COURSE STRUCTURE

&

SYLLABUS
(3rd – 8th SEMESTER)

FOR B.TECH PROGRAMME
IN
COMPUTER SCIENCE & ENGINEERING

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY ORISSA, ROURKELA

2007 - 2008
## COURSE STRUCTURE
### SECOND YEAR B.TECH PROGRAMME
### COMPUTER SCIENCE & ENGINEERING

### 3rd Semester

<table>
<thead>
<tr>
<th>Theory</th>
<th>ContactHrs.</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSCM 2201 Mathematics - III</td>
<td>L-T-P 3-1-0</td>
<td>4</td>
</tr>
<tr>
<td>BENG 1208 Fluid Mechanics &amp; Hydraulic Machines / CPES 5201 Network Theory or BENG 1201 Electrical Machines</td>
<td>3-1-0</td>
<td>4</td>
</tr>
<tr>
<td>BSCP 2201 Physics - II</td>
<td>3-0-0</td>
<td>3</td>
</tr>
<tr>
<td>BSCP 2202 Physics of Semiconductor Devices / BSCC 2201 Chemistry - II / BSCC 2202 Material Sciences</td>
<td>3-0-0</td>
<td>3</td>
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<tr>
<td>BCSE 3201 Object Oriented Programming</td>
<td>3-0-0</td>
<td>3</td>
</tr>
<tr>
<td>HSSM 4201 Engineering Economics &amp; Costing or HSSM 4202 Organisational Behaviour</td>
<td>3-0-0</td>
<td>3</td>
</tr>
<tr>
<td>CPES 5202 Analog Electronics Circuit</td>
<td>L-T-P 3-1-0</td>
<td>4</td>
</tr>
</tbody>
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**Total** 21

<table>
<thead>
<tr>
<th>Practicals/Sessionals</th>
<th>Contact Hrs.</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>BENG 9202 Basic Electronics Laboratory or BENG 9201 Basic Electrical Engineering Laboratory or BCSE 9201 Computer Lab (OOP)</td>
<td>0-0-3</td>
<td>2</td>
</tr>
<tr>
<td>BENG 9203 Mechanical Engineering Lab. or CPES 9201 Network &amp; Devices Laboratory</td>
<td>0-0-3</td>
<td>2</td>
</tr>
<tr>
<td>CPES 9202 Analog Electronics Laboratory</td>
<td>0-0-3</td>
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**Total** 8

### 4th Semester

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<tr>
<td>BSCM 2202 Mathematics - IV</td>
<td>L-T-P 3-1-0</td>
<td>4</td>
</tr>
<tr>
<td>BENG 1201 Electrical Machines or CPES 5201 Network Theory / BENG 1208 Fluid Mechanics &amp; Hydraulic Machines</td>
<td>3-1-0</td>
<td>4</td>
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<tr>
<td>BSCC 2201 Chemistry - II / BSCC 2202 Material Sciences</td>
<td>3-0-0</td>
<td>3</td>
</tr>
<tr>
<td>BSCP 2201 Physics - II or BSCP 2202 Physics of Semiconductor Devices / BENG 9203 Mechanical Engineering Lab. or CPES 9203 Digital Electronics Laboratory</td>
<td>3-0-0</td>
<td>3</td>
</tr>
<tr>
<td>BCSE 3202 Relational Database Management System</td>
<td>3-0-0</td>
<td>3</td>
</tr>
<tr>
<td>HSSM 4202 Organisational Behaviour or HSSM 4201 Engineering Economics &amp; Costing</td>
<td>3-0-0</td>
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<td>CPES 9201 Network &amp; Devices Laboratory or BENG 9203 Mechanical Engineering Lab.</td>
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**L-Lecture**

**T-Tutorial**

**P-Practical**
Module - I (9 Lectures)
Partial differential equations: The vibrating string. The wave equation & its solution.
The Heat equation and its solution

Module - II (10 Lectures)
Two-dimensional wave equation and its solution.
Laplace equation in polar, cylindrical and spherical coordinates. Potential.

Module - III (13 Lectures)
Complex analysis: Complex numbers and functions conformal mappings
Complex integration. Cauchy’s Theorem Cauchy’s integral formulas.

Module - IV (8 Lectures)
Taylor’s and Laurent’s series, Residue theorem, evaluation of real integrals.

The Course covered by: Advance Mathematics by E. Kreyszig, John Wiley & Son’s (P) Ltd. (8th Edition)
Chapter 11 (except 11.6)
Chapter 12, 13, 14, 15

BENG 1208 - FLUID MECHANICS AND HYDRAULIC MACHINE (3-1-0)
Module – I (12 hours)
Introduction: Scope of fluid mechanics and its development as a science
Physical property of Fluid
Density, specific gravity, specific weight, specific volume, surface tension and capillarity, viscosity,
compressibility and bulk modulus, Fluid classification.

Fluid static
Pressure, Pascal’s Law, Pressure variation for incompressible fluid, atmospheric pressure, absolute
pressure, gauge pressure and vacuum pressure, monometer.
Hydrostatic process on submerged surface, force on a horizontal submerged plane surface, force on
a vertical submerged plane surface.

Module – II (12 hours)
Buoyancy and flotation, Archimedes’ principle, stability of immersed and floating bodies, determination
of metacentric height.
particles, flow rate and continuity equation, differential equation of continuity.
Fluid dynamics: Introduction, Euler’s equation along a streamline, energy equation, Bernoulli’s
equation, Analysis of finite control volumes and its application to siphon, venture meter, orifice meter

Module – III (6 hours)
Turbine: Classification, reaction, Impulse, outward flow, inward flow and mixed flow turbines, Francis
& Kaplan turbines, Pelton wheel, Physical description and principle of operation, Governing of
Turbine.

Module – IV (8 hours)
Centrifugal Pump: Principles of classification, Blade angles, Velocity triangle, efficiency, specific
speed, characteristics curve.
Reciprocating Pump: Principles of working, slip, work done, effect of acceleration and frictional
resistance, separation.
TEX BOOKS
1. Fluid Mechanics, A.K. Mohanty, PHI
3. Fluid Mechanics, Modi & Seth

CPES 5201 NETWORK THEORY (3-1-0)

MODULE - I

Topological description of networks; Reviews of mesh & nodal analysis. Reciprocity & Millman’s theorem, Maximum power transfer theorem.
Q factor, Bandwidth and Selectivity in Series & parallel resonance Circuits.
Coupled Circuits : Dot Convention for representing coupled circuits, coefficient of coupling.
Loop Analysis of coupled circuits, single and double tuned coupled circuits Transiet study in RLC networks by Laplace transform method with DC and AC excitation.
Response to step, impulse and ramp inputs S - domain circuits
Two Port networks : Z, Y, h, & ABCD representation of T and TT2 - port networks both in transmission parameters T - TT networks, 2 port network, Cascade and Parallel Connections.
Image and iterative impedances.

MODULE - II

Network Functions & Responses :
Concept of complex frequency, driving point and transfer functions for one port and two network, poles & zeros of network functions, Restriction on Pole and Zero locations of network function.
Impulse response and complete response. Time domain behaviour form pole-zero plot.
Problems in Optimizing power transfer; Insertion loss.

MODULE - III

Fourier Series & Fourier Transforms : Fourier Series representation of non sinusoidal waves. Discrete spectra, rms values of non sinusoidal waves, Steady state response of linear circuits to non sinusoidal waves, power in such circuits. Fourier Internal and Fourier transform of signum and step functions. Applications to RL and RC circuits.
Network Synthesis :
Driving point functions, properties of positive real function.

MODULE - IV (8 Hours)


TEXT BOOKS
1. Network Analysis : M.E Van Valkenbrg
REFERENCE BOOKS

1. A Course in Electrical Circuits and Analysis : M. L. Soni, J. C. Gupta
2. Network Synthesis : M. E. Van Valkenberg
3. Electrical Networks : Alexander & Sadiku

BENG 1201 ELECTRICAL MACHINES (3-1-0)

Module I (10 Lectures)

D.C Mechanics :
D.C Generator – construction and principle of operation, E.M.F. equation ; types of generator; no load and load characteristics; Voltage build-up of shunt Generator; voltage regulation, Application.
D.C Motor –construction and principle of operation ; back E.M.F; torque and speed equations; characteristics and performance curves; speed control of series and shunt motors; motor starters; industrial application.
Losses and Efficiency of D.C machines.

Module II (10 Lectures)

Transformer:  
Single phase – construction and principle of operation; E.M.F. equation; Phasor diagram; actual and approximate equivalent circuits; open and short circuit tests, voltage regulation; losses and efficiency.  
Three Phase – Construction and principle of operation; connection of three single –phase units in wye, delta, open delta configurations; Autotransformer; conventional transformer connected as Autotransformer. Special Transformers – induction heating and high impedance and high frequency transformer.

Module III (10 Lectures)

Synchronous Machines :
Three- phase alternators – construction and principle of operation; E.M.F. equation; distribution and pitch factors; Synchronous reactance; performance of alternators on no-load and load; Phasor diagram; voltage regulation, power calculations of turbine and hydro-generators.; synchronization of a generator.
Three-Phase Synchronous Motor- construction and principle operation; V- curves; Phasor diagram; methods of starting; applications.

Module IV (10 Lectures)

Three-Phase induction Motor- construction of slip ring and squirrel cage type induction motors; Phasor diagram and equivalent circuit; torque-slip characteristics; maximum torque calculations; open and short-circuit tests; losses and efficiency; starting of induction motors; speed control; Induction generator.
Single-Phase Induction Motor- construction and principle of operation; capacitor- start and capacitor-run motors; Universal motor; Stepper motors.

Books :
This one semester Physics course is divided into four units. The unit - I deals with some aspects of nuclear physics, unit - II introduces certain features of condensed matter physics, unit - III deals with certain aspects of semiconductors and superconductors and unit - IV introduces Opto-electronic devices and fibre-optic communication system.

**Unit - 1**

This unit covers the basic principles and applications of different types of accelerators and their important applications.

**Detailed constructional features of accelerators are not necessary.**

1. Need for nuclear accelerators.
3. RF accelerators : Linear accelerator, cyclotron, electron accelerator, betatron.

**Unit - 2**

This Unit deals with diffraction in crystals and its role in determining crystal structure.

Study of crystal structure by diffraction methods, Bragg’s condition for crystal diffraction, Lau condition, Miller indices, Reciprocal lattice, Geometrical structure factor, Atomic form factor.

**Unit - 3**

This unit deals with certain features of semiconductors and superconductors.

2. Superconductivity : Superconductors and their properties, Meisner effect, Type - I and Type - II Superconductors, Thermodynamic properties of superconductors, London equation, Application of superconductors.

**Unit - 4**

This unit introduces some Opto - electronic devices and fibre - optic communication system.


LED : Principle construction of operation and application, Introduction to fibre optics, basic characteristics of optical fibres, optical fibre communication system.

**Books Recommended**

1. Nuclear Physics, P. R. Roy & B. P. Nigan
2. Particle Accelerators, M. S. Livingston & J. P. Blewett
3. Concepts of Modern Physics, A. Beiser
4. Introduction to Solid State Physics, C. Kittel
5. Introduction to Lasers, A. Avadhnu
Module I

An appreciation of Quantum Mechanics in determining electrical properties of semiconductor.

The Semiconductor in Equilibrium:
Equilibrium distribution of electrons & holes, the n0 and p0 equation, intrinsic carrier concentration; Dopant atoms and energy levels, ionization energy; the extrinsic semiconductor, the n0 p0 product, position of Fermi-energy level, variation of EF with doping concentration and temperature.

Carrier Transport Phenomena:
Carrier drift: mobility, conductivity, velocity saturation;
Carrier Diffusion: Diffusion current density. Total current density. The Einstein relation.

Module II

Non-equilibrium Excess Carrier in Semiconductor
Excess carrier generation and recombination, characteristics of excess carriers-continuity equation and time - dependent Diffusion equation. Ambipolar Transport – Derivation of equation and applications.

The Pn junction and Diode
Basic structure, built-in potential barrier, Electric field, space charge width; Reverse applied bias-space charge width and Electric field. Junction capacitances.
Pn junction Diode: Ideal – current voltage relationship, Minority Carrier distribution, Ideal Pn junction currents under forward and reverse bias.

Module III

Pn junction diode (contd.):
Temperature effects, Small signal model of Pn junction, Equivalent circuits Recombination Current. Junction Breakdown.

Metal-Oxide- Semiconductor FET (MOSFET)
The MOS structure: Energy band diagrams, Depletion Layer thickness, Work function difference, Flat band Voltage, Threshold Voltage, Charge distribution, Capacitance –Voltage characteristics.

The basic MOSFET operation, Current –Voltage relation (Concepts)
Frequency limitation : Small signal Equivalent circuit.
The CMOS Technology.

Module IV

The Bipolar Transistor

Text Book:
1. Semiconductor Physics and Devices- Basic Principles BY Donald A. Neamen, 3rd Edition, Tata McgrawHill Edition. (Selected portion from chapters 2,4,6,7,8,10 &11.)
For additional reading

BSCC 2201 CHEMISTRY - II (3-0-0)

Module I (12 Lectures)
(To develop awareness about Water Treatment)

Water quality parameters and standards.


Module II (16 Lectures)
(To develop the basic concepts about the transition metal compounds and corrosion)

1. Corrosion:
   Dry and wet corrosion, Galvanic Corrosion, Stress Corrosion, Factors affecting corrosion, Corrosion Control : (Proper design and fabrication procedure, Cathodic protection, Passivation).

2. Polymers:

Module III (10 Lectures)
(To introduce the students about the basic concepts of fuels)

1. Fuels:
   Classification of fuels, calorific value, Analysis of Coal and Coke, Refining of Crude oil, Fractional distillation, Cracking, Knocking and antiknocking, Octane and Cetane number.
   Gaseous Fuel : Producer gas, Water gas, LPG & CNG.
   Combustion Calculation.

Module IV (10 Lectures)
(To develop awareness amongst the students about the importance of water quality in domestic and industrial world and concepts of various kinds of pollutions)

1. Water Treatment:
   Water quality parameters and standards, treatment of water for industrial and domestic purpose.

2. Environment pollution:
   Green house effect, acid rain, depletion of ozone layer; Water pollution- bio chemical effect of lead, arsenic, mercury and fluorides, sewage-B.O.D. and C.O.D.
Books:
2. Organic Chemistry by Solomons and Fryhle, Wiley Publishing
3. Guide to Organic Reaction Mechanism by Peter Sykes
4. Concise Inorganic Chemistry by J. D. Lee, 4th/5th Ed. ELBS

BSCC 2202 MATERIAL SCIENCES (3-0-0)

MODULE - I (10 Lectures)

MODULE - II (10 Lectures)
5. Dielectric Materials: Microscopic Displacement of atoms and molecules in an external dc electric field, Polarization and dielectric constant, Dielectric susceptibility. Temperature dependence, Dielectric Breakdown. Ferro electric material Piezoelectrics, Pyroelectric properties. Dielectric Materials as electrical isolators.

MODULE - III (10 Lectures)
9. Ceramics: Types, Structure, Mechanical properties, applications
MODULE - IV (10 Lectures)


Text Books:
2. Vijaya M. S., Rangarajan G, Materials Science, TMH
3. Rajendra V., Marikani A., Materials Science, TMH
4. Van Vlack L. H., Elements of Material Science and Engineering, Addison Wesley
5. Material Science, Raghavan
6. Processes and Material of manufacture: Lindberg, PHI.

BCSE 3201 OBJECT ORIENTED PROGRAMMING USING C++ (3-0-0)

Module I
Introduction to object oriented programming, user defined types, polymorphism, and encapsulation. Getting started with C++ - syntax, data-type, variables, strings, functions, exceptions and statements, namespaces and exceptions, operators. Flow control, functions, recursion. Arrays and pointers, structures.

Module II
Abstraction mechanisms: Classes, private, public, constructors, member functions, static members, references etc. Class hierarchy, derived classes. Inheritance: simple inheritance, polymorphism, object slicing, base initialization, virtual functions.

Module III
Prototypes, linkages, operator overloading, ambiguity, friends, member operators, operator function, I/O operators etc. Memory management: new, delete, object copying, copy constructors, assignment operator, this input/output. Exception handing: Exceptions and derived classes, function exception declarations, Unexpected exceptions, Exceptions when handling exceptions, resource capture and release etc.

Module IV
Templates and Standard Template library: template classes, declaration, template functions, namespaces, string, iterators, hashes, iostreams and other type. Design using C++ design and development, design and programming, role of classes.

Text Books:
1. Bhave & Patekar- Object oriented Programming with C++, Pearson Education
3. Robert Lafore- Object oriented programming in Microsoft C++.
4. Balguru Swamy-C++, TMH publication

**HSSM 4201 ENGINEERING ECONOMICS AND COSTING (3-0-0)**

**Module I**

(10 hours)

Time value of money : Simple and compound interest, Time value equivalence, Compound interest factors, Cash flow diagrams, Calculation, Calculation of time –value equivalences.

Present worth comparisons, Comparisons of assets with equal, unequal and infinite lives, comparison of deferred investments, Future worth comparison, pay back period comparison.

**Module II**

(10 hours)

Use and situations for equivalent annual worth comparison, Comparison of assets of equal and unequal life. Rate of return, Internal rate of return, comparison of IIR with other methods, IRR misconceptions. Analysis of public Projects : Benefit/ Cost analysis, quantification of project, cost and benefits, benefit/ cost applications, Cost –effectiveness analysis.

**Module III**

(10 hours)

Depreciation, Computing depreciation charges, after tax economic comparison, Break-even analysis; linear and non-linear models. Sensitivity analysis: single and multiple parameter sensitivity.

**Module IV**

(12 hours)


**Text Book**

1. Horn green, C.T., Cost Accounting, Prentice Hall of India

**HSSM 4202 ORGANIZATIONAL BEHAVIOUR (3-0-0)**

**Module I**

(8 hours)


Learning – Nature of Learning, How Learning occurs, Learning and OB.

Case Analysis

**Module II**

(10 hours)

Foundations of Individual Behaviour : Personality – Meaning and Definition, Determinants of Personality, Personality Traits, Personality and OB.

Case Analysis

Module III


Case Analysis

Module IV


Case Analysis

TEXTBOOKS:
Keith Davis, Organizational Behaviour, McGraw – Hill.

REFERENCE BOOKS:
Stephen P. Robbins, Organizational Behaviour, Prentice Hall of India.

CPES 5202 ANALOGUE ELECTRONICS CIRCUITS (3-1-0)

MODULE - I

1. DC biasing of BJTs and FETs: Load lines, Operating Point, Fixed bias and Voltage - divider bias. DC bias with voltage feedback. Bias stabilization. Design of bias.

MODULE - II

5. BJT and JFET Frequency Response: General frequency considerations. Low-frequency analysis of R-C combination in single stage BJT or FET amplifier - Bode Plot. Lower Curt Off frequency for the system. Low frequency response of BJT and FET amplifiers. Miller Effect.
Capacitance. High - frequency modelling of BJT and FET. High frequency analysis of BJT and FET amplifiers - Bode plot. Square Wave testing of amplifiers.

MODULE - III
(14 hours)


MODULE - IV
(8 hours)


TEXT BOOK

SUPPLEMENTARY BOOKS :
4. Electronic Devices and Circuits By David A. Bell, 4th Edition, PHI.

PRACTICAL
BENG 9202 BASIC ELECTRONICS LABAROTARY (0-0-3)
(At least 8 experiments including 1 - 7 and any one from 8 - 10)

1. Familiarity with electronics components and Devices
   Testing of a semiconductor Diode and a Transisitor. IC pins connection (Digital Multimeter should be used should be used in testing components and devices).

2. Study and use of Oscilloscope to view waveforms and measure its amplitude and frequency.


4. Half wave and Full wave rectifiers without and with capacitor filter. Record of waveforms, Measurement of Average and rms values.

5. V - I Characteristics of anpn or pnp transistor. DC Biasing and measurement of dc voltages and currents.

7. Op amp in Inverting, non inverting, Integrating and Differentiating configuration, Record of wave forms.
8. Truth Tables of logic gates.
9. Study and experiment using MUX - DEMUX ICs / Shift Register IC.
10. Study on CMOS logic Inverter.

**BENG 9201 BASIC ELECTRICAL ENGINEERING LABORATORY (0-0-3)**

List of Experiment (Any 8 of the following)
1. Study and measurement the armature and field resistance of a DC machine.
2. Calibration of ammeter, voltmeter and wattmeter with the help of sub-standard instrument.
3. Verification of circuit theorems. Thevenin’s and Superposition theorems (with DC source only).
4. Voltage-current characteristics of incandescent lamps and fusing time-current characteristics of fuse wire.
5. Measurement of current, voltages and power in R-L-C series circuit excited by Single Phase AC supply.
6. Connection and starting of a three phase induction motor using direct online (DOL). or star-delta starter.
7. Connection and measurement of power consumption of a fluorescent lamp.
8. Determination of open circuit characteristics (OCC) of DC machine.
10. Connection and testing of a single phase energy meter (unity power factor load only)
11. Study of fan motor

**BCSE 9201 OOP WITH C++ LABORATORY (0-0-3)**

(10 classes for 10 different programs)
1. Programs on concept of classes and objects.(1 class)
2. Programs using inheritance.(1 class)
3. Programs using polymorphism.(1 class)
4. Programs on use of operator overloading.(1 class)
5. Programs on use of memory management.(1 class)
6. Programs on exception handling and use of templates.( 1 class)
7. Programs on File handling in C++.(1 class)

**BENG 9203 MECHANICAL ENGINEERING LABORATORY (0-0-3)**

Group A (Mechanics / Material Testing Lab.
1. Determination of equilibrium of coplanar forces.
2. Determination of Moment of Inertia of Flywheel
Group B
4. Determination of Metacentric Height and application to stability of floating bodies.
5. Verification of Bernoulli’s Theorem and its application to Venturimeter.

Group C
7. Calibration of Bourden Type Pressure gauge and measurement pressure using manometers.
8. Study of Cut-Sections of 2 stroke and 4 stroke Diesel Engine.

CPES 9201 NETWORK DEVICES LABAROTARY (0-0-3)

1. Verification of Network Theorems
3. Determination of parameters of a 2 port network Z, Y, h and ABCD parameters.
5. Study of a transformer as a coupled circuit and determination of its self and mutual inductance.
6. Response of single of double tuned coupled circuits.
7. Spectral analysis of a non-sinusoidal wave form.

CPES 9202 ANALOG ELECTRONICS CIRCUIT LABORATORY (0-0-3)

List of Experiments
(At least 10 out of 12 experiments should be done)
1. BJT Bias circuit –Design, construction & test
4. Design, Build and test of BJT emitter-follower-D.C and A.C performance voltage gain, input impedance and output impedance investigated.
6. Frequency response of a common-emitter amplifier: low frequency, high frequency and mid frequency response.
7. feed back amplifiers: series and shunt feedback types- input and output impedance and A.C gain with and without feedback.
10. OP-Amp Frequency Response and Compensation.
Module - I
Solution of equations by iteration, Newton’s method, Secant method, Interpolation
Numerical integration and differentiation

Module - II
Gauss Siedel iteration method for solving a system of linear equations, Ruage Kutta Methods,
Introductory Linear Programming, Introductory Programming

Module - III
Probability, Random variables, Probability distribution, mean & variance of distribution
Binomial, Poisson, hyper-geometric and normal distributions

Module - IV
Random sampling, estimation of parameters, confidence intervals, Testing of hypothesis, acceptance
sampling, correlation and regression

Course covered by: Advance Mathematics by E. Kreyszig (8th Edition)
Chapter 17 (17.1 - 17.3, 17.5), Chapter 18 (18.4), Chapter 19 (19.1), Chapter 20, Chapter 21, Chapter 22

BENG 1208 - FLUID MECHANICS AND HYDRAULIC MACHINE (3-1-0)

Module – I
Introduction: Scope of fluid mechanics and its development as a science
Physical property of Fluid
Density, specific gravity, specific weight, specific volume, surface tension and capillarity, viscosity,
compressibility and bulk modulus, Fluid classification.

Fluid static
Pressure, Pascal’s Law, Pressure variation for incompressible fluid, atmospheric pressure, absolute
pressure, gauge pressure and vacuum pressure, monometer.
Hydrostatic process on submerged surface, force on a horizontal submerged plane surface, force on
a vertical submerged plane surface.

Module – II
Buoyancy and flotation, Archimedes’ principle, stability of immersed and floating bodies, determination
of metacentric height.
particles, flow rate and continuity equation, differential equation of continuity.
Fluid dynamics: Introduction, Euler’s equation along a streamline, energy equation, Bernoulli’s
equation, Analysis of finite control volumes and its application to siphon, venture meter, orifice meter

Module – III
Turbine: Classification, reaction, Impulse, outward flow, inward flow and mixed flow turbines, Francis
& Kaplan turbines, Pelton wheel, Physical description and principle of operation, Governing of
Turbine.

Module – IV
Centrifugal Pump: Principles of classification, Blade angles, Velocity triangle, efficiency, specific
speed, characteristics curve.
Reciprocating Pump: Principles of working, slip, work done, effect of acceleration and frictional
resistance, separation

Text Books
1. Fluid Mechanics, A.K. Mohanty, PHI
3. Fluid Mechanics, Modi & Seth
CPES 5201 NETWORK THEORY (3-1-0)

MODULE - I (12 hours)

Topological description of networks; Reviews of mesh & nodal analysis. Reciprocity & Millman’s theorem, Maximum power transfer theorem.
Q factor, Bandwidth and Selectivity in Series & parallel resonance Circuits.
Coupled Circuits : Dot Convention for representing coupled circuits, coefficient of coupling.
Loop Analysis of coupled circuits, single and double tuned coupled circuits Transiet study in RLC networks by Laplace transform method with DC and AC excitation.
Response to step, impulse and ramp inputs S - domain circuits
Two Port networks : Z, Y, h, & ABCD representation of T and TT2 - port networks both in transmission parameters T - TT networks, 2 port network, Cascade and Parallel Connections.
Image and iterative impedances.

MODULE - II (12 hours)

Network Functions & Responses :
Concept of complex frequency, driving point and transfer functions for one port and two network, poles & zeros of network functions, Restriction on Pole and Zero locations of network function. Impulse response and complete response. Time domain behaviour form pole-zero plot.
Problems in Optimizing power transfer; Insertion loss.

MODULE - III (10 hours)

Fourier Series & Fourier Transforms : Fourier Series representation of non sinusoidal waves. Discrete spectra, rms values of non sinusoidal waves, Steady state response of linear circuits to non sinusoidal waves, power in such circuits. Fourier Internal and Fourier transform of signum and step functions. Applications to RL and RC circuits.
Network Synthesis :
Driving point functions, properties of positive real function.

MODULE - IV (8 hours)


TEXT BOOKS

1. Network Analysis : M.E Van Valkenbrg

REFERENCE BOOKS :

1. A Course in Electrical Circuits and Analysis : M. L. Soni, J. C. Gupta
2. Network Synthesis : M. E. Van Valkenberg
3. Electrical Networks : Alexander & Sadiku
Module I (12 Lectures)
(To develop awareness about Water Treatment)
Water quality parameters and standards.
Hardness of Water: Types of hardness, Units of hardness, Determination of hardness.
Disadvantages of hard water, acidity and alkalinity, Water Softening Techniques. Boiler feed water, Water for Domestic purposes (municipal / Drinking Water)

Module II (10 Lectures)
(To develop the basic concepts about the transition metal compounds and corrosion)
1. Corrosion:
   Dry and wet corrosion, Galvanic Corrosion, Stress Corrosion, Factors affecting corrosion,
   Corrosion Control: (Proper design and fabrication procedure, Cathodic protection, Passivation).
   (8 Lectures)

2. Polymers:
   (8 Lectures)

Module III (10 Lectures)
(To introduce the students about the basic concepts of fuels)
1. Fuels:
   Classification of fuels, calorific value, Analysis of Coal and Coke, Refining of Crude oil, Fractional distillation, Cracking, Knocking and antiknocking, Octane and Cetane number.
   Gaseous Fuel: Producser gas, Water gas, LPG & CNG.
   Combustion Calculation.

Module IV (10 Lectures)
(To develop awareness amongst the students about the importance of water quality in domestic and industrial world and concepts of various kinds of pollutions)
1. Water Treatment:
   Water quality parameters and standards, treatment of water for industrial and domestic purpose.
2. Environment pollution:
   Green house effect, acid rain, depletion of ozone layer; Water pollution- bio chemical effect of lead, arsenic, mercury and fluorides, sewage-B.O.D. and C.O.D.

Books:
2. Organic Chemistry by Solomons and Fryhle, Wiley Publishing
3. Guide to Organic Reaction Mechanism by Peter Sykes
4. Concise Inorganic Chemistry by J. D. Lee, 4th/5th Ed. ELBS
BSCC 2202 MATERIAL SCIENCES (3-0-0)

MODULE - I (10 Lectures)

MODULE - II (10 Lectures)
5. Dielectric Materials : Microscopic Displacement of atoms and molecules in an external dc electric field, Polarization and dielectric constant, Dielectric susceptibility. Temperature dependence, Dielectric Breakdown. Ferro electric material Piezoelectrics, Pyroelectrics, Dielectric Materials as electrical isolators.

MODULE - III (10 Lectures)
Plastics - Types : Thermosetting and thermoplastics. Transfer moulding, injection moulding, extension moulding, Blow moulding, Welding of plastics; Rubber types, application.
9. Ceramics : Types, Structure, Mechanical properties, applications

MODULE - IV (10 Lectures)

Text Books :
2. Vijaya M. S., Rangarajan G, Materials Science, TMH
3. Rajendra V., Marikani A., Materials Science, TMH
4. Van Vlack L. H., Elements of Material Science and Engineering, Addison Wesley
5. Material Science, Raghavan
6. Processes and Material of manufacture : Lindberg, PHI.
This one semester Physics course is divided into four units. The unit - I deals with some aspects of nuclear physics, unit - II introduces certain features of condensed matter physics, unit - III deals with certain aspects of semiconductors and superconductors and unit - IV introduces Opto-electronic devices and fibre-optic communication system.

Unit - 1
This unit covers the basic principles and applications of different types of accelerators and their important applications.

**Detailed constructional features of accelerators are not necessary.**
1. Need for nuclear accelerators.
3. RF accelerators : Linear accelerator, cyclotron, electron accelerator, betatron.

Unit - 2
This Unit deals with diffraction in crystals and its role in determining crystal structure.
Study of crystal structure by diffraction methods, Bragg’s condition for crystal diffraction, Lau condition, Miller indices, Reciprocal lattice, Geometrical structure factor, Atomic form factor.

Unit - 3
This unit deals with certain features of semiconductors and superconductors.
2. Superconductivity : Superconductors and their properties, Meisner effect, Type - I and Type - II Superconductors, Thermodynamic properties of superconductors, London equation, Application of superconductors.

Unit - 4
This unit introduces some Opto - electronic devices and fibre - optic communication system.
LED : Principle construction of operation and application, Introduction to fibre optics, basic characteristics of optical fibres, optical fibre communication system.

**Books Recommended :**
1. Nuclear Physics, P. R. Roy & B. P. Nigan
2. Particle Accelerators, M. S. Livingston & J. P. Blewett
3. Concepts of Modern Physics, A. Beiser
4. Introduction to Solid State Physics, C. Kittel
5. Introduction to Lasers, A. Avadhnu

**BSCP 2202 PHYSICS OF SEMICONDUCTOR DEVICES (3-0-0)**

Module I (9 Hours)
An appreciation of Quantum Mechanics in determining electrical properties of semiconductor.
The Semiconductor in Equilibrium:
Equilibrium distribution of electrons & holes, the n0 and p0 equation, intrinsic carrier concentration; donor and acceptor atoms and energy levels, ionization energy; the extrinsic semiconductor, the n0 p0 product, position of Fermi-energy level, variation of EF with doping concentration and temperature.

Carrier Transport Phenomena:
Carrier drift: mobility, conductivity, velocity saturation.
Carrier Diffusion: Diffusion current density. Total current density. The Einstein relation.

Module II (9 hours)
Non-equilibrium Excess Carrier in Semiconductor
Excess carrier generation and recombination, characteristics of excess carriers-continuity equation and time – dependent Diffusion equation. Ambipolar Transport – Derivation of equation and applications.

The Pn junction and Diode
Basic structure, built-in potential barrier, Electric field, space charge width; Reverse applied bias-space charge width and Electric field. Junction capacitances.
Pn junction Diode : Ideal – current voltage relationship, Minority Carrier distribution, Ideal Pn junction currents under forward and reverse bias.

Module III (9 hours)
Pn junction diode (contd.):
Temperature effects, Small signal model of Pn junction, Equivalent circuits Recombination Current. Junction Breakdown.

Metal-Oxide- Semiconductor FET (MOSFET)
The MOS structure : Energy band diagrams, Depletion Layer thickness, Work function difference, Flat band Voltage, Threshold Voltage, Charge distribution, Capacitance – Voltage characteristics.
The basic MOSFET operation, Current – Voltage relation (Concepts)
Frequency limitation : Small signal Equivalent circuit.
The CMOS Technology.

Module IV (8 hours)
The Bipolar Transistor

Text Book:
1. Semiconductor Physics and Devices- Basic Principles BY Donald A. Neamen, 3rd Edition, Tata Mcgraw-Hill Edition. (Selected portion from chapters 2,4,6,7,8,10 &11.)
For additional reading


BCSE 3202 RELATIONAL DATABASE MANAGEMENT SYSTEMS (3-0-0)

Module I
(10 hours)
Database System Architecture - Data Abstraction, Data Independence, Data Definitions and Data Manipulation Languages.
Data models - Entity Relationship(ER), Mapping ER Model to Relational Model, Network .Relational and Object Oriented Data Models, Integrity Constraints and Data Manipulation Operations.

Module II
(10 hours)
Relation Query Languages, Relational Algebra, Tuple and Domain Relational Calculus, SQL and QBE.
Relational Database Design: Domain and Data dependency, Armstrong’s Axioms, Normal Forms, Dependency Preservation, Lossless design, Comparison of Oracle & DB2

Module III
(8 hours)
Query Processing and Optimization: Evaluation of Relational Algebra Expressions, Query Equivalence, Join strategies, Query Optimization Algorithms.

Module IV
(12 hours)
Advanced topics: Object-Oriented and Object Relational databases. Logical Databases, Web Databases, Distributed Databases, Data Warehouse and Data Mining.

Text Books:-
2. C.J.Date - An introduction to Database Systems, Pearson Education

HSSM 4202 ORGANIZATIONAL BEHAVIOUR (3-0-0)

Module I
(8 hours)
Learning – Nature of Learning, How Learning occurs, Learning and OB.
Case Analysis

Module II
(10 hours)
Foundations of Individual Behaviour : Personality – Meaning and Definition, Determinants of Personality, Personality Traits, Personality and OB.
Case Analysis
Module III (12 hours)

An Introduction to Transactional Analysis (TA).

Case Analysis

Module IV (10 hours)

Case Analysis

TEXTBOOKS:
Keith Davis, Organizational Behaviour, McGraw – Hill.

REFERENCE BOOKS:
Stephen P. Robbins, Organizational Behaviour, Prentice Hall of India.

HSSM 4201 ENGINEERING ECONOMICS AND COSTING(3-0-0)

Module I (10 hours)
Time value of money: Simple and compound interest, Time value equivalence, Compound interest factors, Cash flow diagrams, Calculation, Calculation of time–value equivalences.

Present worth comparisons, Comparisons of assets with equal, unequal and infinite lives, comparison of deferred investments, Future worth comparison, pay back period comparison.

Module II (10 hours)
Use and situations for equivalent annual worth comparison, Comparison of assets of equal and unequal life. Rate of return, Internal rate of return, comparison of IIR with other methods, IRR misconceptions. Analysis of public Projects: Benefit/ Cost analysis, quantification of project, cost and benefits, benefit/ cost applications, Cost –effectiveness analysis.

Module III (10 hours)
Depreciation, Computing depreciation charges, after tax economic comparison, Break-even analysis; linear and non-linear models. Sensitivity analysis: single and multiple parameter sensitivity.

Module IV (12 hours)
Fixed and variable cost, Product and Process Costing, Standard Costing,
Cost estimation, Relevant Cost for decision making, Cost estimation, Cost control and Cost reduction techniques.

Text Book
1. Horn green, C.T., Cost Accounting, Prentice Hall of India

CPES 5203 DIGITAL ELECTRONICS CIRCUITS (3-1-0)

Module I
Number System and Codes
Binary Number base Conversations, Octal and Hexadecimal numbers, Complements, Signed Binary Numbers, Binary Codes- BCD Codes, Gray Code, ASCII Character Code, Codes for serial data transmission and storage.

Module II
Gate Level Minimization
The Map Method, K Maps, input five variables, Product of Sums Simplification, Don't care conditions. Nand and NOR implementation. AND –OR Invent, OR-AND Invent implementation, Ex-OR function, Parity generation and checking, Hardware Description Language (HDL).

Combinational Logic
Combinational Circuits, Analysis and Design Procedure; Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multipliers, HDL for Combinational Circuits.

Module III
Synchronous Sequential Logic

Registers and Counters
Shift Register, Ripple Counters, Synchronous Counters Asynchronous Counter, Ring Counters, Modulo-N Counters, HDL for Registers and Counters.

Module IV
Memory and Programmable Logic
Random Access Memory (RAM), Memory Decoding, Error detection and Correction, Read only Memory, Programmable Array Logic, Sequential Programmable Devices.

Register Transfer Levels
Register transfer level notion, Register transfer level in HDL, Algorithm, State Machine, Design Examples. HDL Description of Design, Examples, Binary Multiplier, HDL, Description of Binary Multiplier.

Digital Integrated Logic Circuits
RTL, DTL, TTL, ECL, MOS and CMOS logic circuits. Switch –lever-Modeling with HDL.
Text Book

PRACTICAL
BENG 9201 BASIC ELECTRICAL ENGINEERING LABORATORY (0-0-3)
List of Experiment (Any 8 of the following)
1. Study and measurement the armature and field resistance of a DC machine.
2. Calibration of ammeter, voltmeter and wattmeter with the help of sub-standard instrument.
3. Verification of circuit theorems. Thevenin’s and Superposition theorems (with DC source only).
4. Voltage-current characteristics of incandescent lamps and fusing time-current characteristics of fuse wire.
5. Measurement of current, voltages and power in R-L-C series circuit excited by Single Phase AC supply.
6. Connection and starting of a three phase induction motor using direct online (DOL). or star-delta starter.
7. Connection and measurement of power consumption of a fluorescent lamp.
8. Determination of open circuit characteristics (OCC) of DC machine.
10. Connection and testing of a single phase energy meter (unity power factor load only)
11. Study of fan motor

BENG 9202 BASIC ELECTRONICS LABAROTARY (0-0-3)
(At least 8 experiments including 1 - 7 and any one from 8 - 10)
1. Familiarity with electronics components and Devices
   Testing of a semiconductor Diode and a Transistor. IC pins connection (Digital Multimeter should be used should be used in testing components and devices).
2. Study and use of Oscilloscope to view waveforms and measure its amplitude and frequency.
4. Half wave and Full wave rectifiers without and with capacitor filter. Record of waveforms, Measurement of Average and rms values.
5. V - I Characteristics of anpn or pnp transistor. DC Biasing and measurement of dc voltages and currents.
7. Op amp in Inverting, non inverting, Integrating and Differentiating configuration, Record of wave forms.
8. Truth Tables of logic gates.
9. Study and experiment using MUX - DEMUX ICs / Shift Register IC.
10. Study on CMOS logic Inverter.

BCSE 9202 RDBMS LABORATORY (0-0-3)
(10 Classes for 10 Different Programs)
1. Use of SQL syntax : Insertion, Deletion, Join), Updation using SQL. (1 class)
2. Program segments in embedded SQL using C as host language to find average grade point of a student, etc.. (1 class)
3. Program for Log based data recovery technique. (1 class)
4. Program on data recovery using check point technique. (1 class)
5. Concurrency control problem using lock operations. (1 class)
6. Use of package (ORACLE) for programming approaches(2 classes)
7. Use of package (DB2) for programming approaches(2 classes)
8. Programs on JDBC/ODBC to print employee’s / student’s information of a particular department. (1 class)

**CPES 9201 NETWORK DEVICES LABAROTARY (0-0-3)**

1. Verification of Network Theorems
3. Determination of parameters of a 2 port network Z, Y, h and ABCD parameters.
5. Study of a transformer as a coupled circuit and determination of its self and mutual inductance.
6. Response of single of double tuned coupled circuits.
7. Spectral analysis of a non-sinusoidal wave form.

**BENG 9203 MECHANICAL ENGINEERING LABORATORY (0-0-3)**

**Group A (Mechanics / Material Testing Lab.)**
1. Determination of equilibrium of coplanar forces.
2. Determination of Moment of Inertia of Flywheel.

**Group B**
4. Determination of Metacentric Height and application to stability of floating bodies.
5. Verification of Bernoulli’s Theorem and its application to Venturimeter.

**Group C**
7. Calibration of Bourden Type Pressure gauj and measurement pressure using manometers.
8. Study of Cut-Sections of 2 stroke and 4 stroke Diesel Engine.

**CPES 9203 DIGITAL ELECTRONICS CIRCUITS LABORATORY (0-0-3)**

(10 experiments out of 13 should be done during the Semester)
1. Digital Logic Gates: Investigate logic behaviour of AND, OR, NAND, NOR, EX-OR, EX-NOR. Invert and Buffer gates, use of Universal NAND Gate.
2. Gate–level minimization: Two level and multi level implementation of Boolean functions
3. Combinational Circuits: design construct and test: address and subtractors, code converters, gray code to binary and 7 segment display.
4. Design, implement and test a given design example with (i) NAND Gates only (ii) XOR Gates only and (iii) Decide and NAND Gates.
5. Design with multi-plexers and de-multiplexers.
7. Shift Registers: Investigate the operation of all types of shift registers with parallel load. Design.
9. Memory Unit: Investigate the behaviour of RAM unit and its storage capacity – 16 X 4 RAM: testing, simulating and memory expansion.
10. Clock-pulse generator: design, implements and test.
12. Binary Multiplier: design and construct a circuit that multiplier 4-bit unsigned numbers to produce a 8-bit product.
13. Verilog HDL simulation of experiments: choose any from Sl No 3 to 12 and implement it.
## COURSE STRUCTURE
### THIRD YEAR B.TECH PROGRAMME
#### COMPUTER SCIENCE AND ENGINEERING

### 5th Semester

<table>
<thead>
<tr>
<th>Theory</th>
<th>ContactHrs.</th>
<th>Credit</th>
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<tbody>
<tr>
<td>HSSM 4301 Optimization Engineering</td>
<td>3-0-0</td>
<td>3</td>
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<tr>
<td>BCSE 3301 Design &amp; Analysis of Algorithms</td>
<td>3-0-0</td>
<td>3</td>
</tr>
<tr>
<td>BCSE 3308 Automata Theory</td>
<td>3-0-0</td>
<td>3</td>
</tr>
<tr>
<td>BCSE 3309 Computer Architecture</td>
<td>3-0-0</td>
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<td>&amp; Organization – I</td>
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<tr>
<td>BSCM 3301 Discrete Mathematical Structures</td>
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**Total** 16

### Practicals/Sessionals

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<tr>
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<tr>
<td>BCSE 9302 Design &amp; Analysis Algorithms Lab.</td>
<td>0-0-3</td>
<td>2</td>
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<tr>
<td>BCSE 9303 Computer &amp; Organization Lab.</td>
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**Total** 6

### 6th Semester

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<td>HSSM 4302 Production &amp; Operation Mgmt.</td>
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<tr>
<td>BCSE 3305 Operating Systems</td>
<td>3-0-0</td>
<td>3</td>
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<tr>
<td>BCSE 3306 Computer Networks</td>
<td>3-0-0</td>
<td>3</td>
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<tr>
<td>BCSE 3307 Computer Architecture</td>
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<td>&amp; Organization - II</td>
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<tr>
<td>CPEC 5302 Digital Signal Processing</td>
<td>3-1-0</td>
<td>4</td>
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<tr>
<td>Electives (Any one)</td>
<td>3-0-0</td>
<td>3</td>
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<tr>
<td>PECS 3301 Artificial Intelligence</td>
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<tr>
<td>CPEC 5308 Communication Engineering</td>
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<tr>
<td>PEBT 8301 Bioinformatics</td>
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**Total** 20

### Practicals/Sessionals

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<tr>
<td>BCSE 9304 Operating Systems Lab.</td>
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<tr>
<td>CPEC 9306 DSP Lab.</td>
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<tr>
<td>BCSE 9305 Project</td>
<td>0-0-3</td>
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**Total** 6

### L-Lecture T-Tutorial P-Practical

28
5th Semester

HSSM 4301 OPTIMIZATION IN ENGINEERING (3-0-0)

Course Objective: The course aims at acquainting the students to mathematical modeling of engineering design, operation and maintenance problems and their optimization algorithms.

Module – I (10 hours)
Formulation of engineering optimization problems: Decision variables, objective function and constraints. Example of typical design, operation and maintenance problems in engineering: Design of a water tank, design of a truss, design of a network (electrical, communication sewerage and water supply networks), product mix problem, transportation and assignment problems, shift scheduling of employees, design of reliable devices, design of reactors, shortest route problem, set covering problem, traveling salesman problems. Only physical problems and their mathematical models to be discussed.

Linear Programming Problem: Formulation, Graphical solution, Simplex method, Duality theory, Dual simplex method, Formulation and solution of engineering problems of planning and scheduling.

Module – II (10 hours)
Sensitivity Analysis, Transportation Problem, Assignment Problem, Network Models: Minimal Spanning Tree Problem, Maximal Flow Problem, Shortest Route Problem, Minimum Cost Flow Problem. Algorithms and applications to be covered.

Module – III (10 hours)

Module – IV (12 hours)
Queueing theory, Game theory, Simulation, Decision theory & Sequencing Problem

References:
4. B.E Gillett, Introduction to operations research, TMH

BCSE 3301 DESIGN & ANALYSIS OF ALGORITHMS (3-0-0)

Module – I
Introduction to design and analysis of algorithms, Growth of Functions (Asymptotic notations, standard notations and common functions), Recurrences, solution of recurrences by substitution, recursion tree and Master methods, worst case analysis of Merge sort, Quick sort and Binary search, Design & Analysis of Divide and conquer algorithms.

Heapsort:
Heaps, Building a heap, The heapsort algorithm, Priority Queue, Lower bounds for sorting.

Module – II
Dynamic programming algorithms (Matrix-chain multiplication, Elements of dynamic programming, Longest common subsequence)

Module – III
Data structure for disjoint sets: Disjoint set operations, Linked list representation, Disjoint set forests.
Graph Algorithms: Breadth first and depth-first search, Minimum Spanning Trees, Kruskal and Prim’s algorithms, single – source shortest paths (Bellman-ford and dijkstra’s algorithms).
Module – IV
Fast Fourier Transform, string matching (Rabin-Karp algorithm), NP – Completeness (Polynomial time, Polynomial time verification, NP – Completeness and reducibility, NP-Complete problems (without Proofs), Approximation algorithms (Traveling Salesman Problem).

Text Book

Chapters : 1,2,3,4 (excluding 4.4), 6,7,(7.4.1), 8(8.1)15(15.2,15.3,15.4), 16 (16.1,16.2,16.3), 21 (21.1,21.2,21.3), 22(22.2,22.3), 23,24(24.1,24.2,24.3) 30,31(31.1,31.2) 34,35(35.2)

BCSE 3308 AUTOMATA THEORY (3-0-0)

Module – I
Automata & Language; Context-free grammars,

Module – II
Pushdown automata, noncontext free languages Turing machines.

Module – III
Decidability, reducibility

Module – IV
Time complexity class P, class NP, NP completeness.

Text Book
Michael Sipser : Introduction to the theory of computation (Thomson)
Chapters : 1,2,3,4,5,7

Reference Books
Theory of computer Science (Automata Language & computations) K.L. Mishra N. Chandrashekhar PHI

BCSE 3309 COMPUTER ARCHITECTURE AND ORGANIZATION– I (3-0-0)

Module – I

Module – II
8085 Microprocessor Architecture: Instruction Sets, Addressing modes, Memory Interfacing, Assembly Language Programming.

Module – III
Arithmetic : Addition and subtraction of signed Numbers, Design of Fast Adders, Multiplication of positive Numbers, Signed-operand multiplication , Fast multiplication, Integer Division, Floating- point Numbers, (IEEE754 s…) and operations.

Module – IV
Basic Processing units: Fundamental concepts, execution of complete Instructions, Multibus organization, Hardwired control, Micro programmed control

Memory System: Basic Concepts, cache Memory, performance consideration, Virtual memories, Memory Management requirement, secondary storage.

Text Book
2. Microprocessor Architecture, Programming and application with 8085, R.S. Gaonkar
Reference Book :

1. Computer Organization and Design Hardware/ Software Interface: David A. Patterson, John L. Hennessy ELSEVIER.
5. Structured Computer Organisation A.S. Tanenbum, PHI

BSCM 3301 DISCRETE MATHEMATICAL STRUCTURES (3-1-0)

Module – I

Module – II
Basics of counting, the pigeonhole principle, generalized permutations and combinations, recurrence relations, solution of recurrence relations, generating functions, Inclusion - Exclusion, Applications of Inclusion-Exclusion, Relations and their properties, many relations representation & closures of relation, Equivalence relations, partial orderings.

Module – III
Introduction to graphs, graph terminology, representing graphs and graph isomorphism, connectivity, Erlong and Hamiltonian Paths, Planar graphs, graph coloring. Introduction to trees, Application of trees,

Module – IV
Semi groups, Monoids, Groups, Subgroups, Cosels and Lagrange’s theorem, Permutation groups, group codes, Isomorphisms, Homomorphism and normal subgroups, Rings, Integral domains and fields.
Lattices and algebraic systems, principle of duality, Basic Proportion, Distributive & complemented relation boolean lattices and Boolean algebras, Boolean function and Boolean expression, propositional calculus.

Text Books
3. Thomas Koshy – Discrete Mathematics and Application, ELSEVIER.

PRACTICALS

BCSE 9301 OPTIMIZATION LABORATORY (0-0-3)

1. Solving linear programming problems using a package (formulation, solution, sensitivity analysis etc)
2. writing small programmes to implement Hook and Jeeves algorithm, Nelder and Nead (Geometric Simplex Algorithm etc. in C, C ++ , Mat lab or any other programming language.
4. Introduction to simulated annealing and genetic algorithm
5. Formulation of some real life engineering problems as optimization problems

**BCSE 9302 DESIGN AND ANALYSIS OF ALGORITHM LAB. (0-0-3)**

All the problems have to be implemented either writing C programs or writing C++ programs

**Elementary Problems : (8 is compulsory and any four among the rest)**

1. Using a stack of characters, convert an infix string to a postfix string.
2. Implement polynomial addition using a single linked list
3. Implement insertion, deletion, searching of a BST, Also write a routine to draw the BST horizontally.
4. Implement insertion routine in an AVL tree using rotation.
5. Implement binary search and linear search in a program
6. Implement heap sort using a max heap.
7. Implement DFS/ BFS routine in a connected graph
8. Implement Dijkstra’s shortest path algorithm using BFS

**Greedy Algorithm (Any Two)**

1. Given a set of weights, form a Huffman tree from the weight and also find out the code corresponding to each weight.
2. Take a weighted graph as an input, find out one MST using Kruskal/ prim’s algorithm
3. Given a set of weight and an upper bound M – Find out a solution to the Knapsack problem

**Divide and Conquer Algorithm (any Two)**

1. Write a quick sort routine, run it for a different input sizes and calculate the time of running. Plot in graph paper input size verses time.
2. Implement two way merge sort and calculate the time of sorting
3. Implement Strasseem’s matrix multiplication algorithm for matrices whose order is a power of two.

**Dynamic programming (Any one)**

1. Find out a solution for 0/1 knapsack problem
2. Given two sequences of character, find out their longest common subsequence using dynamic programming

**NP Complete and NP Hard problems (Any two)**

1. Find out a solution to graph colorability problem of an input graph
2. Find out a solution to the N-Queen Problem
3. Find out a solution to sum of subset problems
Backtracking Algorithm (All two)

1. Rat in a Maze
2. Game Trees

BCSE 9303 COMPUTER & ORGANIZATION LAB. (0-0-3)

1. Simulation of fast multiplication and division algorithms in Matlab or C programs
2. Some experiments using hardware trainer kits for floppy drive, CD drive, dot matrix printers etc.
3. Dismantling and assembling a PC along with study of connectors, ports, chipsets, SMPS etc.
   Draw a block diagram of mother board and other board

A study project on some hardware technologies (Memory, Serial Bus, Parallel Bus, USB Standard, Hard Disk Technology etc)
6th Semester

HSSM 4302 PRODUCTION AND OPERATION MANAGEMENT (3-0-0)

Objective: This course aims at acquainting all engineering graduates irrespective of their specializations, the basic issues and tools of managing production and operation functions of an organization.

Module I


Module II


Module III


8. Inventory Control: Relevant Costs, Basic EOQ Model, Model with Quantity discount, Economic Batch Quantity, Periodic and Continuous Review Systems for Stochastic Systems, Safety Stock, Reorder Point and Order Quantity Calculations. ABC Analysis. (4 hours)

Module – IV


10. Modern Trends in Manufacturing: Just in Time (JIT) System; Shop Floor Control By Kanbans, Total Quality Management, Total Productive Maintenance, ISO 9000, Quality Circle, Kaizen, Poke Yoke, Supply Chain Management (6 hours)

Reference:


BCSE 3305 OPERATING SYSTEMS (3-0-0)

Module – I
Introduction: What is an Operating System.
Operating system structures: system components, protection system, O.S. Services, system calls

Module – II
Deadlocks: System model, Deadlock Characterization Methods for Handling Deadlocks, Deadlock Prevention, Deadlock avoidance, Deadlock Detection, recovery from Deadlock.
Memory management: Background, Logical versus Physical Address space, swapping, contiguous Allocation. Paging, Segmentation.

Module – III

Module – IV
I/O systems: Overview, I/O Hardware, Application of I/O interface, Kernel I/O - subsystem Transforming I/O requests to Hardware Operations. Secondary storage Structure: Disk Structure, Disk Scheduling, Disk Management, Swap space Management, Disk Reliability, Case Studies LINUX, WINDOW NT.

Text Book
Chapter-1, Chapter-3 (3.1,3.2,3.3) , Chapter-4, Chapter-5(5.1,5.2,5.3) Chapter-7 (7.1-7.7), Chapter-8, Chapter-9, Chapter-10, Chapter-11, , Chapter-12(12.1-12.5), , Chapter-13(13.1-1.35)

Reference Book:
1. Operating System, McGraw Hill, Madnik & Donovan,
BCSE 3306 COMPUTER NETWORKS (3-0-0)

Module – I
Overview of Data Communications and Networking.
Analog Transmission: Modulation of Digital Data; Telephone modems, modulation of Analog signals.
Multiplexing: FDM 150, WDM 155, TDM 157,
Transmission Media: Guided Media, Unguided media (wireless)
Circuit switching and Telephone Network: Circuit switching, Telephone network.

Module –II
Data Link Layer
Error Detection and correction: Types of Errors, Detection, Error Correction
Data Link Control and Protocols:
Flow and error Control, Stop-and-wait ARQ, Go-Back-N ARQ, Selective Repeat ARQ, HDLC.
Point-to –Point Access: PPP
Point –to- Point Protocol, PPP Stack,
Multiple Access
Random Access, Controlled Access, Channelization.
Local area Network: Ethernet.
Traditional Ethernet, Fast Ethernet, Gigabit Ethernet.
Wireless LANs: IEEE 802.11, Bluetooth virtual circuits: Frame Relay and ATM.

Module – III
Network Layer: Host to Host Delivery: Internetworking, addressing and Routing
Network Layer Protocols: ARP, IPV4, ICMP, IPV6 ad ICMPV6
Transport Layer: Process to Process Delivery: UDP; TCP congestion control and Quality of service.

Module –IV
Application Layer:
Client Server Model, Socket Interface, Domain Name System (DNS):
Electronic Mail (SMTP) and file transfer (FTP) HTTP and WWW.
Security
Cryptography, Message security, User Authentication.

Text Book

Reference Book:
2. Computer Networks, A. S. Tannenbum PHI.

BCSE 3307 COMPUTER ARCHITECTURE & ORGANIZATION -II (3-1-0)

Module-1
(8 hours)
Input-output organization: Accessing I/O devices, Programmed I/O, Interrupt driven I/O, DMA, Buses, Interface circuits, standard I/O interfaces (PCI, SCSI, USB)
Module-2

Architectural classification of parallel processing (FLYNN’S), Pipelining: Basic concepts, Instruction and arithmetic pipelining, Data Hazards, Instruction Hazards, Influence on Instruction sets, Data path and control considerations, superscalar operations, Ultra SPARC II example, performance considerations, pipeline reservation tables and scheduling.

Module-3

Array processors: SIMD Array processors, SIMD Interconnection networks.

Module-4

Multiprocessor: Functional structures, Interconnection networks, Parallel memory organizations, some example of multiprocessor: C.mmp, S-1, HEP, Mainframe multiprocessor systems, Cray X-mp.

Text Book:
1) Computer Organization by Carl Hamacher, Zvonko Vranesic, Safwat Zaky, INTERNATIONAL EDITION

CPES 5302 DIGITAL SIGNAL PROCESSING (3-0-0)

Module – I

Discrete Time Signals and System

Discrete Time Signals (Elementary examples, classification: periodic and a periodic Signals, energy and Power signals, Even and Odd Signals).

Discrete Time System:

Block diagram representation of discrete time systems, classification of discrete time systems –static and dynamic, time variant and time – invariant, linear and non-linear, casual and anti-casual, stable and unstable.

Analysis and response (convolution sum) of discrete - time linear LTI system, Recursive and Non-recursive discrete time system. Constant coefficient differences equations and their solutions, impulse response of LTI system, structures of LTI systems Recursive and Non-recursive realization of FIR system. Correlation of dispute time Signal.

Selected portions from Chapter 2 (2.1, 2.2,2.3,2.4,2.5, 2.6.1) of Textbook – I
Chapter 1 of Textbook- 2.

Module – II

The Z transform

The Z-transform and one-sided Z-transform, properties of Z-transform, inverse of the Z-transform, Solution of difference equations.

Selected portions from Chapters 3 (3.1, 3.2,3.5) of Textbook – I
Selected portion of chapter 4 of Textbook - 2

The Discrete Fourier Transform

The DFT and IDFT, relationship, DFT with Z-transform, the DFT as a linear transformation Relationship of DFT with Z-transform, properties of DFT: periodicity, linearity, summery and time reversal of a sequence.
Circular convolution, circular correlation, circular correction by convolution, method linear convolution by overlap save methods and by overlap add method, Circular convolution and correlation by DFT method, Overlap add and save filtering by DFT method.

Selected portion from Chapter – 5 (5.1.2,5.1.3,5.1.4,5.2,5.2.1,5.2.2, 5.2.3, 5.3.2) of textbook – 1.

Selected portion of chapter 6 of textbook - 2.

**Module- III**

**(10 hours)**

**Fast Fourier Transform**:

Operation counts by direct copulation of DFT, Radix – 2 FFT algorithm- Decimation –in-time (DIT) and Decimation – in frequency (DIF) algorithm, Efficient computation DFT of Two real sequences, Efficient Computation of DFT of a 2 N-pt real sequences.

Selected portions from chapter 6 (6.1.1,6.1.3, 6.2.1, 6.2.2) of Text book –I

Selected portions from chapter 7 and 8 of Text book – 2.

**Design and Digital Filters**:


Selected portions from chapter 8 (8.1.1, 8.2.1, 8.2.2., 8.3.2,8.3.3.) of Text book – I

**Module – IV**

**(10 hours)**

Estimation of spectra from finite duration signals, Non-parametric method of power spectrum estimations.

The Bartleff method and the Blackman and Tukey method.

Selected portion from chapter 12 of Text book - 1: 12.1,12.1.1,12.1.2,12.1.3,12.2.1, 12.2.3.

Selected portion from chapter 12 of Text book – 2


Structure IIR Systems - Direct form I & II realizations

Selected portions from chapter 7 (7.2, 7.2.1, 7.2.2, 7.3, 7.3.1 ) of Text book –I

Selected portions from chapter 9 of Text book – 2.

**Text Books**

2. Digital Signal Processing by S. Salivahanan, TMH

**Reference Book**:

1. Introduction of Digital Signal Processing – J. R. Johnson, PHI.

**PECS 3301 ARTIFICIAL INTELLIGENCE (3-0-0)**

**Module – I**

10 hours


Informed Search Methods; Best-First Search, Heuristic Functions, Memory Bounded Search, and Iterative Improvement Algorithms.

**Module – II**
10 hours


**Module – III**
10 hours


Learning in Neural and Belief Networks’ How the Brain Works, Neural Networks, perceptions, Multi-layered Feed Forward Networks Applications Back propagation algorithm Applications of Neural Networks.

**Module – IV**
10 hours

Knowledge in Learning; Knowledge in Learning, Explanation-based Learning, Learning Using Relevance Information, Inductive Logic programming.


Practical Natural Language processing Practical applications. Efficient Parsing Scaling up the lexicon. Scaling up the Grammar Ambiguity. Discourse Understanding.

**Text book:**
Reference Book:


CPEC 5308 COMMUNICATION ENGINEERING (3-0-0)

Module - I

(12 hours)


Baseband Signals

Analogue Signal, Digital Signal. Converting an analogue signal to Digital Signal: Sampling, Nyquist Criteria. Information and Sampled value. Quantization and Binary Coding of sampled values. Transformation of Baseband signal from Time domain to Frequency domain and Vice-versa. F. T. of few simple baseband signals.


Module - II

(12 hours)

Modulation Techniques:


Digital Modulation Techniques

Phase Shift Keying (PSK), Frequency Shift Keying (FSK) – their Basic Principle, Waveform, Generation and Detection. Ideal low pass, Bandpass and Band rejection filters – their impulse response (no mathematical derivation).

Module – III

(11 hours)


Noise bandwidth, Available Power, Noise temperature Two port noise Bandwidth, Input Noise Temperature, Noise Figure, Equivalent noise temperature of a cascade. An example of a receiving system.

Antennas and Propagation of Radio Waves:

Dipole Antenna and Parabolic Reflector Antenna- their Principle of Operation, Radiation Pattern and Gain Propagation of Radio wave over ground and through ionosphere. Line of Sight Propagation of Microwave Signal.
Module – IV

Modern Communication Systems:
Brief description of fiber optic communication System : Block Diagram, Range of operating Wavelength , Optical Fiber, Optical Sources - LEO & LASER, Optical detectors; Concept of GH2 - km Bandwidth . Advantages of fiber optic system,

Brief description of Satellite Communication Systems : Block diagram. Frequency bands of operation, uplink and down link frequencies, Transponder , earth stations, Types of Antenn mounted on satellites. Services available through satellite.

Mobile Communication
Cellular Communication System : Block Schamic description , Cellular frequency bands, digital Technology , Cellular Concept, Capacities, Roaming facilities . Received Signal, Fading concept of diversity reception. Multiple access facilities.

Text Books :
1. Analog and Digital Communication Systems 5th Edition by Martin S. Roden. SPD Publisher Selected portion from Ch. 1,2, 3,4 and 5.
3. Communication Systems by R.P. Singh and S. D. Sapre. TMH.

Additional Reading :
1. Communication Electronics - Principles and Applications, 3rd Edition by Louis E. Freuzel. (For topics 6,7, and 8)

PEBT 8301 BIO INFORMATICS (3-0-0)

Module I

Module II
Introduction to MSDN (Microbial Strain Data Network) : Numerical Coding Systems of Microbes, Hibridoma Data Bank Structure, Virus Information System Cell line information system ; other important Data banks in the area of biotechnology/life sciences/biodiversity.
Sequence analysis : Analysis Tools for Sequence Data Banks : Pair wise alignment - NEEDLEMAN and Wunsch algorithm, Smith Waterman, BLAST, FASTA algorithms to analyze sequence data ; Sequence patterns motifs and profiles.

Module III
Secondary Structure Predictions ; prediction algorithms; Chao-Fasman algorithm. Hidden-Markov model, Neural Networking.
Tertiary Structure predictions; predication algorithms; Chao-Fasman algorithm. Hidden-Markov model, Neural Networking.

Module IV

10 hours

Applications in Biotechnology: Protein classifications, Fold libraries, Protein structure prediction: Fold recognitions (threading), protein structure predictions: Comparative modeling (Homology), Advanced topics: Protein folding, Protein-ligand interactions, Molecular Modeling & Dynamics, Drug Designing.

Books

1. Lesk, Introduction to Bioinformatics, OUP
2. Introduction to Bio-informatics, Atwood, Pearson Education
4. Statistical Methods in Bio-informatics, Springer India
5. Beginning Perl for Bio-informatics, Tisdall. SPD
8. Murty CSV, Bioinformatics, Himalaya

PRACTICALS

BCSE 9304 OPERATING SYSTEM LAB. (0-0-3)

1. Study of UNIX Command
2. Introduction to LINUX (Any distribution can be used)
3. Shell scripting for UNIX/ LINUX systems
4. Study of Windows NT/ 2000 features
5. Study of File systems: UNIX/ FAT/ NTFS
6. Introduction to the Windows Registry
7. A study project on any one aspect of modern operating systems

CPEC 9306 DIGITAL SIGNAL PROCESSING LAB. (0-0-3)

1. Simulation of Various DSP fundamental in Mat Lab or C
2. Design of Filters in MAT Lab or C
3. Some experiments on DSP on trainer Kits on any brand (TI, Analog Etc) involving study of the processor commands and processor architecture. The student should understand how the DSP Chip Architecture is different from the Architecture of a general purpose processor
### COURSE STRUCTURE
#### FOURTH YEAR B.TECH PROGRAMME
##### COMPUTER SCIENCE AND ENGINEERING

<table>
<thead>
<tr>
<th>7th Semester</th>
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<td>HSSM 4403 Environmental Engineering</td>
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<td>PECS 3404 Compiler Design</td>
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<td>BCSE 3402 Software Engineering</td>
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<td>PECS 3401 Soft Computing</td>
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<td>PECS 3409 Advanced Operating Systems</td>
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<td>BCSE 9410 Internet Technology Lab.</td>
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**L-Lecture**  
**T-Tutorial**  
**P-Practical**
Objective: This course introduces the students to the environmental consequences of Industries, development actions etc. and the methods of minimizing their impact through technology and legal systems.

Module – I
Chemistry and Microbiology in Environmental Engineering: Physical and chemical properties of water, Atmospheric chemistry, Soil chemistry, Microbiology, Chemical and biochemical reactions, Material balances and Reactor configurations.

Module – II
Water Pollution: water quality standards and parameters, Assessment of water quality, Aquatic pollution, Freshwater pollution, Estuarine water quality, Marine pollution, Organic content parameters, DO and BOD demand in streams, Transformation process in water bodies, Oxygen transfer by water bodies, Turbulent mixing, Water quality in lakes and preservers, Ground water quality.
Air Pollution: Air pollution and pollutants, criteria pollutants, Acid deposition, Global climate change – greenhouse gases, non-criteria pollutants, emission standard form industrial sources, air pollution meteorology, Atmospheric dispersion.

Module – III
Solid Waste Management
Source classification and composition of MSW: properties and separation, storage and transportation, MSW Management, Waste minimization of MSW, Reuse and recycling, Biological treatment, Thermal treatment, Landfill, Integrated waste management.
Industrial Air Emission Control:
Characterization of air stream, Equipment selection, Equipment design, Special Methods: Flue gas desulphurization, NOx removal, Fugitive emissions.

Module – IV
Environment impact Assessment, Origin and procedure of EIA, Project Screening for EIA, Scope studies, Preparation and review of EIS.
Reference
3. Environmental Science, Curringham & Saigo, TMH,
4. Principles of Environmental Science, Curringham
5. Introduction to Environmental Science, Y. Anjaneyalu, B. S. Publication.

PECS 3404 COMPILER DESIGN (3-0-0)

Overview of systems, Software and programming language, Compiler and translators, Automatic generation of lexical analysers, Syntax analysis, parsing of context free language, Top down and bottom-up parsing techniques, deterministic parser concept, Recursive descent parser, LL (1), SLR and LALR, Error detection, Correction and recovery, syntax directed translation, Semantic analysis, Symbol table organization and routine allocation, Register allocation and code generation and optimization.

Text Book

BCSE 3402 SOFTWARE ENGINEERING (3-0-0)

Module – I
Evolution and impact of Software engineering, SW lifecycle models SW project Management; Requirement analysis and specification.

Module – II
Software design, function oriented software design, object modeling wring UML, object Oriented software development, user interface design.

Module – III
Coding & Testing, Reliability and Quality management.

Module – IV
Computer aided software engineering, software maintenance, software reuse.

Text Book :

BCSE 3405 INTERNET AND WEB TECHNOLOGY (3-0-0)

The Internet and WWW
Understanding the WWW and the Internet, Web Architecture, Major issues in web solution development, Web servers (details of Apache Web Server), Web Browsers (Microsoft Internet Explorer and Netscape Navigated)

HTML
Planning of Web page, Model and structure for a Website, designing Web pages, Basic HTML using images links, HTTP methods and forms, Tables, Multimedia content (Audio and Video) Frames

CGI Basics
Introduction to CGI, CGI building blocks, CGI Scripting in C, CGI Security

JAVA Script
Programming Fundamentals, built in object, Form object and element, Advancce Java Script objects, Working with data, Flow Control Structures, Operator, Custom function and Object, Data entry and Validation, Tables and Forms, Security Issues

45
VB Scripts
VB Script functionality, Active X controls, Active Server Pages, Error Handling, VB Script Controls, Web Based application

Textbooks
There are large numbers of good books available in each topic. Instructor are advised to use their library resources.

Reference Books
1. Internet Read-Map, Benett Falk, BPB Publication
2. HTML complete reference, Powell, TMH
3. Rese Colderun, Teach yourself CGI Programming in 7 days, Tech Media 1998
5. Professional ASP 3.0, Alles Homer & David Susmen, SPD Publication

BCSE 3406 INFORMATION SYSTEMS & DESIGN (3-0-0)

Module – I
Requirement Analysis and Determinations:

Module – II

Module – III
System Design: Objectives, Features to be designed, Managing the design process, Managing End-User development system Design of output, Design of Input and control, Design of online dialogue, Design of Files and Databases.

Module – IV
System Engineering and Quality Assurance: Designing reliable and maintainable system , Program Structure charts, Software Modules, Coupling, Cohesion.
Software Design and documentation Tools :
Managing System Implementation: Training Conversion Methods, Data and File Preparation, post implementation review.
Managing Information system Development: Estimation and management of development Time, Personnel and Development Management, structured walkthroughs.
Selection of Hardware and Software:
Text Book :
Analysis and Design of Information Systems, A. James Senn, Tata McGraw Hill
Module – I
Introduction, Historical perspective, VLSI Design methodologies, VLSI Design Flow, Design Hierarchy, Design Styles, CAD Technology, Fabrication of MOSFETS, Fabrication processes, NMOS Fabrication, CMOS n-well process, Layout Design rules, Stick Diagrams, Full Custom Mark Layout Design, MOS Transistor, Review of structure and operation of MOSFET (n-MOS enhancement type), CMOS, MOSFET v-I characteristics, MOSFET scaling and small geometry effects, MOSFET capacitances, Modeling of MOS Transistors- Basic concept of the SPICE level-1 models, the level 2 and level 3 model equations.

Module – II
MOS Inverters: Basic NMOS inverters, characteristics, inverters with resistive load and with n-type MOSFET load, CMOS inverter and characteristics.
MOS inverters: Switching characteristics and interconnect effects: Delay time definitions and calculation, inverter design with delay constraints, estimation of parasitics switching power dissipation of CMOS inverters.

Module – III
Combinational MOS logic circuits, CMOS logic circuits, state style, complex logic circuits, pass transistor logic, sequential logic circuit – introduction, SR latch, clocked latch & flip-flop circuits, CMOS D latch and edge triggered flip-flop.
Dynamics logic circuits: Dynamic logic, basic principles, high performance dynamics CMOS circuits, Dynamic Ram, SRAM, flash memory.

Module – IV
Systems Design method, design strategies, concept of FPGA, standard cell based design, design capture tools, hardware definition languages such as VHDL and packages. Xilinx (introduction), introduction to IRSIM and GOSPL (open source packages), design verification and testing, simulation at various levels including timing verification, faults models. Design strategies for testing chip level and system level test techniques.

Text Books:
1. CMOS Digital integrated Circuits – Analysis & Design – Sung Mo-Kang & Yussuf Leblebici, TMH.
2. VHDL Programming by example – Perry TMH.
4. CMOS Digital Integrated Circuit, B.M. Kang & Y Leblebici, TMH
6. Algorithm for VLSI Design and Automation, N. Sherwani, Kluwer
7. VHDH, Bhaskar, PHI

Reference Books:

Module - I
Neural Networks:
Fundamentals of Neural Networks: Models of an artificial Neuron, Neural Network Architecture, Learning methods
Back Propagation Networks:
Module – II
Associative memory: Auto correlators, Kosko’s Discrete BAM, Exponential BAM, Associative memory for Real-coded Pattern Pairs, Applications.
Adaptive Resonance Theory:
ART1, ART2, Applications

Module – III
FUZZY LOGIC
Fuzzy set theory: crisp sets, fuzzy sets, crisp relations, fuzzy relations, Fuzzy Systems: Crisp logic predicate logic, fuzzy logic, fuzzy Rule based system, Defuzzification Methods.

GENETIC ALGORITHMS
Genetic Modeling:
Cross cover, Inversion and deletion, Mutation operator, Bit-wise operators, Bitwise operators used in GA. Convergence of Genetic algorithm. Applications, Real life Problems.

Module – IV
Hybrid Systems:
Hybrid system, neural Networks, fuzzy logic and Genetic algorithms hybrids.
Genetic Algorithm based Back propagation Networks:
GA based weight determination applications:
Fuzzy Back Propagation Networks, Fuzzy Associative Memories: Single Association FAM, Fuzzy Hels FAMS,
Fuzzy logic controlled genetic Algorithms soft computing tools,
Fuzzy constraints, GA in fuzzy logic controller design, Applications.

Text Book:
Neural Networks, Fuzzy Logic, and Genetic Algorithm (synthesis and Application)
S. Rajasekaran, G.A. Vijayalakshmi Pai, PHI

Reference Book:

PECS 3409 ADVANCED OPERATING SYSTEM (3-0-0)

Process Synchronization
Concept of processes, Concurrent processes, Threads, Overview of different classical synchronization problems, Monitors, Communicating sequential processes (CSP)
Process deadlocks
Introduction causes of deadlocks, Deadlock handling strategies Models of deadlock.

Distributed operating system
Architectures, Issues in Distributed operating systems, Limitations of Distributed Systems, Lamports logical clock, Global states, Chandy-Lamper's global state recording algorithm, Basic concepts of Distributed Mutual Exclusion, Lamport’s Algorithm, Ricart-Agrawala Algorithm: Basic concepts of Distributed deadlock detection, Distributed File system, Architecture, Design issues, SUN Network File system.
Basic concepts of Distributed shared memory, Basic concepts of Distributed Scheduling, Load balancing, Load sharing.
Distributed OS Implementation
Models, Naming, Process migration, Remote Procedure Calls.
Multiprocessor System
Motivation, Classification, Multiprocessor Interconnections, Types, Multiprocessor OS functions & requirements; Design & Implementation Issue; Introduction to parallel programming; Multiprocessor Synchronization.
Performance, Coprocessors, RISC & data flow
Introduction, Necessity, Measures, Techniques, Bottlenecks & Saturation, Feedback loops, Coprocessors, RISC.

Analytic Modeling

Introduction, Queing Theory, Markov Process.

Security & Protection


Text Books:
1. Operating System Concepts & Design , Milan Milenkovic, TMH
2. Operating System, H.M. Beitel, Pearsons,
3. Advanced Concepts in operating Systems, Mukesh singhal and Niranjan G. Shivaratri, TMH

BCSE 3401 COMPUTER GRAPHICS & MULTIMEDIA (3-0-0)

Module – I (10 hours)


Graphic User Interface and Interactive Input Methods : The User Dialogue, Input of graphical Data, input Function, Initial Values for input Device parameters, Interactive Picture construction.

Output Primitives : Points and lines Bresenham’s Line Algorithm, Midpoint Circle Algorithm, Filled Area Primitives

Attributes of Output Primitives : Line Curve, Color, Are fill and Character Attributes, Bundled Attributes, Antialiasing

Module – II (8 hours)

Two Dimensional Geometric Transformation : Basic Transformation (Translation, rotation, Scaling) Matrix Representation and Homogeneous coordination, Composite Transformations, Reflection Shears, Transformation between coordinate system.

Two Dimensional Viewing : the viewing Pipeline Viewing coordinate Reference frame, window-to view port coordinate Transformation.

Line Clipping (Cohen-Sutherland Algorithm) and Polygon Clipping (Stherland-Hodgeman Algorithm)

Module –III (12 hours)

Three Dimensional Object Representation : Polygon Surface, quadratic Surface, Spline Representative, Bezier Curves and Surfaces B-Spline Curves and surfaces.

Fractal Geometry Methods : Fractal Generation Procedure, Classification of Fractarals Dimension, geometric Construction of Deterministic self similar Implementation of the above using Open GL

Three Dimensional Geometric and Modeling Transformations : Translation Rotation, Scaling, Reflections, shear, Composite Transformation, Modeling and Coordinate Transformation

Three Dimensional Viewing : Viewing Pipeline, Viewing Coordinates, Projections (Prallel and Prospective) Clipping

Implementation of above using openGL

Module –IV (8 hours)

Visible Surface Detection Method : Backface Detection, Depth Buffer, A Buffer, Scan line and Depth sorting

Illumination Models : Basic Models, Displaying Light Intensities, Halftone Pattern and Dithering Techniques

Surface Rending Methods : Polygon Rendering Methods, Gouraud and Phong Shading

Quick Introduction to Computer Animation

Implementation of above using OpenGL

Textbook
PRACTICALS
BCSE 9409 COMPILER DESIGN LAB. (0-0-3)

1. Introduction to LEX and YACC. Preferable on UNIX but any other version is also acceptable.
2. Writing simple scanner for accepting and validating floating point numbers and fixed point numbers
3. writing simple scanners for tokenizing C or BASIC programs. The Programm will output the list of token to a file and classify them by type of token
4. writing a program to pick out comments in a C ++ program or a JAVA Program
5. developing a rudimentary C Preprocessor capable of handling the “ define, ifdef, ifndef, include” directives. More ambitious students can implement substitution of Macros with arguments.
6. Converting simple finite Automata into program

BCSE 9410 INTERNET TECHNOLOGY LAB. (0-0-3)

1. Introduction to major internet protocol- HTTP, FTP, SMTP
2. Study of Web Browser- Microsoft Internet Explorer and Netscape Navigator. Their Network options, security features, Cookies, file caching, temporary files etc.
3. HTML- Basics of HTML., text, image, other MIME types, lists, tables, HTTP methods, forms.
4. Multimedia on the Web- Embeddig audio and video files in HTML
5. Java Script- Introduction to Java Script for client side validation.
6. Serves side scripting – Introduction to fundamentals concepts of ASP or JSP or PHP (any one platform depending on instructor). Basics of CGI scripting using Perl or C. Simple examples of request/ response objects. Basic introduction to web solutions architecture.
Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/service packages keeping competitive market, customers and cost in view.

Module – I (9 hours)

Marketing Management: Concept, Process, Functions and relevance in the current context.
Competition Analysis: Factors contributing to competition, Competition analysis tools, Competitive arena mapping, Segmentation matrix.

Module II (10 hours)

Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research, Competitive Intelligence.
Consumer Behaviour: Importance of buyer and his/her role in purchasing. Influence of buyer behaviour, Buyer behaviour study tools. Organizational buying behaviour.
Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools: Buying Intention Survey, Sales Force Opinion and Delphi Techniques.

Module – III (11 hours)


Module –IV (10 hours)

Channels of Distributions: Designing Distribution Channels, Wholesaling and Physical Distribution, Retailing, Supply Chain Management (Basic only). Personal selling, Direct Marketing, Managing Sales Force.

References:
PECS 3407 PARALLEL AND DISTRIBUTED SYSTEM (3-0-0)

Module – I
Introduction to parallel computing Motivation and scope. Parallel Programming Platforms:

Module – II
Principles of parallel Algorithm Design:
Preliminaries, Decomposition Techniques, Characteristics of Tasks and Interactions, Mapping Techniques for load Balancing, Methods for containing, Interactions overheads, Parallel Algorithm Models. Basic Communication Operations: One-to-All Broadcast and All-to-One Reduction, All-to-All Broadcast and reduction All-Reduce and Prefix sum operations, scatter and Gather, All-to-All personalized communication, circular shift, Improving the speed of some communication operation.

Module – III
Analytical Modeling of Parallel Programms:
Performance Metrics for Parallel systems, Effect of Granularity of Performance, scalability of parallel system, Minimum Execution Time and Minimum Cost-optimal execution Time, Asymptotic Analysis of parallel Programs, other scalability Metrics. Programming Using the message passing Paradigm:

Module – IV
Dense Matrix Algorithm:

Sorting:
Bubble Sort and its variants, Quick Sort.
Graph Algorithms:
Minimum Spanning Tree (Prim’s Algorithm) shortest path (Dijkstra’s Algorithm)

Text Book:
Introduction to Parallel Computing, Second Edition, Ananth Gram, Anshul Gupta, George Karypis, Vipin Kumar Person Education. Chapters : 1,2,3,4,5,6,8,9,3,9,4,10,2,10,3,10,4

PECS 3405 EMBEDED SYSTEMS (3-0-0)

Module – I
Introduction : An embedded system, Processor in the system, other hardware units, software embedded into a systems, exemplary embedded system-on-chip (SOC) and VLSI circuit

Module – II
Devices and Device Drivers ; I/O devices, Timer and counting devices, serial communication using the IC, CAN and advance I/O buses between the networked multiple devices, Host system or computer parallel communication between the networked I/O multiple devices using the ISA, PCI, PCI-X and advance buses, Device drivers, Parallel port devices drivers in a system, Serial port device drives in a system, Interrupt servicing (Handling) mechanism.

Module – III
Software and Programming Concept : Processor selection for an embedded system, memory selection for an embedded system, Embedded programming in C ++, Embedded programming in JAVA, Unified modeling language (UML), Multiple processes and application, problem of sharing data by multiple tasks and routines, Inter process communication.
Real time Operating System : Operating system services, I/O subsystem, Network operating system, Real Time and embedded system, Need of well tested and debugged Real time operating system (RTOS), Introduction to C/ OS- II.
Module – IV
Case studies of programming with RTOS: Case study of an embedded system for a smart card
Hardware and Software Co-design: Embedded system project management, Embedded system
design and co-design issues in system development process, design cycle in the development phase
for an embedded system, Use of software tools for development of an embedded system, Issues in
embedded system design.

Text Book
1. Embedded System Architecture, Programming and Design, Raj Kamal, TMH
3. Embedded Real time system Programming, Sriram V. Iyer and Pankaj Gupat, TMH

PEEC 5409 MOBILE COMPUTING (3-0-0)

Module - I
Introduction to Personal Communications Services (PCS): PCS Architecture, mobility management,
Networks signaling, Global System for Mobile Communication (GSM) System overview: GSM
Architecture, Mobility management, Network signaling.
General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes, Mobile Data
Communication; WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.

Module - II
Wireless Application Protocol 9WAP): The Mobile Internet standard, WAP Gateway and Protocols,
wireless mark up Languages (WML), Wireless Local Loop (WLL): Introduction to WLL Architecture,
wireless Local Loop Technologies.
Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications
2000 (IMT 2000) Vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000,
Quality of services in 3G.

Module - III
Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems. Wireless
Enterprise Networks: Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols.

Module - IV
Server-side programming in Java, Pervasive web application architecture, Device independent
example application.

Text Book
2. “Mobile Communication”, J. Schiller, Pearson

Reference:
1. “Guide to Designing and Implementing Wireless LANs”, Mark Ciampa, Thomson learning,
   Publishers,

PECS 3410 E-COMMERCE & ERP (3-0-0)

Module - I
Electronic Commerce: Overview, Definitions, Advantages & Disadvantages of E-Commerce,
Threats of E-Commerce, Managerial Prospective, Rules & Regulations for Controlling E-Commerce,
Cyber Laws.
**Technologies** : Relationship Between E-Commerce & Networking, Different Types of Networking for E-Commerce, Internet, Intranet, EDI Systems


**Module - II**

**E-strategy** : Overview, Strategic Methods for developing E-Commerce.

**Four C's** (Convergence, Collaborative Computing, Content Management & Call Centre).


Collaborative Computing : Collaborative product development, contract as per CAD, Simultaneous Collaboration, Security.

Content Management : Definition of content, Authoring Tools and Content Management, Content - partnership, repositories, convergence, providers, Web Traffic & Traffic management : Content Marketing.

Call Centre : Definition, Need, Tasks Handled, Mode of Operation, Equipment, Strength & Weaknesses of Call Centre, Customer Premises Equipment (CPE). [6L]

Supply Chain Management : E-logistics, Supply Chain Portal, Supply Chain planning Tools (SCP Tools), Supply Chain Execution (SCE), SCE - Framework, Internet’s effect on Supply Chain Power.

**Module - III**

E-Payment Mechanism ; Payment through card system, E-Cheque, E-Cash, E-Payment Threats & Protections.

E-Marketing : Home - shopping, E-Marketing, Tele-marketing

Electronic Data Interchange (EDI) : Meaning, Benefits, Concepts, Application, EDI Model, protocols (UN EDI FACT / GTDI, ANSI-X-12, Data Encryption (DES / RSA)


**Module - IV**

Enterprise Resource Planning (ERP) : Features, capabilities and Overview of Commercial Software, re-engineering work processes for IT applications, Business Process Redesign, Knowledge Engineering and Data Warehouse.

Business Modules ; Finance, Manufacturing (Production), Human Resources, Plant Maintenance, Materials, Management, Quality Management Sales & Distribution ERP Package.

ERP Market ; ERP Market Place, SAP AG, PeopleSoft, BAAN, JD Edwards, Oracle Corporation.

ERP-Present and Future : Enterprise Application Integration (EAI), ERP and E-Commerce, ERP and Internet, Future Directions in ERP
**Reference Book**:

1. E-commerce. MM Oka, EPH
3. Bhaskar Bharat ; Electronic Commerce - Technologies & Applications. TMH.
8. Beginning E-Commerce, Reynolds, SPD

**PECS 3411 MULTIMEDIA TECHNOLOGY (3-0-0)**

**Module - I**
Multimedia System Organization and Architecture, QOS architecture, Multimedia Distributed Processing Models, Multimedia Conferencing Model, Storage Organization.

**Module – II**

**Module – III**
Raster Scanning Principal, Color fundamental, color video, video performance measurement, Analog audio, Stereo effect, MPEG and DVI technology, Multimedia applications Toolkit and hyper application.

**Module – IV**
Multimedia information system, Operating system support middleware system service architecture, Presentation services, User Interface, File system and information and information model, presentation and anchoring file.

Multimedia standards role of standards, Standardization issues, distributed multimedia systems.

**Text Books**
Multimedia Systems, P.K. Buford, AWL
Multimedia Communication Systems, Rao, Bojkovic and Milovanovic
Multimedia Computing Communication and Application, Ralf & Klara

**PECS 3406 COMPUTER SECURITY (3-0-0)**

**Module – I**
The Security Problem in Computing:
Module – II
Program Security:
Secure Programs, Nonmalicious Program Errors, viruses and other malicious code, Targeted Malicious code, controls Against Program Threats, Protection in General-Purpose operating system protected objects and methods of protection memory and addmens protection, File protection Mechanisms, User Authentication Designing Trusted O.S: Security polices, models of security, trusted O.S design, Assurance in trusted OS. Implementation examples.

Module – III
Data base Security :
Security requirements, Reliability and integrity, Sensitime data, Inference, multilevel database, proposals for multilevel security.

Module - IV
Administering Security :


PECS 3408 IMAGE PROCESSING (3-0-0)

Module I

Module – II

Module III
Image Restoration

Module – IV
Image Compression
Fundamentals, Image Compression Models, Elements of Information Theory, Error-Free Compression, Image Compression Standards.

Text Books

Reference Book
2. Fundamentals of Digital Image Processing, Anil Ku Jain, PHI
3. Fundamental of Electronic Image Processing, Arther R. Weeks Jr. PHI
PRACTICALS
BCSE 9407 ENTREPRENEURSHIP PROJECT (0-0-3)

1. The project will be for 2 credits and 3 periods per week is to be devoted for the project.
2. The teacher has to give elementary idea about entrepreneurship through classroom teaching before a project report is prepared by the student.
3. The teacher will first cover the following topics through lecturer and exercises on motivation and games.
   - Entrepreneurship concept, EDP in India, Indian middle class value.
   - Entrepreneurial qualities, motivation perception, risk taking etc.
   - Market survey, Business opportunity guidance
   - Role of DIC, SFC, Bank etc.
   - Decision making, Leadership, Communication skill
   - Preliminary Project Report, preparation for a specific product and submission of the report.
4. Evaluation
   (a) The teacher has to conduct tests/ motivational exercises to assess entrepreneurial capability of the student (20%)
   (b) The teacher has to test the knowledge of the student on the above topic through a written test. (20%)
   (c) The teacher has to evaluate the report submitted by the student (i.e. Project report within 50 pages) (60%).

Reference Books:
1. Entrepreneurship of Small Industries, M. V. Deshpande, Deep and Deep Publication