order / Propositional logic.
6. Sorting algorithms employing forward chaining.
7. Logical reasoning examples for E-commerce stores using forward/backward chaining.
8. Study of Machine learning tool.
9. Exercises on decision trees, SVM using the tool.
10. K-means clustering implementation using tool.
11. Agglomerative, divisive, fuzzy clustering using tool.
12. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples.
13. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
14. Write a program to demonstrate the working of the decision tree based ID3 algorithm.
15. Use an appropriate data set for building the decision tree and apply this knowledge to classify anew sample.
16. Build an Artificial Neural Network by implementing the Back propagation algorithm and test thesame using appropriate data sets.
17. Write a program to implement the naïve Bayesian classifier for a sample training data set storedas a .CSV file.
18. Compute the accuracy of the classifier, considering few test data sets.

19. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Calculate the accuracy, precision, and recall for your data set.
20. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. Apply EM algorithm to cluster a set of data stored in a .CSV file.
21. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering.
22. Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions.
23. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points.

Select appropriate data set for your experiment and draw graphs.

Requirements:

Java/Python ML library classes/API etc.

Program / Semester: B.Tech (VI)	**Branch: Electronics & Telecommunication Engineering**
Subject: Soft Computing lab	**Course Code: BT05609**
Max. No. – 35 Min. - 14	**L: 2 T: 1 P: 0**
	Duration (End Semester Exam): 03 Hours

List of Experiments: (At least Ten experiments are to be performed by each student)

1. To generate the basic Analog and Discrete Signals.

2. Implementation of Linear convolution, Circular convolution, linear convolution using circularconvolution.

3. DFT Implementation for a given signal.

4. To plot Fourier Transform amplitude spectrum and phase spectrum for a given function.

5. To plot frequency response in Z-domain for the given transfer function.

6. To plot frequency response in S-domain for a given transfer function.

7. To plot Fast Fourier Transform (amplitude & phase).

8. To sample a sinusoidal signal at Nyquist rate, above the Nyquist Rate and below the Nyquist Rate.

9. Design & implementation of IIR filters[LPF,HPF,BPF,BSF].

10. Design & implementation of FIR filters[LPF,HPF,BPF,BSF].

11. To design various filters using Simulink.

12. To design a Graphical User Interface to display various basic signals [sinewave ,sinc wave, etc].

13. To perform Interpolation and decimation [Multirate DSP].

14. To design a digital notch filter and embed it on a digital signal processor block.

15. Experiments with application of DSP in Communication / Speech Processing / Image Processing.

(Institutes may append more programmes / Experiments based on the infrastructure available)

List of Equipments /Machine Required:

C++Compiler, Simulation Software, DSP Processor kit, Digital Storage CRO, Spectrum Analyzer.

Recommended Books:

1. Digital Signal Processing, Vallavaraj, Salivahanan, Gnanapriya, TMH
2. Stein, J. Digital Signal Processing-a computer science perspective. Wiley

Program / Semester: B.Tech (VI)	Branch: Electronics & Telecommunication Engineering
Subject: Technical Communication & Soft Skills	Course Code: BT05610
Max. No. – 50 Min. - 20	L: 0 T: 0 P: 2

UNIT-1 Communication Skills-Basics: Understanding the communicative environment, Verbal Communication; Non Verbal Communication & Cross Cultural Communication, Body Language & Listening Skills; Employment Communication &writing CVs, Cover Letters for correspondence. Common errors during communication, Humour in Communication.

UNIT-2 Interpersonal communication: Presentation, Interaction and Feedbacks, Stage Manners, Group Discussions (GDs) and facing Personal Interviews, Building Relationships, Understanding Group Dynamics- I, Emotional and Social Skills, Groups, Conflicts and their Resolution, Social Network, Media and Extending Our Identities.

UNIT- 3 Vocational skills: Managing time: Planning and Goalsetting, managing stress: Types of Stress; Making best out of Stress, Resilience, Work-life balance, Applying soft-skills to workplace.

UNIT-4 Mindsets and Handling People: Definitions and types of Mindset, Learning Mindset, Developing Growth Mindset, Types of People, How to Lead a Meeting, How to Speak Effectively in Meetings, Behavior & Roles in Meetings, Role Play: Meeting.On Saying “Please”, How to say “NO”.

UNIT-5Positive Pschycology: Motivating oneself, Persuasion, Survival Strategies, Negotiation, Leadership and motivating others**,** controlling anger**,** Gaining Power from Positive Thinking.

Text Books:

1. Petes S. J., Francis. Soft Skills and Professional Communication. New Delhi: Tata McGraw-Hill Education,2011.

2. Stein, Steven J. & Howard E. Book. The EQ Edge: Emotional Intelligence and Your Success. Canada:Wiley & Sons, 2006.
3. Dorch, Patricia. What Are Soft Skills? New York: Execu Dress Publisher, 2013.

Reference Books:

- Kamin, Maxine. Soft Skills Revolution: A Guide for Connecting with Compassion for Trainers, Teams, andLeaders. Washington, DC: Pfeiffer & Company, 2013.
- Peale Norman Vincent. The Power of Positive Thinking: 10 Traits for Maximum Result. PaperbackPublication. 2011.
- Klaus, Peggy, Jane Rohman & amp; Molly Hamaker. The Hard Truth about Soft Skills. London: HarperCollins E-books, 2007.

Course Outcomes

1. Learn to listen actively to analyse audience and tailor the delivery accordingly.
2. Increase their awareness of communication behaviour by using propriety-profiling tool.
3. Master three “As” of stressful situation: Avoid, Alter, Accept; to cope with stressors and create a plan toreduce or eliminate them.
4. Develop growth mind-set and able to handle difficult person and situations successfully.
5. Develop technique of turning negativity into positivity and generate self-motivation skills.

Program / Semester: B.Tech (VI)	**Branch: Electronics & Telecommunication Engineering**
Subject: Information Theory and coding	**Course Code: BT05604(01)**
Max. No. – 70 Min. - 28	**L: 0 T: 0 P: 2**

Course Objectives:

- To understand the role of information theory and coding for an efficient, error-free and securedelivery of information using binary data streams.

UNIT I Source Coding: Introduction to Information Theory, Uncertainty and Information, Average Mutual Information, Discrete Memory less Source ,Entropy of Binary Memory Less source and its extension to Discrete Memory Less Source, ,Information Rate, Information Measures for Continuous Random Variables, Kraft Inequality, Rate Distortion Function, Source Coding Theorem, Shannon Fano coding, Huffman coding, The Lempel-Ziv algorithm, Run Length Encoding and the PCX Format, Introduction to JPEG Standard for Lossless and Lossy Compression.

UNIT II Channel Capacity and Coding: Channel Models, Channel Capacity ,Discrete Memory less Channel: Lossless Channel, Deterministic Channel, Noiseless Channel, Binary Symmetric Channel, Binary Erasure Channel, Channel Coding Theorem, Information Capacity Theorem, Shannon's Limit, Gaussian Channel, Parallel Gaussian Channel

Unit III Error Control Coding (Block codes and Cyclic Codes): Linear Block Codes for Error Correction & Cyclic Codes: Introduction to Error Correcting Codes, Basic Definitions, properties of Linear Block Codes ,Matrix Description of Linear Block Codes, Equivalent Codes, Parity Check Matrix, Decoding of a Linear Block Code, Syndrome Decoding, Hamming Codes. Cyclic Codes: Polynomials, The Division algorithm for Polynomials, Encoding and Decoding of Cyclic Codes, Matrix Description of cyclic codes.

UNIT IV Error Control Coding (Convolutional Codes) : Convolutional Codes: Introduction to Convolutional Codes, Tree codes and Trellis Codes, Polynomial Description of Convolutional Codes (analytical Representation),Graphical Representation: The State diagram, Code Trellis and Code Tree , Distance Notions for Convolutional Codes, The

Generating Function, Matrix Description of Convolutional Codes, Viterbi Decoding.

UNIT V Error Control Coding(TCM,BCH codes and LDPC codes): Introduction to TCM:TCM Encoder, Mapping by Set Partitioning, Ungerboeck's TCM Design Rules. Bose-Chaudhuri- Hocquenghem (BCH) Codes: Introduction to BCH Codes, Primitive Elements, Minimal Polynomials, Generator Polynomials in Terms of Minimal Polynomials, Generation of BCH Codes, Decoding of single error in BCH Codes, Introduction to LDPC codes, Representation of LDPC codes using Tanner graph.

Text Books:

1. Information Theory coding & Cryptography by Ranjan Bose,(Unit- I,II,III,IV,V) ,3rdEd.,TataMcGraw-Hill.
2. Communication Systems, Simon Haykin, Wiley India.

Reference Books:

1. Principles of Digital Communication - Das MullickChatterjee, Willey Eastern Publications
2. Digital communication –B.Sklar, Pearson Publication
3. Digital communication - Prokais, Tata McGrawHill
4. Channel Codes – Classical and Modern, William Ryan, Shu Lin, CUP, 2009.

Course Outcomes

1. Students will be able to analyze source coding techniques like the Huffman encoding, ShannonFano encoding , Lempel Ziv encoding and Run Length encoding.
2. Students will be able to categorize different types of channels and can determine capacity of agiven channel.
3. Students will be able to encode and decode using Block codes and Cyclic codes
4. Students will be able to use graphical method ,polynomial and polynomial matrix to describeconvolutional codes.
5. Students will be able to use the mathematical tools developed including primitive element to studyBCH codes, and can draw tanner graph of LDPC codes.

Program / Semester: B.Tech (VI)	**Branch: Humanities**
Subject: Microelectronics Technology	**Course Code: BT05604(02)**
Total Marks (Internal Assessment): 70 **Min. marks - 28**	**L: 0 T: 0 P: 2**
	Duration (End Semester Exam):3 hours

Course Objectives:

1. To get and overview of the field of integrated circuit design.
2. To understand various oxidation techniques.
3. To understand diffusion and ion implantation methods.
4. To understand steps of wafer preparation.
5. To understand MOSFET technology.

UNIT – I Introduction: The Historical Prospect of Integrated Circuits, Silicon Wafers, Wafer Terminology. Crystal Growth: The Czochralski Technique, Bridgeman Technique, Float Zone Process.

UNIT – II Oxidation: Thermal Oxidation, Kinetics of Thermal Oxidation, Film Deposition, Dielectric Deposition, Polysilicon Deposition.

UNIT – III Diffusion: Diffusion Mechanics, Diffusion Equation, Diffusion Profile. Ion Implantation: Implantation Mechanism, Ion Implantation System, Low Energy Implantation, High Energy Implantation.

UNIT – IV Epitaxy: Vapor Phase Epitaxy, Liquid Phase Epitaxy, Molecular Beam Epitaxy. Lithography: Optical Lithography, Electron Beam Lithography, X-Ray Lithography, Ion Beam Lithography. Etching: Wet Chemical Etching, Reactive Chemical Etching. Metallization: Physical Vapor deposition, Chemical Vapour deposition, Aluminum Metallization, Metallization with Silicides. Process Simulation and Integration

UNIT – V MOSFET Technology: Introduction, MOS Structure. MOS Transistor: MOSFET Structure, Enhancement MOSFET, Threshold Voltage, Depletion MOSFET, Operation of MOSFET. MOSFET Characteristics: Gradual Channel Approximation, Charge Control Model, Velocity Saturation Effects, Channel Length Modulation, Subthreshold region. MOS

Capacitance and Equivalent Circuit. Scaling of MOSFET: Short channel Effects, SPICE model for MOSFETs. MOSFET Fabrication.

Text Book:

1. VLSI Design by Sujata Pandey & Manoj Pandey, Dhanpat Rai & co.
2. VLSI Technology by S.M. Sze, TMH Book Company

Reference Book:

1. VLSI Fabrication Principles by Sorab K. Gandhi, Wiley & Sons, New York.
2. Physics & Technology of Semiconductor Devices by A.S. Grove, Wiley & Sons, New York.

Course Outcomes

1. Student gets brief historical overview specific to VLSI design field.
2. Student learns about oxidation techniques.
3. Student gets an insight into diffusion and ion implantation mechanism.
4. Student is able to understand different steps of wafer preparation.
5. Student gets an overview of microelectronics devices and MOSFET technology.

Program / Semester: B.Tech (VI)	**Branch: Humanities**
Subject: ARM System Architecture & Design	**Course Code: BT05604(03)**
Total Marks (Internal Assessment): 70 **Min. marks - 28**	**L: 0 T: 0 P: 2**
	Duration (End Semester Exam): 3 hours

Course Objectives:

The objective of this course is to give the students a thorough exposure to ARM architecture and make the students to learn the ARM programming & Thumb programming models.

UNIT I ARCHITECTURAL FEATURES OF ARM PROCESSOR: Processor modes, Register organization, Exceptions and its handling, Memory and memory-mapped I/Os, ARM and THUMB instruction sets, addressing modes, ARM floating point architecture and DSP extensions, ARM co- processors.

UNIT II ARM 9 TDMI ARCHITECTURAL STUDY: H/W architecture, Timing diagrams for various accesses, Memory buses: AMBA, ASB, APB, Case study of Intel Xscale architecture or Samsung ARM implementations

UNIT III ARM AND THUMB INSTRUCTION SETS: Conditional execution and flags, Branch instructions, The barrel shifter, Immediate constants, Single register data transfer, Block data transfer, Stack management, Coprocessor instructions, Register access in Thumb, ARM architecture V5TE new instructions, Assembler workbooks ARM / THUMB INTERWORKING: Switching between states, Branch exchange example, Mixing ARM and Thumb subroutines, ARM to thumb veneer, Thumb-to- ARM veneer, Interworking calls, and Interworking using codewarrior.

UNIT IV ARM DEVELOPPER SUITE (ADS) OVERVIEW: Using the core tools, C/C++ compilers key features, Supplied libraries, Code warrior introduction, Debugging with multi-ICE.

ADS INTRODUCTORY WORKBOOK: Compiling and running an example, Creating a header file, Creating a new project, Viewing registers and memory. EXCEPTION HANDLING: Exception return instructions, Exception priority, Vector table instructions,

Chaining exception handlers, Register usage in exception handlers, FIQ vs IRQ, Example C interrupt handler, Software managed interrupt controller, Issues when re-enabling interrupts, C nested interrupt example, Invoking SWIs, Data abort with memory management, The return address

UNIT V EMBEDDED SOFWARE DEVELOPMENT: ROM or RAM at 0x0, ROM/RAM remapping,
Exception vector table, Reset handler, Initialization : stack pointers, code and data areas, C library initialization, Scatter loading, Linker placement rules, Long branch veneers, C library functionality,Placing the stack and heap, Debugging ROM images.

Text Books:

1. ARM System Developer's Guide: Designing and Optimizing, Sloss Andrew N, Symes Dominic,Wright Chris, Morgan Kaufman Publication.
2. ARM System-on-Chip Architecture, Steven Furber, Pearson Education

Reference Books:

1. Technical references on www.arm.com.
2. Technical reference manual for ARM processor cores, including Cortex, ARM 11, ARM 9 &ARM 7 processor families.
3. User guides and reference manuals for ARM software development and modeling tools.
4. David Seal, ARM Architecture Reference Manual, Addison-Wesley.

Course Outcomes

Students are able to

- Describe the programmer’s model of ARM processor and create and test assembly levelprogramming.
- Analyze various types of coprocessors and design suitable co-processor interface to ARM processor.
- Analyze floating point processor architecture and its architectural support for higher level language.
- Become aware of the Thumb mode of operation of ARM.
- Identify the architectural support of ARM for operating system and analyze the function ofmemory Management unit of ARM.

Program / Semester: B.Tech (VI)	**Branch: Humanities**
Subject: Image Processing & remote sensing	**Course Code: BT05604(04)**
Total Marks (Internal Assessment): 70 **Min. marks - 28**	**L: 0 T: 0 P: 2**
	Duration (End Semester Exam): 3 hours

Course Objectives:

1. To know the basic components of an image processing system..
2. To understand the basics of the human visual system as they relate to image processing includingspatial frequency resolution and brightness adaptation.
3. To teach the students about various image enhancement techniques and transformation of images.
4. To have an illustrative idea about various edge detection techniques.
5. To give knowledge about the need of thresholding and types of thresholding techniques.
6. To have a brief idea about approaches to restoration and image compressions

Unit – I: Introduction and Basic Concepts: Introduction, Basic Concepts of remote sensing, Airborne and space-borne sensors, Passive and active remote sensing, EMR Spectrum, Energy sources and radiation principles. Energy Interactions in the atmosphere. Energy interactions with earth surface features, Spectral reflectance curves , Energy interactions with earth surface features.

Unit – II: Remote Sensing System : Satellites and orbits, Geo-Synchronous, sun synchronous and polar orbiting satellites, Spatial, Spectral and radiometric resolutions, Temporal resolution, Spatial, Spectral and radiometric resolutions, Multispectral, thermal and hyper spectral remote sensing. Remote sensing satellites and their features.

Unit – III : Digital Image Processing – Image Restoration: Geometric Corrections, Ground Control Points(GCP), Co-registration of data, Atmospheric corrections, solar illumination correction.

Unit – IV: Digital Image Processing – Image Enhancement: Concept of Color, RGB and HIS color schemes, Color composites. Contrast stretching – linear and non-linear stretching.

Filtering techniques, Edge enhancement, Density slicing, Thresholding, Intensity-Hue-Saturation (HIS) images, Time Composite images, Synergetic images.

Unit – V: Digital Image Processing – Information Extraction: Supervised and unsupervised classification,Fuzzy classification, Image transformations, Ratio images, Vegetation Indices, Principal component analysis.

Text Books:

1. Digital Image Processing by Gonzalez & Woods, Pearson Education.
2. Introduction to Digital Image Processing by Alasdair Mc Andrew, Cengage learning.
3. Fundamental of Digital Image Processing by AK Jain, PHI.
4. Joseph, G. (2004): Fundamentals of Remote Sensing, Universities Press, Hyderabad, India
5. Lillesand, T. M., Kiefer, R. W. and Chipman, J. W. (2008): Remote Sensing and Image Interpretation, John Wiley & Sons, New Delhi

Reference Book:

1. Image Processing, Analysis and Machine Vision by Milan Sonka,T homson Learning.
2. Digital Image Processing by Pratt W.K, John Wiley & Sons.
3. Digital Image Processing by Madhuri A. Joshi, PHI
4. Sabins, F. F. (1996): Remote Sensing: Principles and Interpretation, W. H. Freeman and Company, San Francisco
5. Jensen, J. R. (2005): Introductory Digital Image Processing, Prentice Hall, New Jersey
6. Campbell, J. (2002): Introduction to Remote Sensing, Taylor & Francis, London

Course Outcomes:

1. Students will understand the basic concepts of image and remote sensing.
2. Emphasis will be to develop engineering skills and intuitive understanding of the tools used inImage Processing.
3. Students will be able to do various operations on images like Image enhancement, transformation, sharpening etc.
4. Students can analyze various edge detection techniques and their algorithms.
5. Students will be able to use various thresholding techniques and segmentations.
6. Students will be able to visualize approaches used in image restoration.

Program / Semester: B.Tech (VI)	**Branch: Humanities**
Subject: Wireless Sensor Networks	**Course Code: BT05604(05)**
Total Marks (Internal Assessment): 70 **Min. marks - 28**	**L: 0 T: 0 P: 2**
Internal Assessments to be conducted: 02	**Duration (End Semester Exam): 3 hours**

Course Objectives:

1. To understand the WSN node Architecture and Network Architecture
2. To identify the Wireless Sensor Network Platforms
3. To program WSN using embedded C
4. To design and Develop wireless sensor node

UNIT I: Introduction to wireless sensor networks (WSN), Hardware of wireless sensor node, Network deployment, Localization, Coarse grained and fine grained localization, Network wide localization,Theoretical analysis of localization techniques.

UNIT II: Time synchronization, Traditional approaches, Fine grained clock synchronization, Coarse grained data synchronization. Medium access and sleep scheduling.

UNIT III: Sleep based topology control, Topologies for connectivity, topologies for coverage, Cross layer issues. Energy efficient and robust routing, Metric based approaches, Routing with diversity,Multipath routing, Energy aware routing.

UNIT IV: Distributed detection and estimation in sensor networks.

UNIT V: Data centric networking, Data centric routing, Data gathering with compression, Querying, Data centric storage and retrieval.

Text Books:

1. Networking wireless sensor nodes, B Krishnamachari, Cambridge University Press, New York2005.
2. Wireless sensor networks: An information processing approach, F Zhao, L J Guibas, MorganKaufman Publishers/ Elsevier, New Delhi 2004.

Reference Books

1. Sabrie Soloman, SENSORS HANDBOOK by Mc Graw Hill publication.
2. Feng Zhao, Leonidas Guibas, Wireless Sensor Networks, Elsevier Publications.
3. Kazem Sohrby, Daniel Minoli, Wireless Sensor Networks: Technology, Protocols andApplications, Wiley-Inderscience
4. Philip Levis, And David Gay Tinyos Programming by Cambridge University Press.

Course Outcomes:

After completing this course the students should:

1. Understand and explain common wireless sensor node architectures.
2. Be able to carry out simple analysis and planning of WSNs.
3. Demonstrate knowledge of MAC protocols developed for WSN.
4. Demonstrate knowledge of routing protocols developed for WSN.
5. Understand and explain mobile data-centric networking principles.
6. Be familiar with WSN standards.