DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
B.TECH. – ELECTRONICS AND COMMUNICATION ENGINEERING
CURRICULUM & SYLLABUS - 2007 REGULAR

III Semester

Sub Code	Subjects	L	T	P	C
	Theory				
BEC201	*Solid state devices	3	0	0	3
BMA205	*Mathematics – III	3	1	0	4
BCS203	Object Oriented Programming	3	1	0	4
BEE201	*Circuit Theory	3	1	0	4
BEE233	Electrical Machines	3	0	0	3
BEE235	*Electromagnetic fields	3	1	0	4
	Laboratory / Practice				
BEC221	*Circuits and Devices Lab	0	0	3	1
BEE241	Electrical Engineering Lab	0	0	3	1
			TOTAL		**24**

Code	Equivalent of the previous years / Part-Time / Other departments
BEC201	BEC151
BMA205	BMA202A
BCS203	---
BEE201	BEE151/BEE203A
BEE233	BEE213/BEE158
BEE235	BEE205/BEE155/BEE253/BEE205A/BEE206
BEC221	BEC156
BEE241	---

IV Semester

Sub Code	Subjects	L	T	P	C
Theory					
BEC202	*Digital Electronics	3	1	0	4
BEC204	*Electronic Circuits	3	0	0	3
BEC210	*Signals and Systems	3	1	0	4
BMA208	Probability and Random Process	3	1	0	4
BCS232	*Data Structures and Algorithms	3	1	0	4
BEE202	*Network Analysis Synthesis	3	1	0	4
	Laboratory / Practice				
BEC222	*Electronic Circuits Lab	0	0	3	1
BCS222	Data Structures using C++ Lab	0	0	3	1
			TOTAL		**25**

Code	Equivalent of the previous years / Part-Time / Other departments
BEC202	BEC251/BEC229/BEC2234
BEC204	BEC154/BEC257
BEC210	---
BMA208	BMA253
BCS232	BCS251/BCS201
BEE202	BEE203/BEE152/BEE204A
BEC222	---
BCS222	BCS253/BCS221

V Semester

Sub Code	Subjects	L	T	P	C
	Theory				
BEC301	*Microprocessor and its Applications	3	0	0	3
BEC303	*Linear Integrated Circuits	3	0	0	3
BEC305	*Transmissions lines & wave guides	3	1	0	4
BEC309	*Communication Systems	3	0	0	3
BEE301	*Control Engineering	3	1	0	4
BCS303	Computer Architecture	3	1	0	4
	Laboratory / Practice				
BEC321	*Linear & Digital IC lab	0	0	3	1
BEC323	*Microprocessor Lab	0	0	3	1
				TOTAL	**23**
Code	**Equivalent of the previous years / Part-Time / Other departments**				
BEC301	BEC252/BEC359/333/213/332/216				
BEC303	BEC256				
BEC305	BEC302/BEC253				
BEC309	BEC206/254				
BEE301	BEE252				
BCS303	BCS431				
BEC321	---				
BEC323	---				

VI Semester

Sub Code	Subjects	L	T	P	C
	Theory				
BEC304	*Digital signal Processing	3	1	0	4
BEC306	*Computer Networks	3	0	0	3
BEC312	*Digital Communication	4	1	0	4
BEC310	Measurements & Instrumentation	3	0	0	3
BEC316	*Antennas and Wave Propagation	3	1	0	4
BMG332	*Management Concepts and organizational behavior	3	0	0	3
	Laboratory / Practice				
BEC324	*Communication Engineering Lab – I	0	0	3	1
BEC328	*Digital Simulation & Signal Processing Lab	0	0	3	1
				TOTAL	**23**
Code	**Equivalent of the previous years / Part-Time / Other departments**				
BEC304	BEC351				
BEC306	BEC356				
BEC312	BEC307/BEC357				
BEC310	---				
BEC316	BEC401/BEC353/BEC308				
BMG332	BMG331/BMG351/BMG352				
BEC324	BEC361/BEC323/BEC322				
BEC328	---				

Sub Code	Subjects	L	T	P	C
Theory					
BECE01 BECE03 BECE05 BECE07 BECE09 BECE11 BECE13 BECE15 BECE17	*Elective-I	3	0	0	3
BECE01 BECE03 BECE05 BECE07 BECE09 BECE11 BECE13 BECE15 BECE17	*Elective-II	3	0	0	3
BEC403	*Optical Communication	3	1	0	4
BEC405	*Microwave Engineering	3	0	0	3
BEC407	*Introduction to VLSI and Embedded Systems	3	1	0	4
BMG431	*Entrepreneurship development	3	0	0	3
Laboratory / Practice					
BEC421	*Communication Lab-II	0	0	3	1
BEC427	*VLSI & Embedded System Design Lab	0	0	3	1
BEC423	*Comprehension	0	0	3	2
				TOTAL	**24**
Code	**Equivalent of the previous years / Part-Time / Other departments**				
BECE01 BECE03 BECE05 BECE07 BECE09 BECE11 BECE13 BECE15 BECE17	BECE07 --- BECE09 BECE06 BECE10 BECE12 BECE17 BECE11 BECE15				
BEC403	BEC451				
BEC405	BEC402/BEC352				
BEC407	---				
BMG431	---				
BEC421	BEC322				
BEC427	BEC354				
BEC423	---				

Project has to commence in 7th Semester itself.

Sub Code	Subjects	L	T	P	C
BMG432	*Total Quality Management	3	0	0	3
BECE02 BECE04 BECE06 BECE08 BECE10 BECE12 BECE14 BECE16	*Elective – III	3	0	0	3
BEC422	*Project Phase – II	0	0	30	10
				TOTAL	16

Code	Equivalent of the previous years / Part-Time / Other departments
BMG432	---
BECE02 BECE04 BECE06 BECE08 BECE10 BECE12 BECE14 BECE16	--- BECE13 BECE04 BECE05 BECE01 BECE08 --- ---
BEC422	BEC439

LIST OF ELECTIVES

VII SEMESTER-ELECTIVES

1.	BECE01	Biomedical Instrumentation	3	0	0	3
2.	BECE03	Digital Image Processing	3	0	0	3
3.	BECE05	Satellite communication	3	0	0	3
4.	BECE07	Electromagnetic Interference & Compatibility	3	0	0	3
5.	BECE09	Device Modeling	3	0	0	3
6.	BECE11	Advanced microprocessor	3	0	0	3
7.	BECE13	Television & Video Engineering	3	0	0	3
8.	BECE15	Power Electronics	3	0	0	3
9.	BECE17	Database Management Systems	3	0	0	3

VIII SEMESTER ELECTIVES

10.	BECE02	Cellular Mobile Communication	3	0	0	3
11.	BECE04	Radar & Navigational aids	3	0	0	3
12.	BECE06	Pattern Recognition	3	0	0	3
13.	BECE08	Neural networks and its applications	3	0	0	3
14.	BECE10	Embedded Systems	3	0	0	3
15.	BECE12	Bio Signal Processing	3	0	0	3
16.	BECE14	Operating Systems	3	0	0	3
17.	BECE16	Visual Programming	3	0	0	3

Total Credits (III Semester to VIII Semester):   = 135

L: Lecture   T: Tutorial   P: Practical   C: Credits
* - Indicates core subjects to be passed as a minimum eligibility for award of degree.

BEC201   **SOLID STATE DEVICES**   3   0   0   3

Equivalent subject code of the previous years / Part-Time / Other departments: BEC201/BEC151

UNIT – 1   **9**

Theory of PN junction diode – VI characteristics – static and dynamic resistance – effect of temperature on diodes – space charge and diffusion capacitance - zener diode – avalanche and zener break down mechanisms – Zener diode as a voltage regulator.

UNIT – 2   **9**

Principles of transistor action – current components – cut off, Active & saturation region – I/P & O/P characteristics CE, CB and CC. Small signal large signal 'β', Break down & Switching characteristics – Transistor biasing – bias stabilization – bias compensation – Thermal runaway – Design with Heat sink.

UNIT – 3   **9**

Construction feature & Working principles of JFET, MOSFET Depletion and Enhancement mode, Biasing of FET, and MOSFETS.

UNIT – 4 SPECIAL SEMICONDUCTOR DEVICES AND DEVICE TECHNOLOGY   **9**

Charge transfer device, UJT, SCR, Diac, Triac, GTO and Introduction to Gallium Arsenide Devices, device technology , Planer Process, Diffusion, Ion Implantation and Vapour deposition, Additive and subtractive sequences, Process sequence for bipolar, NMOS and CMOS integrated circuits

UNIT – 5   **9**

Small signal model of transistor- Analysis of Amplifiers using small signal model. Common Emitter, Common Base, Common Collector, Common source, Common Drain, Common Gate, multistage amplifiers.

                                                            Total Number of Hours : 45

Text Book :

Nandita Das Gupta, Amitava Das Gupta, " Semiconductor Devices", Prentice Hall of India, 2005

Sedra and Smiuth, " Microelectronic Circuits" Oxford University press, 2004

Mohammed Gausi and Spencer, "Introduction to electronics circuit design", Pearson Education, 2004

Reference Book:

1. Boylestad, Robert. L and Nashelsky Louis – Electronic Devices and Circuit theory" Prentice Hall of India,6th Edition, 2001
2. William & Harris, Electronic Devices and Circuits Tata McGraw Hill International Editions, 2000
3. Millman Halkias, "Electron Devices", Tata McGraw Hill , 2000
4. David A.Bell, " Electron Devices and Circuits", Prentice Hall of India, 2003

BMA205   **MATHEMATICS – III**   3   1   0   4

Equivalent subject code of the previous years / Part-Time / Other departments: BMA202A

LAPLACE TRANSFORM   **12**

Transforms of simple functions – Basic operational properties – Transforms of derivative and integrals – Initial and final value theorems – Inverse Transforms – Convolutions theorem – Periodic functions – Applications of Laplace transform for solving linear ordinary differential equations of first order with constant coefficient

FOURIER SERIES   **12**

Circlet's conditions – General Fourier series – Half range Sine and cosine series Parsifal's identity – Complex form of Fourier series -Harmonic analysis.

FOURIER TRANSFORMS   **12**

Statement of Fourier integral theorem – Fourier transform pairs – Fourier Sine and Cosine transforms – Properties – Transforms of simple functions – Convolutions theorem – Parietals Identity.

ANALYTIC FUNCTIONS   **12**

Cauchy Ruiernann equations – Properties of analytic functions – Determination of harmonic conjugate – Milne – Thomson's method – Conformal mappings

$w = z + a, az, \dfrac{1}{z}, z^2$ and bilinear transformation.

COMPLEX INTEGRATION   **12**

Cauchy's theorem – Statement and applications of Cauchy's integral. Formalin – Taylor's and Laurent's expansions singularities Classifications – Resides, Cauchy's residue theorem – Contour integrations (excluding poles on real axis)

                                                            Total Number of Hours : 60

Text Book :

Peter O'Neil, " Advanced Engineering Mathematics, 5th Edition, Thomson learning, 2003

Reference Books :

1. Kandasamy, K.Thilagavathy and K.Gunavathy, 'Engineering Mathematics'' Vol – II & III (4th Revised) S.Chand & Co., Publishers, New Delhi (2000)
2. B.S.Grewal, "Higher Engineering Mathematics:, 35th Edn.
3. E.Kreyszig, "Advanced Engineering Mathematics" (8th Edn) John Wiley and Sons (Asia)Pvt. Limited Singapore
4. S.Narayanan, T.K.Manikavachagam Pillai and G.Ramanaiah, 'Advanced Mathematics for Engineering students – Vol I (2nd Ed.)
5. M.K. Venkataraman, Engineering Mathematics – Vol – III A & B – National Publishing, Chennai – (13th ed.) (1998)

| BCS203 | OBJECT ORIENTED PROGRAMMING | 3 | 1 | 0 | 4 |

Equivalent subject code of the previous years / Part-Time / Other departments:**BCS203**

INTRODUCTION 9
Programming methodologies – Comparison – Object Oriented concepts – Basics of C++ environment.

CLASSES 9
Definition – Data members – Function members – Access specifies – Constructor – Default constructors – Copy constructors – Destructors – Static members – This pointer – Constant members – Free store operators – Control statements

INHERITANCE AND POLYMORPHISM 9
Overloading operators – Functions – Friends – Class derivation – Virtual functions – Abstract base classes – Multiple inheritances. Microsoft Foundation class Libraries.

TEMPLATES 9
Class templates – Function templates – Exception handling – Streams.

JAVA PROGRAMMING 9
Java environment – Classes – Definition – Fields – Methods – Object creation – Constructors – Overloading methods – Static members – This keyword – Nested classes – Extending classes – Inheritance – Member accessibility – Overriding methods – Abstract classes – Interfaces.

Tutorial Problems   15 Hrs
Total Number of hours:60

Text Books:
1.   Gary J. Bronson, "Object Oriented Program development using C++", Thomson Learning, 2005.
2.   Gary J. Bronson, "Object oriented program development using Java, Thomson Learning 2005.
3.   Stanley B.Lippman, "The C++ Primer" Addison Wesley, 1988.
4.   H.M.Deitel and P.E.Deitel, "Java How to Program", Prentice Hall , 1998.
Reference ;
1.   Deitel and Deitel, " C++ How to Program" Prentice Hall, 1998.
2.   N.Barkakati, "Object Oriented Programming in C++", Prentice Hall of India Pvt. Ltd, 1997.
3.   Ken Arnold and James Gosling, "The Java Programming Language", Addison Wesley 1998.

| BEE201 | CIRCUIT THEORY | 3 | 1 | 0 | 4 |

Equivalent subject code of the previous years / Part-Time / Other departments:**BEE201/BEE151/BEE203A**

BASIC CIRCUIT CONCEPTS 12
V-I relationships of R, L and C – independent sources – dependent sources – Kirchoff's Laws - simple resistive circuits – network reduction – voltage division – current   division – source transformation. Formation of matrix equations and analysis by using Mesh-current and Node-voltage methods.

AC FUNDAMENTALS 12
AC quantity, Phasor representation – analysis of simple series and parallel circuits – power and power factor – Analysis mesh current and node voltage methods – series resonance and parallel resonance

NETWORK THEOREMS AND APPLICATIONS 12
Superposition theorem – Thevenin's theorem – Norton's theorem - Maximum power transfer theorem - Reciprocity theorem – Compensation theorem – Substitution theorem - Millman's theorem and Tellegen's theorem with applications.

THREE PHASE CIRCUITS 12
Three phase systems - phase sequence – solution of three phase balanced circuits – solution of three phase unbalanced circuits – power measurement and two Watt meter method

COUPLED CIRCUITS 12
Mutual inductance – coefficient of coupling – ideal transformer – analysis of multi winding couple circuits – single & double tuned circuits – critical coupling.
Total number of Hours = 60

TEXT BOOK
1.   Bruce Carlson, "circuits: Engineering concepts and analysis of linear electric circuits, 1st edition Thomson Learning 2002.
2.   Artice.M. Davis, Linear circuits Analysis, Thomson Learning 2002
3.   Sudhakar, A. and Shyam Mohan S.P. "Circuits and Network Analysis and Synthesis", Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1994.
REFERENCES
1.   Hyatt, W.H. Jr and Kimmerly, J.E., 'Engineering Circuits Analysis', McGraw Hill International Editions, 1993.
2.   Edminister, J.A., 'Theory and Problems of Electric Circuits', Schaum's outline series McGraw Hill Book Company, 2nd Edition, 1983.
3.   Paranjothi S.R., 'Electric Circuit Analysis', New Age International Ltd., Delhi, 2nd Edition, 2000.

| BEE233 | ELECTRICAL MACHINES | 3 | 0 | 0 | 3 |

Equivalent subject code of the previous years / Part-Time / Other departments:**BEE233/BEE158**

D.C MACHINES: 9
Constructional details- EMF and Torque – Circuit model – Methods of Excitation – Characteristics of Generators – Characteristics of motors – Starting and Speed control methods – Testing and Efficiency – Losses in D.C machines – Applications

TRANSFORMERS: 9

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Constructional details - Principle of operation –EMF equation – Equivalent circuit - Losses and efficiency - Voltage regulation – Auto transformers – Three phase transformers – Constructional details – Types of connections.

INDUCTION MOTORS: 9
Construction details - types – Principle of operation – Torque equation - Equivalent circuit – Characteristics - Performance calculations – Starting methods – Speed control methods.

SYNCHRONOUS MACHINES: 9
Construction of Synchronous machines – Classification - Induced EMF equation – Voltage regulation – EMF method – Parallel operation. Synchronous motor – Principles of operation – Methods of starting – Hunting – Effect of change of excitation of a synchronous motor.

SINGLE PHASE INDUCTION MOTORS & SPECIAL MACHINES: 9
Single phase Induction motors – Construction & Principles of working – Types. Universal motor – Reluctance motor – Stepper motor – Two-phase servo motor - Tachogenerator - Linear induction motor. (Qualitative Treatment)

Total number of Hours = 45

Text:
1. Mulukatla.S.Sarma, "Electric Machines, Stead state theory and dynamic performance, Thomson Learning
2. S.K Bhattacharya, "Electrical Machines", Tata McGraw Hill Publications.

References:
1. I.J. Nagrath & D.P. Kothari, "Electrical Machines", Tata McGraw Hill Publications, Second Edition 1997.
2. Nasar S.A, "Electrical Machines & Power Systems", TMH Publications
3. "Hughes Electrical Technology", Revised by I McKenzie Smith, Low price Edition, Pearson Education, Seventh edition.
4. Irving I.Kosow, " Electric Machinery and Transformers", PHI, Second Edition, 2001.

BEE235	ELECTROMAGNETIC FIELD THEORY	3	1	0	4

Equivalent subject code of the previous years / Part-Time / Other departments:**BEE235/BEE205/BEE155/BEE253/BEE205A/BEE206**

GENERAL PRINCIPLES AND ELECTROSTATICS 12
The field concept – sources of electromagnetic fields, changes – Coulomb's Law – electric field intensity – electric flux – Gauss's law – potential – boundary value problems – Lap lace and Poisson's equations – electrostatic energy – dielectrics – capacitance.

MAGNETOSTATICS 12
Current density – magnetic field – magnetic flux – Biot – Savart – Ampere's Law – Torque – force – vector – potential – boundary value problem.

ELECTROMAGNETIC FIELDS 12
Faraday's Law- Lenz's law – Maxwell's equations – displacement current eddy current – relation between field theory and circuit theory

ELECTROMAGNETIC WAVES 12
Generation – Propagation of waves in dielectrics – conductors and transmission n lines – pointing vector – skin effect.

FIELD MODELING AND COMPUTATION 12
Problem formulation – boundary conditions – solutions – analytical methods- variables separable methods – conformal transformation – method of Images – numerical methods – finite difference method – finite element method – charge simulation Method.

TUTORIAL PROBLEMS 12
Field plotting of electrostatic, Magnetostatics and electromagnetic configurations using standard software.

Total number of Hours = 60

TEXT BOOKS:
1. Liang C. Shen, "Applied Electromagnetism", Thomson Learning
2. John d Kraus, 'Electromagnetics', McGraw Hill Boom Co., New York, Third Edition, 1989.
3. Joseph A Edminister, 'Theory and Problems of Electromagnetics', Schaums Outline series McGraw Hill Book company New York, 1986
4. William H Hayt, Jr., 'Engineering Electromagnetics', Tata McGraw Hill Edition, New Delhi, 1998.
5. David J Griffith, 'Introduction to Electrodynamics', Prentice Hall of India Pvt. Ltd New Delhi, Second Edition , 1997.
6. Richard E.Dubroff, S.V.Marshall, G.G. Skitck, 'Electromagnetic Concepts and Applications', Fourth Edition, Prentice Hall of India Pvt Ltd, New Delhi, 1996
7. Kraus and Fleish, 'Electromagnetics with Applications', McGraw Hill International Editions fifth Edition 1999

BEC221	CIRCUIT & DEVICES LAB	0	0	3	1

Equivalent subject code of the previous years / Part-Time / Other departments:BEC221/BEC156

1. Verification of superposition Theorem, MPT, Thevenin
2. Characteristics of P-N junction & Zener Diode
3. I/P & O/P of characteristics of BJT
4. Characteristics of JFET; Finding β of the transistor and fixed Biasing
5. Biasing of transistor in CE mode; BJT Amplifier Design CE Mode
6. BJT Amplifier CB mode and CC mode; JFET C.S. Amplifier
7. UJT Characteristics; SCR Characteristics
8. MOSFET Characteristics; Study of resonant circuits

BEE241   **ELECTRICAL ENGINEERING LAB**   0   0   3   1
Equivalent subject code of the previous years / Part-Time / Other departments:**BEE241**

1. OCC and Load Test on DC Shunt Generator
2. Load Test on DC Shunt Motor
3. Load Test on DC Series Motor
4. Speed Control of DC shunt motor
5. Swinburne's Test
6. Load test on single phase transformer
7. OC and SC tests on single phase Transformer.
8. Regulation of three phase alternator by emf method
9. Load test on alternator
10. V and Inverter V curve of synchronous motor
11. Load test on three phase induction motor
12. Load test on single phase induction motor

BEC202   **DIGITAL ELECTRONICS**   3   1   0   4
Equivalent subject code of the previous years / Part-Time / Other departments:**BEC202/BEC251/BEC229/BEC234**

NUMBER SYSTEMS   **12**
Review of binary, octal and hexadecimal number systems – conversions; Binary Arithmetic – signed magnitude form – 1's, 2's complement representation. Codes: - BCD, Excess-3, Grey codes, ASCII Codes, Error detecting codes (Hamming code)

BOOLEAN ALGEBRA   **12**
Boolean algebra – De Morgan's law - Simplifications of Boolean expression – Sum of products and product of sums – Karnaugh Map – Quince McClusky method of simplification (Including Don't care conditions)

COMBINATIONAL LOGIC   **12**
Logic gates – AND, OR, NOT, NOR, NAND and EX-OR – combinational logic- Arithmetic circuits – Half adder – Full adder, Half Subtractor - Decimal Adder – Excess 3 adder – Code converters – Multiplexer – Demultiplexer- Encoder – decoder – Design of any general combinational logic circuit. PAL, PLA, FPLA

SEQUENTIAL LOGIC DESIGN   **15**
Building blocks of sequential logic-RS, JK, Master-Slave, D and T flip-flop, Asynchronous and synchronous counters - Binary and BCD counters - Shift registers – Design and implementation of synchronous sequential circuits

LOGIC FAMILIES   **9**
Characteristics of RTL, DTL, TTL, families – Schottky, clamped TTL, ECL, IIL – Mos Inverters – complementary Mos inverters
                                                                          Total Hours: 60
Text Books:
1. Charles H. Roth, "Fundamentals of Logic Design", Thompson Learning
2. John. M. Yarbrough, Digital Logic: Application and design, Thomson Learning
3. John. P. Uyemura, "A first course in digital systems design an integrated approach, Thomson Learning.
4. ALBERT PAUL, MALVINO AND DONALD P LEACH: Digital principles and Applications. Mc Graw Hill publications.

Reference Book :
1. FLOYD: Digital Fundamentals, Universal Book Stall, New Delhi.1993
2. Morris Mano, ' Digital Electronics and Design', Prentice Hall of India, 2000

BEC204   **ELECTRONIC CIRCUITS**   3   0   0   3
Equivalent subject code of the previous years / Part-Time / Other departments: BEC204/BEC154/BEC257

RECTIFIER & POWER SUPPLY   **9**
Half & Full wave rectifies – filters – shunt, inductor, LC section & Ripple factor, π Calculation for C, L and LC filters – Voltage regulators – Zener – Series voltage regulator - SMPS

AMPLIFIERS   **9**
Amplifiers – Frequency response of RC coupled amplifiers – Frequency Response of Emitter follower, gain band width product – FET - amplifier at low and high frequency cascaded amplifiers

FEED BACK AMPLIFIER & OSCILLATORS   **9**
Four basic type of Feedback – effect of feed back on amplifier performance – condition for oscillation Barkhunsen criteria – LC oscillators – Hart ley & Colpitts – RC oscillators – Wein bridge, RC phase shift Crystal Oscillator.

MULTIIVIBRATORS   **9**
Collector coupled & Emitter coupled Astable multivibrator, – mono stable, Bistable multivibrator - triggering methods – storage delay and Calculation of switching time - Schmitt trigger circuits, Speed up Capacitor in switching

POWER AMPLIFIER   **9**
Classification – Class A, B, C & AB, Class B-push pull – Class B Complimentary, Symmetry, Class S, Power sections classifications, Efficiency, distortion in amplifiers
                                                                          Total Number of Hours : 45
TEXT BOOK :
Mohammed. H. Rashid, Micro Electronic Circuits, Analysis and Design, Thomson Learning
David. A. Bell Solid state Pulse Circuits Prentice Hall India,4th Edition, 2000.
Millman Taub H Pulse Digital & Switching waveform - Tata McGraw Hill International, 2001

Integrated Electronics – Jacob Millman, Cristas C. Halkias – Tata McGraw Hill., Edition 1991.

| BEC210 | SIGNALS AND SYSTEMS | 3 | 1 | 0 | 4 |

Equivalent subject code of the previous years / Part-Time / Other departments:**BEC210**

CLASSIFICATION OF SIGNALS AND SYSTEMS   12
Continuous time signals (CT signals), Discrete time signals (DT Signals) – Step, Ramp, Pulse, Impulse, Exponential, Classification of CT and DT signals – Periodic and aperiodic, random signals, CT systems and DT systems, Classification of systems – Linear Time invariant Systems.

ANALYSIS OF C.T SIGNALS   12
Fourier series analysis, Spectrum of C.T. Signals, Fourier Transform and Laplace Transform in Signal Analysis

LTI – CT SYSTEM   12
Differential equation, block diagram representation, Impulse response, Convolution integral, Frequency response, Fourier Methods and Laplace transforms in analysis, State equations and Matrix.

ANALYSIS OF D.T. SIGNALS   12
Spectrum of D.T. signals, Discrete Time Fourier Transform (DTFT), Discrete Fourier Transform (DFT), Properties of Z – Transform in signal analysis.

LTI – DT SYSTEMS   12
Difference equations, Block diagram representation, Impulse response, Convolution SUM, Frequency response, FFT and Z – Transform analysis, Realization of Digital filters – Direct Form-I, Direct Form-II, Transposed, parallel, cascade, Lattice- Ladder structure, State variable equation and Matrix.

Total Number of Periods: 60

Text Book:
1. V.Krishnamurthi, "Signals and Systems", Dhillon Publications, 2001.
2. Roger E. Zeimer et al, 'Signals and Systems': continuous and Discrete, McMillan, 2nd Edition, 1990.
Reference Book:
1. Allan V Oppenhiem et al, 'Signals and Systems', Prentice Hall of India Pvt. Ltd, 1997.
2. Douglas K Lindner, "Signals and Systems", McGraw Hill International, 1999.
3. Simon Haykin and Barry Van Veen, ' Signals and Systems, John Wiley and Sons, Inc., 1999.
4. Robert A. Gabel and Richard A. Roberts, 'Signals and Linear Systems', John Wiley, 3 Edition, 1987.

| BMA208 | PROBABILITY AND RANDOM PROCESSES | 3 | 1 | 0 | 4 |

Equivalent subject code of the previous years / Part-Time / Other departments:**BMA208/BEC253**

UNIT – I   12
Probability concepts – Baye's Theorem – Random Variables – Moments, Moment Generating Functions – chebychev's Inequality – Fucntions of Random variables – Marginal and Conditional Distributions

UNIT – II   12
Binominal, Poisson , Geometric, Negative Binomial, Exponential, Gamma, Weibull, Normal distributions central limit theorem

UNIT – III   12
Classification of Random Process – Markov Chains – Markov Process – Ergodic Process – Poisson Process – Birth and Death Process and Binominal Process

UNIT – IV   12
Auto Correlation – Auto Covariance – Cross correlation – Cross Covariance – Stationary Process

UNIT – V   12
Spectral Density – Cross Spectral Density – Applications to Linear Systems with Random Inputs and Outputs.

Total Number of Hours : 60

Text Books;
1. Richard Durrett, Probability : Theory and Examples, 3rd edition, Thomson Learning
2. T.Veerarajan, 'Probability Theory and Random Process', Tat McGraw Hill Pub. Co. New Delhi (2002)
Reference Book
1. M.K.Ochi, 'Applied Probability and Stochastic Process' – John Wolley and Sons (1990)
2. J.N..Kapur and H.C.Saxena. Mathematical Statistics, Chand and Co. Ltd, New Delhi (1997)
3. Peebles, Jr., Probability, Random Variables and Random Signal Principles – Tata Mc Graw – Hill Pubs (1987)

| BCS232 | DATA STRUCTURES AND ALGORITHMS | 3 | 1 | 0 | 4 |

Equivalent subject code of the previous years / Part-Time / Other departments:**BCS232/BCS251/BCS201**

LINEAR DATA STRUCTURES   12
Stacks, Queues & Lists Implementation and Application Singly linked list – Doubly linked   lists.

NON LINEAR DATA STRUCTURE   12
Trees – Binary Trees – Binary Search Tree – Tree Traversals – AVL Trees

ALGORITHMS ANALYSIS   12
Sorting and searching – space complexity – time complexity – Big Oh – Binary Searching – Analysis – Quick sort – Heap sort – Merge sort – Analysis

GRAPH ALGORITHMS   12
Graph operations – DFS – BFS – Minimum cost spanning tree – Krushkal's Prim's Algorithms

ALGORITHMS DESIGN METHODS   12
Greedy method – Shortest path – Divide and Conquer – Matrix multiplication – Dynamic programming – Back tracking – Traveling Sales person problem.

Total Number of Hours : 60

Text Book:
1. Gilberg & Forugan, Data structures: A pseudo code approach using c++ , 1st edition, Thomson Learning 2002.
2. E.Horowitz, S.Sahani & S.Rajasekharan, "Computer Algorithms", Galgotia 1999.

References:
1. Weiss Mark Allen. "Data Structures and Algorithms Analysis in C", Pearson Education, 2/e, 1997
2. E.Horowitz, S.Sahani & Mehta, 'Fundamental of Data Structures in C++", Galgotia 1999.
3. Sara Baase & Allen VanGelder. " Computer Algorithms', Galgotia 2000
4. Bhagat Singh, Thomas L.Naps, "Introduction to Data Structures", BPB Publications

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| BEE202 | NETWORK ANALYSIS AND SYNTHESIS | 3 | 1 | 0 | 4 |

Equivalent subject code of the previous years / Part-Time / Other departments:**BEE202/BEE203/BEE152/BEE204A**

TRANSIENT ANALYSIS   12
Forced and free response of RL, RC and RLC circuits with D.C and sinusoidal excitations.

TWO PORT NETWORKS   12
Characterization of two port networks in terms of Z, Y, H and T parameters – networks equivalents – relations between network parameters – Analysis of T, Ladder, Bridged – T and lattice networks – transfer function of terminated two port networks.

NETWORK TOPOLOGY   12
Network graph – tree – Tieset – cut set – Csutset schedule – primitive impedance and   admittance matrices – Application to network solution.

S – DOMAIN ANALYSIS & NETWORK SYNTHESIS   12
S - domain network – driving point and transfer impedances and their properties – transform network analysis – poles and zeros of network functions – time response from pole – zero plots. Realizability of one port network – Hurwitz polynomials and properties – P. R. functions and properties – synthesis of RL, RC and LC one port networks.

FILTERS & ATTENUATORS   12
Classification of Filters – filter networks – design of constant K, m – derived and composite filters. Analysis of T, π, lattice, bridged – T, and L type attenuators.

L = 45 T = 15 P=0 Total = 60

TEXT BOOK
1. Kuo F.F., 'Network Analysis and Synthesis', Wiley International Edition, Second Edition, 1966.

REFERENCES
1. Van Valkenburg , M.E., 'Network Analysis', Prentice – Hall of India Private Ltd., New Delhi, Third Edition ,1974.
2. Sudhakar. A., and Shyammohan , 'Circuits and Networks Analysis and Synthesis' Tata McGraw Hill Publishing Co.Ltd. New Delhi, 1994.
3. Roy Choudhury, "Network and Systems", New Age International Ltd.

| BEC222 | ELECTRONIC CIRCUITS LAB | 0 | 0 | 3 | 1 |

Equivalent subject code of the previous years / Part-Time / Other departments:**BEC222**
1. Rectifiers – Half wave, Full wave without filter
2. FWR with shunt, L and π filters
3. Voltage Regulator
4. RC coupled amplifier (with & without feedback)
5. Feedback Circuits
6. Schmitt trigger
7. Multi vibrators, Monostable, Astable, Bistable
8. Hartley Oscillator
9. Colpitts oscillator
10. Wein bridge oscillator
11. RC Phase shift Oscillator
12. Class A – Power Amplifier
13. Class B – Power Amplifier

| BCS222 | DATA STRUCTURES C++ LAB | 0 | 0 | 3 | 1 |

Equivalent subject code of the previous years / Part-Time / Other departments: **BCS242/BCS253/BCS221**
1. Implementation of Arrays (Single and Multi dimensional)
2. Implementation of Stack, Queue, Circular Queue (Using Arrays and Pointers)
3. Single Linked List
4. Circular Linked List
5. Doubly Linked List
6. General Lists
7. Evaluation of Expression
8. Binary Tree Implementation and Traversals
9. In order Threaded Binary Trees
10. Quick Sort and Heap Sort
11. AVL Tree – Insertion

| BEC301 | MICROPROCESSOR AND ITS APPLICATIONS | 3 | 0 | 0 | 3 |

Equivalent subject code of the previous years / Part-Time / Other departments: BEC301/252/359/333/213/332/216

UNIT – I   9
Internal Architecture of 8085 microprocessor – Instruction set – Addressing Modes – 8085 interrupts – Timing diagram – Debugging Techniques – Assembly level programming

UNIT – II   9
USART (8251) – Programmable Interval Timer (8253/8254) programmable Peripheral interface (8255) – CRT controller (8275 / 6845) – Floppy disk Controller (8272)

UNIT – III   9
Programmable DMA controller (8257)- Programmable Interrupt controller (8259)-Keyboard display Interface (8279) – ADC / DAC interfacing.

UNIT – IV   9
Typical Application of 8085 – Stepper Motor controls – Traffic light controls – waveform generation – Analog interfacing and industrial control – Microcomputer based system with seven segment displays and key switches

UNIT – V   9
8086 Architecture and pin configuration – Minimum mode and maximum mode configuration - Addressing modes – Basic Instructions – 8086 Interrupts – assembly level Programming – Introduction to 80186, 80286, 80386 and Pentium processor

Total Number of Hours: 45

Text:
1. Ramesh S.Gaonkar, Microprocessor Architecture Programming and Applications with 8085. Fourth edition, Penram International publishing 2000.
2. Douglas V. Hall, Microprocessor and Interfacing, programming and Hardware, Tata McGraw Hill, Second Edition 1999.

References:
1. Yu_Cheng Liu Glenn A. Gibson, Microcomputer systems the 8086 / 8088 family, Prentice Hall 2001.
2. Kenneth J.Ayala The 8086 Microprocessor, Programming and Interfacing the PC, Penram International Publishing, 1995.
3. A.K. Ray & K.M. Bhuchandi, " Advanced Microprocessor and Peripherals, Architecture, Programming and Interfacing", Tata McGraw Hill, 2000.

BEC303	**LINEAR INTEGRATED CIRCUITS**	**3**	**0**	**0**	**3**

Equivalent subject code of the previous years / Part-Time / Other departments:**BEC303/BEC256**

CIRCUIT CONFIGURATION FOR LINEAR ICs   9
Current Sources, Analysis of Difference Amplifiers with Active Loads, Supply and Temperature Independent Biasing, Band Gap References, Monolithic IC operational Amplifiers, Specifications, Frequency Compensation, Slew Rate and Methods of Improving Slew Rate.

APPLICATION   9
Scale changer- inverter and non-inverter - Summer and subtractor – Multiplier and divider – Differentiator and integrator – Instrumentation amplifier – AC amplifier – Op- amp circuits using diodes; Precision rectifier – Clipper and clamper – Sample and Hold circuit – log and antilog amplifiers.

COMPARATORS AND SIGNAL GENERATORS   9
Applications of comparators – Regenerative comparators (Schmitt trigger) – Square wave generator (astable multivibrator) – monostable multivibrator – Triangular wave generator – Saw tooth wave generator – Sine wave generators based on IC555 timer.

ACTIVE FILTERS AND TIMERS   9
RC active filters: low pass – high pass – band pass – band reject – notch – first order – Second order – transformation – State variable filter – Switched capacitor filters – Timer functional diagram – Monostable operation – Astable operation –Application – Schmitt trigger – Counter timers.

PLL, ADC AND DAC   9
Basic Principles – phase detector and comparator: analog and digital voltage controlled oscillator – Low pass filter - PLL – Applications of PLL – DAC/ADC techniques – Integrating DAC /ADC Specifications   **Total Hours : 45**

Text books:
1. James. M. Fiore, Operational amplifiers and linear integrated circuits, 1st Edition , Thomson Learning.
2. Roy Choudhury and Shail Jain: Linear Integrated Circuits, Wiley Eastern Ltd., 1991.

Reference Books:
1. Coughlin and Dirscol, Operational amplifiers and Linear Integrated circuits, Prentice Hall of India Pvt., Ltd., 1992
2. Millman and Halkias :Integrated Electronics, McGraw Hill, 1992.

BEC305	**TRANSMISSIONS LINES & WAVE GUIDES**	**3**	**1**	**0**	**4**

Equivalent subject code of the previous years / Part-Time / Other departments:**BEC305/BEC302/BEC253**

UNIT – I   9
Basic transmission line equations – Wave characteristics on an infinite transmission line, Transmission line, parameters and their evaluation – Attenuation and dispersion.

UNIT – II   9
Response of a lossless line – Bounce diagrams – Multiple reflections – initially charged line – Lines with reactive load.

UNIT – III   9
Lines as circuit elements – Voltage and current on the transmission line as functions of position – Terminated transmission lines, Standing waves, standing wave ratio, reflection coefficient, return loss, Mismatch loss

UNIT – IV   9
Analysis of transmission line properties using the Smith chart – Impedance matching with quarter – wave transformers – Single stub and double stub marching – ABCD parameters and their application to transmission line analysis.

UNIT – V   9

Wave propagation in wave guides – Rectangular wave guide field solutions, modes, properties – Cylindrical wave guide field solutions, modes and properties – Power transmission in wave guides – Attenuation in wave guides – Dielectric wave guides.

Tutorial Problems   15 Hrs
Total Number of Hours : 60

Text Books:

1. John D. Ryder, "Networks, Lines and Fields", Prentice Hall of India, 1995.
2. C.R. Paul, K. White and S.A. Nasar, Introduction to Electromagnetic Fields, McGraw – Hill, 1998.
References:
1. D.K. Cheng, Field and Wave Electromagnetics, Addision – Wesley, 1999.
2. S. Ramo, J.R. Whinnery and T, Van Duzer, Fields and waves in Communication Electronics, Wiley (Latest Edition)
3. S.Ramo, J.R. Whinnery and T.Van Duzer, Fields and Waves in Communication Electronics, Wiley (Latest edition)

BEC309	COMMUNICATION SYSTEMS	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BEC309/BEC206/254**

SIGNALS & NOISE   9

Periodic & Aperiodic Signals – Noise - External Noise – Thermal Agitation – Shot Noise – Noise Figure – Signal to Noise ratio – Equivalent Noise resistance

INTRODUCTION TO COMMUNICATION   9

Basic Communication systems – Need for Modulation in communication systems – Amplitude Modulation – Double Side Band amplitude Modulation – Single sideband and VSB modulation – modulators. Noise in linear Modulators Noise in linear modulation systems. FM modulation.

DETECTORS, TRANSMITTER AND RECEIVER   9

AM demodulators – FM detectors, AM Transmitter. FM transmitter – SSB Transmitters, Broadband transmitter and receiver AM & FM receivers, communication Receivers

MODULATION TECHNIQUES   9

Phase modulation – Noise triangle – Pre-emphasis and de-emphasis – Stereophonic FM multiplex system – comparison of wideband and narrow band FM – AFC

PULSE MODULATION   9

Introduction – Sampling theorem – PAM, PTM, PM, PCM – Telegraph. Digital Modulation System, ASK, FSK, PSK, Detection of signal in Noise.

Total Number of hours: 45

Text Books:

Roy Blake, Electronic Communication systems, 2nd Edition, Thomson Learning, 2002.
George Kennedy: Electronic communication systems, Tata McGraw Hill publications, 1992
Simon Haykins, 'principles of Communications, Prentice Hall of India. 2001
References:
Taub & Schilling, Principles of Communication. A. Bruce Carlson, Communication Systems , Tata McGraw Hill, 1986

BEE301	CONTROL ENGINEERING	3	1	0	4

Equivalent subject code of the previous years / Part-Time / Other departments: **BEE301/BEE252**

INTRODUCTION   9

Open-loop and closed –loop systems, servomechanisms and regulator systems, Transfer function, Block diagram reduction, Signal flow graphs.

MATHEMATICAL MODELS OF PHYSICAL SYSTEMS   9

Mechanical systems, - Translational and rotational systems, Gear trains, Electrical Systems, Thermal systems and Fluid systems Components of feedback control systems, Potentiometers as error sensing devices, Synchros, Servo motors, tachometers.

STABILITY   9

Concept of stability, necessary and sufficient conditions of stability; Closed-loop systems, merits and demerits; Routh-Hurwitz Criterion. Transient Response: Typical inputs, convolution integral, Time domain specifications, steady state errors.

FREQUENCY RESPONSE   9

Definition, equivalence between transient response and frequency response; Bode plots. Nyquist Stability Criterion : Development of criterion; gain and phase margins; m circles and Nichol's chart.

ROOT LOCUS METHOD: 9

Rules for sketching of root loci, Root contours, Synthesis: Lag and Lead networks, proportional, derivative and integral controllers.

Tutorial Problems   15 Hrs
Total Number of Hours : 60

TEXT BOOK

1.   Christopher Kilian, "Modern Control Technology", 2nd Edition, Thomson Learning, 2001
2.   Jeo. H. Chow, Discrete time control problems using MATLAB Thomson Learning
3.   I.J.Nagrath and M.Gopal, 'Control System Engineering', Wiley Eastern Ltd., Reprint 1995.
REFERENCES
1. M.Gopal, 'Control System Principles and Design', Tata McGraw Hill, 1998.
2. Ogatta, 'Modern Control Engineering', Tata McGraw Hill 1997.
3. C.J.Chesmond, 'Basic Control System Technology', low priced student edition, 1998.
4. R.C.Dorf and R.H.Bishop, 'Modern Control Systems,' Addison Wesley, 1995.

BCS303	COMPUTER ARCHITECTURE	3	1	0	4

Equivalent subject code of the previous years / Part-Time / Other departments: **BCS303/431**

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INTRODUCTION   **6**

Basic structure of Computer Hardware-Von-Neumann Architecture-Functional units-Instruction formats and types-Addressing modes.

ARITHMETIC AND LOGIC UNIT   **9**

Fixed point arithmetic operation-addition, subtraction, multiplication, division-Floating point arithmetic operation-Design of ALU-Bit-slice processors.

PROCESSOR UNIT   **12**

Data path implementation-Control unit-hardwired control, microprogrammed control, nanoprogramming- Concepts of pipelining.

MEMORY SYSTEM   **9**

Memory hierarchy-Internal organization of RAM, ROM, Interleaved memory-Cache and associative memories-Virtual memory.

INPUT/OUTPUT AND PERIPHERALS   **9**

Basic concepts-programmed I/O-Interrupts and DMA-I/O processors-input devices-display devices-printers magnetic disk drives-optical drives.

Total Number of Hours: 60

Text Books:

Parthasarathy, Advanced computer architecture, 2nd Edition, Thomson Learning 2004

Hayes, "Computer Architecture and Organization", Tata McGraw Hill, 1998.

MANO, Computer System Architecture, , Third Edition, PHI, 2000

References:

Heuring V.P., Jordan H.F., "Computer System Design and Architecture", Addison Wesley, 1999.

Patterson and Hennessey, "Computer Organization and Design". The Hardware/Software Interface, Harcourt Asia Morgan Kaufmann, 1999.

Carl Hamacher V.,Zvonko G.Vranesic, Safwat G. Zaky, "Computer organization", Tata McGraw Hill, Latest Edition.

BEC321   **LINEAR & DIGITAL INTEGRATED CIRCUITS LAB**   **0**   **0**   **3**   **1**

Equivalent subject code of the previous years / Part-Time / Other departments: **BEC321**

1.   Measurement of Op-Amp Characteristics
2.   Op-amp applications I – Inverting & Non-inverting amplifier, Summer, Multiplier, logarithmic and differential amplifiers, Integrator
3.   Op-amp applications –II –Wave form generation, Multivibrators
4.   Study of 555 IC and its applications
5.   Voltage controlled oscillator (VCO)
6.   A/D & D/A converters
7.   Study of Logic Gates & Digital Logic families
8.   Implementation of Boolean functions
9.   Adders & Subtractors
10. Multiplexers and demultiplexers
11. Study of Flip flops
12. Study of Registers
13. Study of Counters
14. Implementation of any general combinational / sequential logic circuits
15. Logic Circuit Design using MUX / DEMUX and Encoder / Decoder
16. Measurement of CMRR.

BEC323   **MICROPROCESSOR LAB**   **0**   **0**   **3**   **1**

Equivalent subject code of the previous years / Part-Time / Other departments: **BEC323**

8085 Microprocessor: -
1.   Assembly language Programming for single byte, Multibyte, addition and subtraction
2.   Assembly language Programming for Multiplication and division
3.   Searching and sorting
4.   Square and square root

Interfacing: -
5.   Wave form generation using 8255 PPI
6.   Traffic light controller
7.   Stepper Motor Controller
8.   Keyboard Interfacing
9.   Matrix display

8086 Microprocessor: -
10.   Average of N numbers
11.   Block Movement of Data
12.   Multibyte Addition
13.   Maximum of given series
14.   Square of a given number

| BEC304 | DIGITAL SIGNAL PROCESSING | 3 | 1 | 0 | 4 |

Equivalent subject code of the previous years / Part-Time / Other departments: **BEC304**

DISCRETE RANDOM SIGNAL PROCESSING   12

Estimation of Waveforms – The Prediction Problem–The filtering problem – The smoothing problem – Estimation of Stationary Process: The wiener filter – Estimation of Non stationary process: The Kalman filter - Wiener Khintchine Relation-Power Spectral Density –Periodogram – Sample Autocorrelation-Sum Decomposition Theorem, Spectral Factorization Theorem – Discrete Random Signal Processing by Linear Systems-Simulation of White Noise – Low Pass Filtering of White Noise.

DFT & FFT   12

Discrete Fourier Transform (DFT) –Properties – Convolution of sequences – Linear convolution - circular convolution. Introduction to Radix–2 FFT – Properties – DIT (FFT) – DIF (FFT) – Algorithms of Radix–2 FFT – Computing Inverse DFT by doing a direct DFT

DESIGN OF DIGITAL FILTER   14

Review of design techniques for analog low pass filters –Frequency transformations – Design of IIR filter, Properties of IIR filters – Characteristics of FIR filters with linear phase – Properties of FIR filters, Design of FIR filters using windows – Fourier series Method – Frequency sampling Method.

EFFECTS OF FINITE REGISTER LENGTH   12

Fixed Point & Binary floating Point Number Representation – Quantization Effects due to truncation &Rounding – finite word length effect in digital filters.

DIGITAL IMAGE FUNDAMENTAL   10

Elements of Digital Image Processing Systems, Elements of Visual Perception, Image Sampling and Quantization, Matrix and Singular Value representation of Discrete Images.

Total Hours : 60

Text: -

Ashok Ambardar, Analog and Digital signal processing, 2nd edition, Thomson Learning 2000.
Ashok Ambardar, Digital Signal processing, A modern introduction, 1st edition, Thomson Learning, 2006
Sanjit K.Mitra 'Digital Signal Processing', A computer Based Approach, Tata McGraw Hill, New Delhi, 1998.
Johnny R.Johnson, Introduction to 'Digital Signal Processing' Minth Printing, September 2001.
M.D. Srinath, P.K. Rajadekaran, R. Viswanathanm 'Introduction to Statistical Signal Processing with Applications', Prentice – Hall of India Pvt. Ltd., New Delhi, 1999.

Reference:

John G.Proakis and Dimitris G.Manolakis, "Digital Signal Processing, Algorithms and Applications", PHI of India Ltd, New Delhi 3rd Edition 2000.

| BEC306 | COMPUTER NETWORKS | 3 | 0 | 0 | 3 |

Equivalent subject code of the previous years / Part-Time / Other departments: **BEC306/BEC356**

DATA COMMUNICATION   9

ISO Reference Model, Open System Standard, Transmission of Digital Data – Electrical Interface, Modems, Line Configuration, Error Detection and Correction (CRC) - Introduction to Bluetooth.

DATA LINK CONTROL AND PROTOCOLS   9

Flow Control and Error Control, Stop And Wait, Sliding Windows, Automatic Repeat (ARQ), Asynchronous Protocols, - X Modem, Y Modem, Synchronous Protocols – Character Oriented and Bit Oriented Protocols (HDLC).

LOCAL AREA NETWORKS   9

IEEE 802 Standards, LLC, MAC layer Protocols – CSMA/CD Ethernet, Token Bus, Token Ring, FDDI, Distributed Queue Dual Bus, Switched Multimegabit Data Service.

WIDE AREA NETWORKS   9

Circuit Switch Packet Switch, Message Switching, X.25 Protocols, Architecture and layers of Protocol, ISDN and ATM Protocol – Architecture Header structure, function of AAL Layer,Internetworking Devices, Repeater, Bridge, Routers and Gateways, Routing Algorithms.

UPPER OSI LAYERS   9

Session Layer Protocols, Presentation Layer – Data Security, Brief introduction to Encryption / Decryption, Data Compression, Application Layer Protocols, MHS, file Transfer.

Total Number of Hours : 45

Text Books
1. William A, Shay, Understanding data communications and networks, 3rd Edition, Thomson Learning, 2003
2. Miller, Data and network communications, Thomson Learning
3. Gallo, Computer communications and networking technologies, 1st edition, Thomson Learning, 2001.
4. Behrus A. Forouzan Etal, "Data Communication and Networking", 2nd Edition, Tata McGraw Hill, 2000.

Reference Books :
1. William Stallings, "Data and Computer Communication", Fifth Edition, Prentice Hall of India, 1997.
2. Andrew S. Tanenbaum, "computer Networks", Third Edition, Prentice hall of India, 1996.
3. Fred Hallsall, "Data Communication Computer Networks and open System", Addison – Wesley, 1992.

BEC312	DIGITAL COMMUNICATION	3	1	0	4

Equivalent subject code of the previous years / Part-Time / Other departments: **BEC312/BEC307/BEC357**

SAMPLING & WAVEFORM CODING 9
Sampling Theorem, Band Pass Sampling, Distortion due to sampling, Uniform and Non Uniform quantization, Quantization Error, PAM, PCM and TDMA principles, Differential Pulse Code Modulation and Delta Modulation, Linear Prediction and prediction Filters, speech Coding at Low Bit Rates.

BAND LIMITED SIGNALING 9
Power Spectra of PAM Signals, Inter Symbol Interference, Ideal Nyquist Channel, raised Cosine Channels, Correlative coding and Precoding, Eye Patterns and Equalization Techniques.

DIGITAL MODULATION, DETECTION AND ESTIMATION 12
Gram Schmidt Procedures, Matched Filters, correlation Receivers, Likelihood Functions, and Maximum Likelihood Detections, BPSK, QPSK, FSK and MSK Schemes Bit and Symbol Error Properties, Performance, Comparisons, Principles of Carrier and Timing Synchronizations.

ERROR CONTROL CODING 9
Introduction to Linear Block Codes, Hamming Codes, BCH Coding, RS Coding, Convolution coding, Coding Grain Viterbi Decoding.

UNIT – V SPREAD SPECTRUM SYSTEMS 6
Pseudo Noise sequences, Generation and Correlation Properties, Direct Sequence Spread Spectrum Systems, frequency Hop system, Processing Gain Antijam and Multipath Performance. **Tutorial Problems 15 Hrs**
Total No. of Hours : 60

Text Books :
1. B.P. Lathi, Modern Digital and Analog communication system, Oxford publications, Third edition.
2. Simon Haykins, " Digital communications", John Wiley, 1988.

Reference Books:
1. Roy Blake, Electronic Communication systems, 2nd edition, Thomson Learning, 2002
2. John. G. Proakis,m "Digital Communication", McGraw Hill Inc., Third Edition, Malaysia, 1995.
3. M.K. Simen, "Digital Communication Techniques, Signal Design & Detection", Prentice Hall of India, 1999.

BEC310	MEASUREMENTS AND INSTRUMENTATION	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BEC310**

TRANSDUCERS 9
Measurements, Instrumentation, Errors in Measurements, Calibration and Standard, Classification and characteristics of Transducers, Digital, Electrical, Electronic Weighing System, AC / DC Bridge Measurement and their applications.

SIGNAL GENERATOR AND SIGNAL ANALYZERS 9
A.F. Generator, Pulse Generator, AM / FM Signal generator, Function Generator, Sweep frequency generator, Wave analyzers, Spectrum Analyzers , Logic Analyzer, Distortion Analyzers.

DIGITAL INSTRUMENTS 9
Digital Voltmeters and Multimeters, Automation in Voltmeters, Accuracy of DVM, Guarding Techniques, Frequency, Period, Time Interval and Pulsewidth Measurements, Automatic Vector Voltmeter**.**

DATA DISPLAY AND RECORDING SYSTEM 9
CRO, Single beam, Dual Trace, Double Beam CRO, Digital Storage and Analog Storage Oscilloscope, Sampling Oscilloscope, Power Scope, Curve tracer, Analog, Digital Recorders and Printers

COMPUTER CONTROLLED TEST SYSTEM 9
Testing and Audio Amplifier, Testing a Radio Receiver, Instrument used in Computer controlled Instrumentation, Digital Control Description, Microprocessor based Measurements, Case Studies in Instrumentation.
Total Number of Periods: 45

Text Books:
1. Rangan C.S. "Instrumentation Devices and Systems", Tata McGraw Hill, 1998.
2. Cooper, "Electronic Instrumentation and Measurement Techniques", Prentice Hall of India, 1988.

Reference Books:
1. Bouwels A.J., "Digital Instrumentation", McGraw Hill, 1986.
2. Barney .C., "Intelligent Instrumentation ", Prentice Hall of India, 1985.
3. Oliver and Cage, "Electronic Measurements and Instruments and Instrumentation", McGraw Hill, 1975.
4. Deobelin, "Measurements Systems", McGraw Hill, 1990.

BEC316	ANTENNAS AND WAVE PROPAGATION	3	1	0	4

Equivalent subject code of the previous years / Part-Time / Other departments: **BEC316/BEC401/BEC353/BEC308**

RADIATION PRINCIPLE AND ANTENNA TERMINOLOGIES: 5
Principle of Radiation, Isotropic radiator – Antenna terminologies - Reciprocity theorem - Friis Formula

ANTENNA FUNDAMENTALS: 12
Introduction – Basic antenna parameters - Beam area - Directivity gain – resolution aperture – Point sources – arrays of point sources -Radiation from an oscillating dipole - Short linear antennas - Half wave dipole as a basic radiating element - Folded unipole and dipole antennas - Shunt fed dipoles - slot antennas - Loop antennas - Standing wave radiators.

ANTENNA ARRAYS& PRACTICE: **7**
Pattern multiplication - Arrays of two driven antennas - Broadside arrays - end fire arrays - Collinear arrays - Parasitic Arrays -Antenna for low & medium frequencies - Tower antenna

SPECIAL ANTENNA   **8**
Effects of ground on antenna performance - Ground systems - Top loading - Excitation methods - Antenna couplers, baluns - Yagi antenna - comer reflector - Biconical antennas - Turnstile antennas - Helical antennas - Parabolic reflectors

WAVE PROPAGATION: **13**
Propagation in free space - Propagation around the earth - Surface wave and its propagation - Structure of the ionosphere - Propagation of plane waves in an ionized medium - Determination of critical frequencies - Maximum usable frequency - Effect of Earth's magnetic field - Ionospheric variations - Fading - Tropospheric propagation - Space wave - Super refraction - frequency - Refractive index of troposphere - Effect of surface irregularities - Scatter propagation.

Tutorial Problems 15 Hrs
Total No. of Hours   60

TEXT BOOKS:
Prasad .K.D., "Antennas and wave propagation", Satya prakasan, 3rd Edition, 1996
John D.Kraus,. "Antennas " Tata McGraw Hill 2nd Edition, 2000.
REFERENCES:
Edward.C.Jordan and Keith.G.Balmain, "Electromagnetic waves and radiating systems", Prentice Hall, 2nd Edition, 1995.

BMG332   MANAGEMENT CONCEPTS AND ORGANIZATIONAL BEHAVIOR   **3**   **0**   **0**   **3**
Equivalent subject code of the previous years / Part-Time / Other departments: **BMG332/BMG331/BMG351/BMG352**
Objectives:
This course is aimed at addressing the contemporary issues, which fall under the broad title of management and its function; In addition, there will also be an attempt to analyze the behavior of individuals within an organization and the issues of working with other groups or teams.

Contents:
1. Management – definition, evolution, MBO
2. Management functions – planning, Organization, Leading, Motivating, Control and operations / Marketing / Finance / HR
3. Organizing and managing HR and communicating
4. Motivating and leading
5. Behavior of an individual in an organization – attitude, value, job satisfaction, personality, perception, concepts of learning, motivation, theories and application
6. Group behavior – structure process, decision making, work team – different from group
7. Power and politics, organizational culture
8. Organization work culture and work design
9. HR polices and practices
10. Managing the future – new worker / new organization etc.

Text Books:
1. John Pierce, Management and organizational behavior, 1st edition, Thomson Learning 2005.
2. Stephen P. Robbins, Organizational Behavior , Prentice Hall of India, IX edition, i2001
3. Koontz O'Dannel, Principles of Management – McGraw Hill Publication, co. ltd
4. Peter Drucker, The Practice of Management - Allied Publication
5. L.KM. Prasad, Management Principles, Sultan Chand and Sons

Reference Books:
1. Stephen P. Robbins and David A. Decenzo, Fundamentals of Management, Pearson Education, III Edition, 2001.
2. Koontz, Essentials of Management, Tata McGraw Hill, V Edition, 2001.
3. Gupta. C.B Management Theory and Practice, Sultan Chand and Sons
4. Steward Black and Lyman W. Porter, Management – Meeting new challenges, Prentice Hall of India, 2001.

BEC324   COMMUNICATION ENGINEERING LAB – I   **0**   **0**   **3**   **1**
Equivalent subject code of the previous years / Part-Time / Other departments: **BEC324/BEC361/BEC323**
1. Design and Testing of Amplitude modulation
2. Design and Testing of Amplitude demodulation
3. Design and Testing of frequency modulation
4. Design and Testing of frequency demodulation (any one method)
5. Design and Testing of Pulse amplitude modulation & demodulation
6. Design and Testing of ASK, FSK and PSK
7. Study of Line coding and decoding techniques
8. Study of Sampling
9. Study of Pulse code modulation

BEC328   DIGITAL SIMULATION AND SIGNAL PROCESSING LAB   **0**   **0**   **3**   **1**
Equivalent subject code of the previous years / Part-Time / Other departments: **BEC328**
1. Digital Simulation using EDA tools (25 % of course)
2. Application of Combination Logic Design
3. Application of Sequential Logic Design
4. Using MATLAB (25 % of course)
5. Representation of time-series; computation of convolution
6. Response of a difference equation to initial conditions; stability
7. DFT computation

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8. Computational experiments with digital filtering
9. DSP processor implementation (40 % of course)
10. Sampling & Waveform generation
11. FIR & IIR Filters Implementation
12. Fast Fourier transforms
13. Adaptive Filters
14. Multirate Signal Processing
15. Measurement on signal parameters in Time Domain & Frequency Domain. (10 % of course)
16. Determination of the individual amplitudes of the different dominate harmonics of a composite signal (Example ; Square wave signals) using Spectrum analyzer
17. Determination of the phase difference between two signals (Derived from the Same source (say 1 KHz square wave signal) using two different paths, one of which contains a delay unit) using CRO and a phase detector circuitry,
18. Determination of the frequency of unknown signals: using CRO and Lissajous patterns

References:

1.James H. McClellan, C. Sidney Burrus, Alan, V. Oppenheim, Thomas W. Parks & Schafer / Schuessler, " Computer based exercises for Signal Processing Using MATLAB ", Ver. 5 Prentice Hall Inc., 1/e, 1998.

2.Henrik V. Sorensen & Jianping Chen, Digital signal processing laboratory using the TMS320C30 Prentice Hall Inc., 1/e, 1997.

| BEC403 | OPTICAL COMMUNICATION | 3 | 1 | 0 | 4 |

Equivalent subject code of the previous years / Part-Time / Other departments: **BEC403/BEC451**

Introduction to optical fibers   9
The General system – Evolution of Fiber optical system – Elements of an optical Fiber Transmission link – Ray Theory transmission – Cylindrical Fiber – Single Mode fibers

Attenuation of optical fibers   9
Absorption losses, scattering losses – Bending losses – Core and cladding losses – Material Dispersion – Wave guide Dispersion – Signal Distortion in SM fibers - Inter-modal Dispersion

Optical Sources   9
Direct and Indirect Band Gap material – LED structures - LED power and efficiency – modulation – Laser Diodes structures and Radiation pattern – single mode lasers – modulation of laser diodes.

Optical Detectors   9
PIN and APD Diodes – Photo detector Noise, SNR, Detector Response time, Avalanche multiplication noise – comparison of photo detectors – fundamentals Receiver operation – FET preamplifiers

Digital Systems   9
Point –Point links – system design consideration – Fiber splicing and connectors – Line power Budget – Rise time Budget – Noise Effects on system performance – operational principles of WDM.   **Tutorial Problems   15 Hrs**
         Total Number of hours : 60

Text Book:
   1. John M. Senior, "Optical Fiber Communication principles and practice" – Prentice Hall of India private limited, 1996
Reference Book
   1.Gerd Keiser, "Optical Fiber Communication System", McGraw Hill, International, Singapore 3rd ed., 2000.
   2. J. Gower, "Optical communication system", Prentice Hall of India, 2001.

| BEC405 | MICROWAVE ENGINEERING | 3 | 0 | 0 | 3 |

Equivalent subject code of the previous years / Part-Time / Other departments: **BEC405/BEC402/BEC352**

Overview of microwaves and microwave techniques.
Microwave tubes   9
 Limitations of conventional tubes at very high frequencies – Velocity – modulated tubes, two – cavity klystron amplifiers, reflex klystron oscillators, Multi – cavity klystron amplifiers – Periodic slow – wave structures and their use in traveling wave tube amplifiers, focusing techniques, TWTA performance characteristics – Electron motion in crossed electric and magnetic fields, Magnetron oscillators, Hartree equation Rieke diagram and performance charts – Other microwave tubes.

Microwave solid-state devices   9

 Varactor diodes, manley – Rowe relations, low noise parametric amplifiers, harmonic generation with varactors and step-recovery diodes – transferred – electron devices and their operation, cavity – controlled modes, LSA mode-avalanche – transit time devices and their operation, TRAPATT mode, Other devices for microwave generation – PIN diodes and their use as attenuators and switches – fabrication techniques.

Micro wave Transistors   9

Small – Signal equivalent circuits, high-frequency applications, performance criteria and limitations of BJTs and FETs – HEMTs – Fabrication Techniques

Microwave components   9

 Transmission lines for use at microwave and mm wave frequencies – attenuators, directional couplers, terminators, phase shifters, Faraday rotations isolators and circulators, resonance isolators and field displacement isolators, microwave filters, frequency meters, hybrid junctions, duplex - microwave integrated circuits.

Microwave measurements   **9**

 Slotted - line techniques – measurements of wavelength – Measurement of low and high VSWR – measurement of frequency and frequency meters – measurement of insertion loss and attenuation by substitution methods – measurement of low and high powers at microwave frequencies – modern measurement techniques using automatic network analyzer and spectrum analyzer.   **Total Number of hours: 45**

Text Book:

1. Annapurna Das, Sisr. K. Das, "Microwave Engineering", Tata McGraw Hill Co., Ltd., 1999. Reprint 2001.

Reference Book:

1. D.M. Pozer, Microwave Engineering, Addision – Wesley, 1998.
2. S.Y. Liao, Microwave Devices and Circuits, 3rd Ed., Prentice – hall Int.

BEC407	INTRODUCTION TO VLSI DESIGN & EMBEDDED SYSTEMS	3	1	0	4

Equivalent subject code of the previous years / Part-Time / Other departments: **BEC407**

VLSI FABRICATION TECHNOLOGY   **9**
An overview of wafer fabrication-wafer processing – oxidation – patterning – Diffusion – Ion Implantation – Deposition – Silicon gate nMOS process – CMOS process – nwell – pwell - Twin Tub – CMOS process enhancements – interconnect – Circuit elements.

LOGIC DESIGN   **9**
Switch logic – gate logic – other forms of CMOS logic – simple combinational logic design examples – paring generator – multiplexes – clocked sequential circuits – Dynamic register element – nMOS and CMOS - JK flip-flop circuit – Introduction to FPGA.

SUBSYSTEM DESIGN PROCESS   **9**
Design of a 4-bit shifter – 4 bit arithmetic adder - Multipliers – commonly used memory / Storage elements.

HARDWARE DESCRIPTION LANGUAGES   **9**
VHDL, background and basic concepts, structural specifications of hardware design organization – programming.

PIC MICROCONTROLLER   **9**
Programming of PIC Micro controllers. Architecture of 16C54 and 16F84 Micro controllers. Instruction set of PIC micro controllers. Simple Applications with the above PIC micro controllers

                                                                         Tutorial Problems:15 Hrs
                                                                         Total No. of Hours: 60

Text books:
1. Charles. H. Roth, Digital System design using VHDL, 1st Edition (with CD) Thomson Learning 2000.
2. Douglas A Pucknell and Kamran Eshanghain, "Basic VLSI Design," Prentice Hall of India, New Delhi. November 2001.
Reference Book
1. Wayne wolf, Modern VLSI Design, 2nd Edition, Prentice Hall, 1998
2. Navabi.Z., "VHDL Analysis and modeling of Digital Systems", McGraw Hill, 1993.

BMG431	ENTERPRENEURSHIP DEVELOPMENT	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments:**BMG431**
Objectives :
Starting and operating a new business has now become the exciting option that a large number of young graduates are exploring, especially in the light of the globalized market scenario. The risks associated with new ventures tend to bring about inertia against new creation. This course aims at providing a structures approach to young entrepreneurs to succeed in their pursuit of new, unknown but promising ventures.

Contents
1.   Creativity for generating business idea – focus groups, brain storming etc.
2.   Creating / Starting a venture
3.   Business Plan – Market plan, financial plan, organizational plan, risk assessment
4.   Sources of Capital – equity, debt, commercial loans of different types.
5.   Record keeping, hiring
6.   Motivating and leading a team
7.   Financial control – Assets, costs & Profits
8.   Entrepreneurial skills – marketing, strategic planning, Time – Management etc.
9.   Negotiation skills
10. Other routes for success – joint venture, acquisition, merger, franchising etc
11. Going public – raising funds from the market

Text Books:
1. Hisrich, Entrepreneurship, Tata McGraw Hill, New Delhi, 2001.

Reference:
1. Kuratko, Entrepreneurship, 6th Edition, Thomson Learning, 2005.
2. Prasanna Chandra, Projects – Planning, Analysis, Selection, Implementation and Reviews, Tata McGraw – Hill Publishing company Limited, 1996
3. P.C. Jain (ed.) Handbook for New Entrepreneurs, EDII, Oxford University Press, New Delhi, 1999.
4. Staff college for Technical Education, Manila and Centre for Research and Industrial staff Performance, Bhopal, Entrepreneurship Development, Tata McGraw Hill Publishing company Ltd, New Delhi, 1998.
5. P. Saravanavel, Entrepreneurial Development, Ess Pee kay, Publishing House, Chennai
6. S.S. Khanka, Entrepreneurial Development. S. Chand and Company Limited, New Delhi.

| BEC421 | COMMUNICATION ENGINEERING LAB-II | | 0 | 0 | 3 | 1 |

Equivalent subject code of the previous years / Part-Time / Other departments: **BEC421/BEC322**

1. Reflex klystron mode characteristics.
2. Measurement of guide wave length
3. Measurement of VSWR and impedance of unknown loads, including measurement of high VSWRs.
4. Measurement of the coupling and the directivity of wave-guide directional couplers.
5. Measurement of insertion loss and isolation of non – reciprocal ferrite devices.
6. Study of tee junction (E-Plan, H-Plane and E-H plane tees.)
7. Measurement of the gain and radiation pattern of a wave guide horn antenna
8. Study of Gunn oscillator characteristics.
9. Study of a fiber-optic communication link.
10. Characteristics of LED and PIN diode
11. Characteristics of Laser Diode
12. Characteristics of avalanche photo diode
13. Measurements of fiber parameter: Numerical aperture, Attenuation

| BEC427 | VLSI & EMBEDDED SYSTEM LAB | | 0 | 0 | 3 | 1 |

Equivalent subject code of the previous years / Part-Time / Other departments: **BEC427/BEC354**

(Experiments from 1 to 6 should be done using CPLD Trainer kits, and Experiments from 7 to 12 should be done using PIC microcontroller)

1. Design and Testing of Half adder, Full Adder.
2. Design and Testing of Half subtractor / Full subtractor
3. Design and Testing of JK, D, T and SR Flip Flops
4. Design and Testing of Counters
5. Design and Testing of Multiplexer, Demultiplexer
6. Design and Testing of Magnitude comparator with 8 bits.
7. ADC Interface Experiment with Temperature sensor.
8. Stepper Motor Interface
9. Traffic Light controller
10. DAC / DC Motor Speed Control
11. PIC to PC serial (RS232) Communication
12. 5 x 7 Matrix LED Display Interface and 16 x 2 character LCD Interface.

| BMG432 | Total Quality Management | | 3 | 0 | 0 | 3 |

Equivalent subject code of the previous years / Part-Time / Other departments: **BMG432**

Objectives:

Quality is considered as a major strategic and competitive weapon in today's globalized market scenario. TQM has emerged as the most effective tool in achieving quality, productivity and competitiveness. This course is intended to provide an appreciation and understanding of the fundamental concepts and teachings of TQM to students. Attempts will be made to discuss about the advances in IT and communication .

Contents

1. Introduction to Deming's philosophy
2. Customer satisfaction: Who is the Customer, Complaints, and Feedback?
3. Employee Involvement
4. Continuous process improvement: IIT, Kan Ban, Cellular Manufacturing, Juran's Trilogy, PDSA, Kaizan, Re – Engineering
5. Supplier partnership
6. Performance measures
7. Quality systems – ISO 9000, Others
8. QFD
9. Quality by design: Tools and pitfalls
10. Design of experiments: Statistical Tests (F.T. Etc.) Orthogonal Design
11. Taguchi and Quality engineering: Loss function, Orthogonal Arrays, signal / Noise parameter design, Tolerance Design
12. Failure Mode Effect Analysis
13. ISO 14000 and 14001
14. Management tools: Forced Field Analysis, Nominal Group Techniques, Affinity Diagrams, Interrelationship Diagram, Tree Diagram, Matrix Diagram, Prioritization Matrix, Process Decision program charts, Activity Network Diagram

Text Books:

1. James R. Williams and Lindsey M., The Management and Control of Quality Thomson Press, SW, 2002.
2. Feighbaunm A.V., Total Quality Management, McGraw Hill
3. Oakland, J.S. Total Quality Management Butterworth – Heinemann Ltd.
4. Subbraj Ramaswamy, Total Quality Management, Tata Mc. Graw Hill, 2005.

LIST OF ELECTIVES

| BECE01 | BIOMEDICAL INSTRUMENTATION | | 3 | 0 | 0 | 3 |

Equivalent subject code of the previous years / Part-Time / Other departments: **BECE01/BECE07**

BASIC PHYSIOLOGY: 9

Cells and their structures – Transport of ions through cell membrane – Resting and excited state – Transmemberane potential – Action potential – Bio-electric potential – Nervous system – Physiology of muscles – Heart and blood circulation – Respiratory system – Urinary system.

BASIC TRANSDUCER PRINCIPLES AND ELECTRODES: 9

The transducer principles – Active transducers – Passive transducers – Transducer for Bio-medical application – Electrode theory- Bio-potential electrode – Bio-chemical transducer.

CARDIOVASCULAR SYSTEM　　　　　　　　　　　　　　　　　　　　　　9
The heart and cardiovascular system – Blood pressure – Characteristics of blood flow – Heart sounds - Electro cardiography – Measurements of blood pressure – Measurement of blood flow and cardiac O/P Plethysmography – Measurements of heart sounds.

X-RAY AND RADIOISOTOPE INSTRUMENTATION:　　　　　　　　　　9
X-ray imaging radiography – Fluoroscopy – Image intensifiers – Angiography - Medical use f radioisotopes – Beta radiations – Detectors – Radiation therapy.

BIO-TELEMETRY:　　　　　　　　　　　　　　　　　　　　　　9
Introduction to biotelemetry – Physiological parameters adaptable to biotelemetry – The components of biotelemetry systems – Implantable units – Applications of telemetry in patient care – Application of computer in Bio-medical instrumentation, Anatomy of Nervous system – Measurement from the nervous system – EEG – EMG.

Total Number of hours: 45

Text Books :
1. Lesis Cromwell Fred, J.Werbell and Erich A.pfraffer, Biomedical instrumentation and Measurements – Prentice Hall of India, 1990.
2. M.Arumugam, Bio-medical Instrumentation – Anuradha Agencies Publishers, 1992.
3. Khandpur, Handbook on Biomedical Instrumentation – Tata McGraw Hill Co Ltd., 1989.

BECE02	CELLULAR MOBILE COMMUNICATION	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BECE02**

INTRODUCTION TO WIRELESS MOBILE COMMUNICATION　　　　　　9
History and Evolution of Mobile Radio Systems, Types of Mobile wireless services / systems – Cellular, WII, Paging, Satellite systems, standard, future Trends in Personal Wireless Systems.

CELLULAR CONCEPT AND SYSTEM DESIGN FUNDAMENTALS　　　　9
Cellular Concept and Frequency Reuse, Multiple Access Schemes, Channel Assignment and Handoff, Interface and System Capacity, Trunking and Erlang Capacity Calculations.

MOBILE RADIO PROPAGATION　　　　　　　　　　　　　　　　9
Radio Wave Propagation Issues in Personal Wireless Systems, Propagation Models, Multipath Fading and Based and Impulse Models, Parameters of Mobile Multipath Channels, Antenna System in Mobile Radio.

MODULATION AND SIGNAL PROCESSIN　　　　　　　　　　　　9
Analog and Digital Modulation Techniques, Performance of Various Modulation Techniques – Spectral Efficiency, Error Rate, Power Amplification, Equalization / Rake receiver Concepts, Diversity and Space-time processing, Speech Coding and channel Coding.

SYSTEM EXAMPLES AND DESIGN ISSUES　　　　　　　　　　　　9
Multiple Access Techniques – FDMA, TDMA and CDMA Systems, operational systems, wireless Networking, Design Issues in Personal Wireless Systems.

Total Number of Hours: 45

Text Books
Roy Blake, Wireless Communication technology, 1st Edition Thomson Learning, 2001.
Dharma P. Agarwal, Introduction to wireless and Mobile systems, II Edition, Thomson Learning 2006.
K. Feher, Wireless Digital Communication, Prentice Hall of India, New Delhi, 1995.

Reference:
T.S. Rappaport, Wireless Communication, Principle and Practice, Prentice Hall, NJ, 1996
W.C.Y. Lee, Mobile Communication Engineering; Theory and Application, Second Edition, McGraw Hill International,1998.

BECE03	DIGITAL IMAGE PROCESSING	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BECE03**

CONTINUOUS AND DISCRETE IMAGES AND SYSTEMS　　　　　　　9
Light, Luminance, Brightness and Contrast, Eye, The Monochrome Vision Model, Processing Problems and Applications, Vision Camera, Digital Processing System, 2-D sampling Theory, Aliasing, Image Quantization, Lloyd Max Quantizer, Dither, Color Images, Linear Systems And Shift Invariance, Fourier Transform, Z-Transform, Matrix theory Results, Block Matrices and Kronecker Products.

IMAGE TRANSFORMS　　　　　　　　　　　　　　　　　　　9
2-D orthogonal and Unitary transforms, 1-D and 2-d DFT, Cosine, Sine, Walsh, Hadamard, Haar, Slant, Karhunen-loeve, singular value Decomposition transforms.

IMAGE ENHANCEMENT　　　　　　　　　　　　　　　　　　9
Point operations – Contrast stretching, clipping and thresholding density slicing, Histogram equalization, modification and specification, spatial operations – Spatial averaging, low pass, high pass, band pass filtering, direction smoothing, medium filtering, generalized cepstrum and homomorphic filtering, edge enhancement using 2-D IIR and FIR filters, color image enhancement

IMAGE RESTORATION　　　　　　　　　　　　　　　　　　　9
Image observation models, sources of degradation, inverse and Wiener filtering, geometric mean filter, non-linear filters. Smoothing splines and interpolation, constrained least squares restoration.

IMAGEDATA COMPRESSION AND IMAGE RECONSTRUCTION FROM PROJECTION　　　9
Image data rates, pixels coding, predictive techniques transform coding and vector DPCM, Block truncation coding, wavelet transform coding of images, color image coding. Random transform.

Total Number of Periods : 45

Text Books :

136

1.   Milan Sonka, Image Processing – Analysis and Machine vision, 2nd Edition, Thomson Learning.
2.   Alasdar McAndrew, Introduction to digital image processing, Thomson Learning 2004.
3.   Anil K. Jain, "Fundamentals of Digital Image Processing", PHI 1995.

Reference Books:
1.   M.A.Sid Ahmed, "Image Processing", McGraw Hill, Inc, 1995.
2.   R.Gonzalazand P.Wintz, "Digital Image Processing", Addition Wesley 2nd Ed, 1987.
3.   William. K.Pratt, "Digital Image Processing", Wiley Interscience, 2nd Ed, 1991.

BECE04	RADAR AND NAVIGATIONAL AIDS	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BECE04/BECE13**

RANGE AND EQUATION AND TYPES FO RADAR   9
Range Parameters, Pulsed Radars, Signal to Noise Ratio, Integration of Pluses Beam Parameters, System Losses and Propagation Effects MTI; CW and Pulse-doppler Radar, Delay Lines Tracking Radar, Monopulse, Sequential, Simultaneous, Conical Scan and Monopulse Trackers, Beacons,

TRANSMITTER, RECEIVERS AND ANTENNAS   9
Klystron, Magnetron, TWT Amplifiers and Oscillators, Crossed Fields Devices, Parabolic Cassegrainian, Coefficient, Squares Antennas, Radomes, Feeds, Receivers, Performance Figures, Displays Scope and PPI Duplexers.

DETECTION OF RADAR SIGNALS IN NOISE   9
MF, Correlation Detection, Detector Characteristics, Automatic Detection, CFAR Receiver, Pulse Compression and Classification of Targets with Radar.

PROPAGATION OF RADAR WAVES AND CLUTTER   9
Plane Earth and Spherical earth Problem, Refraction and diffraction, GTD Analyzers, Surface and Sea Clutter, Detection of Targets, Effects of Weather on Radar.

RADAR TOPICS AND NAVIGATIONAL AIDS   9
Synthetic Aperture, Over the Horizon Radar, ARSR, ASR, Bistatic and Monostatic Radars, LORAN, ILS, GCA, Direction Finder, VOR Concepts, Airborne Doppler Navigation.

                                                Total Number of hours : 45

Text Books :
1.   M.I. Skoinik "Introduction to Radar Systems:, McGraw Hill 1981.
2.   F.E. Terman, "Electronics and Radio Engineering" McGraw Hill Nagaraja "Electronic Navigation"

BECE05	SATELLITE COMMUNICATION	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BECE05/BECE09**

ELEMENTS OF ORBITAL MECHANICS: 5
Equation, Orbital elements, Orbital perturbation; Tracking and orbital determination, Orbital correction / Control

ELEMENT FO COMMUNICATION SATELLITE DESIGN: 6
Space environment, Spacecraft configuration, Spacecraft subsystem, Payload, Reliability consideration – Spacecraft Integration and testing.

MULTIPLE ACCESS TECHNIQUES :   10
FDM – FM – FDMA, TDMA, SSMA / CDMA, RANDOM MULTIPLE access techniques; Packet switching and packet satellite networks Satellite on board processing and switching.

SATELLITE LINK DESIGN   12
Types of system: BSS, Performance requirements and standards for Telephony, TV and DATA. Performance impairments; Noise, Interference, inter modulation. Design of typical satellite links.

DOMESTIC SATELLITE SYSTEMS:
The INSAT system, International system: INTELSAT, IMMARSAT, Satellite based personal communication LEO, ICO, GEO Systems.

EARTH STATION DESIGN   12
Earth station configuration, Site selection, Antenna and Tracking systems, Receiver and Transmitter subsystems, Terminal equipment: Telephone / Video interface, rearward links, miscellaneous facilities like Echo Suppressor, FM digitizers, Ground station Measurements, Elements of frequency coordination and control. VSAT   Networks and terminals – Satellite broadcasting, Satellite TV systems.

                                                Total Number of Hours : 45

Reference Books:
1.   B.N.Agarwal, Design of Geosynchronous Spacecraft – prentice Hall, 1986.
2.   D.Roddy, Satellite Communication – Prentice Hall, 1989.
3.   T.Pratt and C.W. Bostian, Satellite Communication – John Wiley & Son, 1986.
4.   W.L.Pritchard and A.Sciulli, Satellite Communication System Engineering – Prentice Hall, 1986.
5.   K.Miya, Satellite Communication Technology – KDD Engineering and Consultancy IVC Japan, 1981.
6.   B.G.Evans, Satellite Communication System – Peter Peregrinus Limited, 1987.

BECE06   **PATTERN RECOGNITION**   3   0   0   3

Equivalent subject code of the previous years / Part-Time / Other departments: **BECE06/BECE04**

Pre requisites: The course assumes previous programming experience and some familiarity with linear algebra and statistics.

Course Objectives: To provide an introduction to classical pattern recognition. Pattern recognition is the assignment of a physical object or event to one of several prescribed categories. The course will include sections on neural networks and provide links to the classical statistical pattern recognition techniques.

Unit I: 7

Bayesian decision theory – Parametric estimation – Linear discriminate functions – Nonparametric methods - multi-class classifiers, eigenvector and other feature selection methods - Feature Extraction - classification stages – Hidden Markov model.

Unit II: 8

 Computer vision – Levels of vision - One image – Multiple images – Segmentation – Geometric methods.

UnitIII: 10

Statistical pattern recognition: Different approaches to pattern recognition. Hypothesis testing - Linear classifiers - Parametric and nonparametric classification techniques – K-means clustering - Feature extraction for representation – Classification.

Unit IV: 10

Neural networks for pattern recognition- Fundamentals – Supervised learning – Unsupervised learning - Feed forward networks – Hopfield – Kohonen models – Support vector machines – Radial Basis function networks - Parsing – Graphical approaches –

Unit V: 10

Applications - Automated speech recognition – Speech and speaker recognition, Fingerprint identification – Optical character recognition: Character recognition, Scene analysis.

Total Hours : 45

Textbooks:
1. Richard O. Duda, Peter E. Hart, and David G. Stork, *Pattern Classification*, Second Edition. John Wiley & Sons, New York, 2001.
2. Neural Networks for Pattern Recognition, Christopher M. Bishop, Oxford University Press, 1995.
3. Pattern Classification and Scene Analysis by Richard Duda and Peter Hart, John Wiley & Sons 1973.
4. Introduction to Statistical Pattern Recognition by Keinosuke Fukunaga, Academic Press 1990.

Reference books :
1. R. Schalkoff, J. Pattern Recognition; Statistical, Structural and Neural Approaches, Wiley Inc., 1992.
2. K.S. Fu, Syntactic Pattern Recognition, Academic Press Inc., 1974
3. C.M. Bishop, Neural Networks for Pattern Recognition, Oxford Univ. Press, 1995.
4. Luc Devroye, Lazlo Gyorfi, and Gabor Lugosi, *A Probabilistic Theory of Pattern Recognition*, Springer-Verlag, New York, 1996.
5. Ian Nabney, *Netlab: Algorithms for Pattern Recognition*, Springer-Verlag, New York, 2001.
6. Brian D. Ripley, *Pattern Recognition and Neural Networks*, Cambridge University Press, 1996.
7. K.S. Fu and T.Y. Young, Handbook of Pattern Recognition and Image Processing, Academic Press

Practicals using MATLAB

Recognition of geometric shapes, e.g. circles, squares, rectangles, triangles, etc.
Classification of different tools, e.g. screwdrivers, wrenches, hammers, etc.
Identification of different coins and bills.
Design a program to read bar codes.
Character recognition.
Other projects of your choice with emphasis on applications of pattern recognition / classification.

BECE07 ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY IN   SYSTEM DESIGN   3   0   0   3

Equivalent subject code of the previous years / Part-Time / Other departments: **BECE07/BECE06**

EMI ENVIRONMENT   9

Sources of EMI, conducted and radiated EMI, Transient EMI, EMI-EMC definitions and units of parameters. Units of specification, Civilian standards Military standards.

EMI COUPLING PRINCIPLES   9

Conducted, Radiated and Transient Coupling, Common impedance Ground Coupling, Radiated Common Mode and Ground Loop coupling, Radiated Differential Mode Coupling, Near Field Cable to cable coupling, Power mains and Power supply Coupling.

EMI MEASUREMENTS   9

EMI Test Instruments ? Systems., EMI Test, EMI shielded Chamber, Open Area Test Site, TEM Cell Antennas, Conductors Sensors / Injectors / Couplers,. Military Test Method and Procedures, Calibration Procedures.

EMICONTROL TECHINQUES   9

Shielding, Filtering, Grounding, Bonding, Isolation Transformer, Transient Suppressors, Cable Routing, Signal Control, Component Selection and Mounting.

EMI DESIGN OF PCBs   9

PCB Traces Cross Talk, Impedance Control, Power Distribution Decoupling, Zoning Motherboard Design and Propagation Delay Performance Models.

Total Number of Periods: 45.

Reference Books:
1. Bernhard Keiser." Principles of Electromagnetic compatibility", Artech House, #rd Ed, 1986.
2. Henry W.Ott, "Noise Reduction Techniques in Electronic Systems", John Wiley and Sons, Newyork,   1988.
3. V.P.Kodali, "Engineering EMC Principles, Measurements and Technologies", IEEE Press, 1996.

BECE08   **NEURAL NETWORKS AND ITS APPLICATIONS**   **3**   **0**   **0**   **3**
Equivalent subject code of the previous years / Part-Time / Other departments: **BECE08/BECE05**

INTRODUCTION TO ARTIFICIAL NEURAL NETWORKS   **9**
Neuro – physiology – General Processing Element – ADALINE – LMS learning rule – MADALINE – perception Networks

BPN AND BAM   **9**
Back Propagation Network – Updating of output and hidden layer weights – Application of BPN – Associative memory – Bi-directional Associative Memory - Hop field memory – Traveling sales man problem

SIMULATED ANNEALING AND CPN   **9**
Annealing, Boltzmann machine – Learning – Application – Counter Propagation network – Architecture – Training – Application.

SOM AND ART   **9**
Self-organizing map – Learning algorithm – Feature map classifier – Applications – Architecture of Adaptive Resonance theory – Pattern matching in ART network. Neocognitron: Architecture of Neocognitron – Data processing and performance of architecture of Spacio – Temporal networks for speech recognition

CASE STUDY: **9**
1. Implementation of BPN algorithm in a computer language
2. Application of Neural Networks for Pattern recognition, data comparison
3. Hop field networks for an nbit A/D converter

Total No. of Periods : 45

Text Book

1. Hagan, "Neural Networks design, Thomson Learning.
2. J.A. Freeman and B.M. Skapura, "Neural Networks, Algorithms Applications and Programming Techniques", Addison-Wesley, 1990.

Reference Books:

1. Laurence Fausett, "Fundamentals of Neural Networks: Architecture, Algorithms and Applications", Prentice Hall, 1994.

BECE09   **DEVICE MODELING**   **3**   **0**   **0**   **3**
Equivalent subject code of the previous years / Part-Time / Other departments: **BECE09/BECE10**

INTEGRATED PASSIVE DEVICES :   **9**
Types and structures of resistors and capacitors in monolithic technology – dependence of model parameters on structure.

INTEGRATED DIODES :   **9**
Junction and Schottky diodes in monolithic technologies – static and dynamic behavior – small and large signal models – SPICE models.

INTEGRATED BIPOLAR TRANSISTOR :   **9**
Types and structures in monolithic technologies – Basic model (EberMoll_-Cunmel – poon model – dynamic model, parasitic effects – SPICE model – parameter extraction.

INTEGRATED MOS TRANSISTOR :   **9**
nMOS and PMOS Transistor – Threshold voltage -Threshold voltage equations – MOS device equations – basic DC equations Second order effects – MOS models Small signal AC Characteristics – MOSFET SPICE model level 1,2,3 and 4

SPICE MODELLING   **9**
Advanced Concepts large signal & low Signal modeling

Total no of hours : 45.

Reference
1. Daniel Foty, " MOSFET modeling with spice " prentice hall, 1997.
2. NeilWeste and Kamran Eshranghian " Principles of CMOS VLSI Design, A system Perspective", " Addition – Wesley, 1993.
3. Jacob Millman & Arvin Millman, "Micro Electronics", McGraw Hill (Second Edi) 1987.
4. M.Styagi, John Wiley " Introduction to Semi-conductor materials and devices ", New Edition

BECE10   **EMBEDDED SYSTEMS**   **3**   **0**   **0**   **3**
Equivalent subject code of the previous years / Part-Time / Other departments: **BECE10/BECE01**

UNIT – I   **9**
Embedded Computer systems: - Applications, software issues, memory mapped architecture, 68HCII Architecture and different addressing modes, study of 8051 microcontroller

UNIT – II   **9**
Programming of PIC Micro controllers. Architecture of 16F873 and 16F877 Micro controllers. Instruction set of PIC micro controllers. Simple Example programs with PIC micro controllers

UNIT – III   **9**
Software Development: -   Quality programming, memory allocation, self-documenting code, Abstraction, Device drivers and object oriented interfacing

UNIT – IV   **9**

Study of 'C' cross Compilers for programming Microcontrollers. Examples using 'C' cross compiler for PIC Microcontroller environment.

UNIT – V   **9**

Threads interrupt synchronization, Timing Generation & measurements, Serials I/O devices, Parallel Port interfaces, memory interfacing and high speed I/O interfacing.

Total No. of Periods: 45

Text Books

1. Barnett, Embedded C Programming the microchip PIC Microcontroller, 1st Edition, Thomson Learning 2004.
2. Jonathan.W.Valvano, Brooks 'Embedded Microcomputer system', COLE Thomson learning series.

Reference Books:

1. Myke Predko , "Programming and customizing the Microcontroller", Tata McGraw Hill Pvt. Ltd.

BECE11	ADVANCED MICROPROCESSORS	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BECE11/BECE12**

THE INTEL X86 FAMILY   **9**

The Intel X86 family architecture, 32 bit Processor evolution systems connections and timing, Instruction and Data Formats, Instruction set of X86 Processors, Addressing Modes.

INTEL X86 ASSEMBLY LANGUAGE PROGRAM   **9**

Implementation of strings, Procedures, Macros, BIOS and DOS Services using X86 Assembly Language Programming, Memory and I/O Interfacing, Analog Interfacing and Industrial Control.

SYSTEM DEVELOPMENT   **9**

Microprocessors Based System Design, TMS 320 Series DSP Based Signal Processing, Microcontroller 8051, 8051 Based System Design.

THE MOTOROLA MC 68000 FAMILY   **9**

The MC 68000 Architecture, CPU Registrars, Data Formats, Addressing Modes, Instruction Set and Assembler Directors, Memory Management Instruction and Data, Caches, Exception Processing.

RISC PROCESSORS   **9**

RISC vs CISC, RISC Properties and Evaluation, Advanced RISC Microprocessors, DEC ALPHA, The Power PC family. The SUN SPARC Family, The MIPS RX 100 Family, The Intel 860 Family. The Motorola M88000 Family, HP Precision Architecture.

Total Number of hours: 45

Text Books

1.   B.B. Bery, "The Intel Mircroprocessors 8086 / 8088, 80186 / 80188, 80286, 80386, 80486, PENTIUM, and PENTIUM Processors", Prentice Hall, 1997.
2.   K Udayakumar, B.S. Uma Shankar, "Advanced Microprocessors and IBM PC Assembly Language Programming", Tata McGraw Hill, 1996.

Reference:

1.   Daniel Tabak, "Advanced Microprocessors", McGraw Hill, 1995.
2.   Douglas V. Hall, " Microprocessors and Interfacing – Programming Hardware", McGraw Hill, 1992.
3.   W.A. Tribel & A. Singh, "The 68000 and 68020 Microprocessors – Architecture, Software and Interfacing Techniques", Prentice hall of India, 1991
4.   Rifiquzzaman, "Microprocessors – Theory and Applications : Intel and Motorola", Prentice Hall, 1992.
5.   Kenneth J. Ayala, "The 8051 Microcontroller, Architecture, Programming and Application", Penram International Publishing (India), 1996.
6.   John Peatman, "Design with Microcontrollers", McGraw Hill International, 1988.

BECE12	BIO-SIGNAL PROCESSING	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BECE12/BECE08**

SIGNAL, SYSTEM AND SPECTRUM   **10**

Characteristics of some dynamic signals – bioelectric signals, impedance,. Acoustic signals, mechanical signals, biomagnetic signals biochemical signals. Signal conversion – simple signal conversion systems, conversion requirements for biomedical signals. Basics of digital filtering – FIR and IIR filters. Spectral analysis – power spectral densities function, cross spectral density and coherence function, cepstral analysis and homomorphic filtering. Estimation of Mean of finite time signal

TIME SERIES ANALYSIS AND SPECTRAL ESTIMATION   **9**

Time series analysis – linear prediction models, process order estimation,. ;attic representation, non-stationary process, adaptive segmentation, model based ECG simulator. Spectral estimation – Blackman Tukey method, Periodogram and model based estimation.

ADAPTIVE FILTERING AND WAVELET DETECTION   **9**

Filtering – LMS adaptive filter, adaptive noise canceling in ECG, improved adaptive filtering in FECG. Wavelet detection in ECG – Structural, features, matched filtering, adaptive wavelet detection, detection of overlapping wavelets.

BIOSIGNAL CLASSIFICATION AND RECOGITION   **9**

Signal classification and recognition – statistical signal classification, linear discriminate function, direct feature selection and ordering, Back propagation Neural network based classification.

SELECTED TOPICS IN BIO-SIGNAL PROCESSING   **8**

Application of wavelet transform on Bio-signal – TFR representation, ECG data compression, ECG characterization. Application of Chaos theory on Biomedical signals. Software implementation of signal processing algorithms on biomedical signals.

Total Number of Hours : 45

References
1. Willies J Tompkins, "Biomedical Digital Signal Processing" Prentice Hall, New Jersey, 1993.
2. Samuel D. Stearns Ruth A. David, Signal Processing algorithms using Fortran and C, Prentice Hall, New Jersey, 1993.
3. Vallaru Rao and Hayagiva Rao, C++ Neural Networks and Fuzzy logic, BPS Publication, New Delhi, 1996
4. Special topics on the applications of chaos theory on Biosignal, Journal of IEEE Engg. In Medicine and Biology Magazine, October, 1996.

BECE13   **TELEVISION AND VIDEO ENGINEERING**   **3**   **0**   **0**   **3**

Equivalent subject code of the previous years / Part-Time / Other departments: **BECE13/BECE17**

FUNDAMENTALS FO TELEVISION   **9**

Characteristics of Eye and Television Pictures – Resoulution and brightness Gradation. Theory of Scanning. Camera Tubes – Vidicon and Silicon Diode Array Vidicon. Monochrome Picture Tube, Composite.

MONOCHROME TELEVISION RECEIVER   **9**

Transmission and Propagation of TV signal, TV Antenna, Receiver: VHF Tuners, Vision IF Subsystem, Inter Carrier Sound System, Video Amplifiers. Synchronous Separation AFC and Deflection Oscillators Frame and Line Deflection Circuits.

COLOUR TELEVISION SYSTEMS   **9**

Colour Characteristics – Colour Cameras colour Picture Tubes, Co,lour signal Generation and Encoding, NTSC, PAL and SECAM Systems .

COLOUR TELEVISION RECEIVERS   **9**

Block Diagram of PAL-D Receivers, Luminance Channel./ Chrominance amplifier, Color Burst Separation and Burst phase Discriminators. R,G.B Matrix and Drives.

SPECIAL TOPICS IN TELEVISION   **9**

Digital Tuning Techniques, Remote Control. Introduction to Cable and Satellite Television. Video Tape Recorders. Videodisc system. Fundamental of Digital TV and High Definition Television.

Total Number of Hours : 45

Text Books
1. Gulati. R.R "Modern Television Practice, Principle of Technology and Servicing ", New Age International Pvt. Ltd., 2002.,
Reference Books
1. Dhake A,M., "Television and Video Engineering", Tata McGraw Hill, 1995.
2. Grob.B.Herndon. C.E., "Basic Television and Video Systems", McGraw Hill 1999.

BECE14   **OPERATING SYSTEMS**   **3**   **0**   **0**   **3**

Equivalent subject code of the previous years / Part-Time / Other departments: **BECE14**

INTRODUCTION   **9**

History of OS, OS Concepts, Processes, Files, Shell, Virtual Machine, Client Server Model, Memory Management without Swapping or Paging, Mono-programming & Multi Programming, Virtual Memory, Paging, Associative Memory, Page Replacement algorithms, Belady's Anamely, Optimum Page size, Segmented Memory.

PROCESS MANAGEMENT   **9**

Inter-process Communications, Critical Sections Mutual Exclusions, Semaphores, deadlocks, Deadlock Deductions and Recovery, Deadlock Avoidance and Prevention's, Round Robin scheduling, Priority Scheduling, SJF Scheduling, Guaranteed Scheduling, Two Level Scheduling , Classical IPC Problems.

FILE SYSTEMS   **9**

File Naming, File structure, File Types, File Attributes, File Access, File operations, Memory Mapped Files, directories, Path Names, Disk Space Management, Security, Internet Worm, User Authentication, Virus, Antivirus Packages, Trojan Horse Attack, Bad block Management, Optimum Block Size.

DISTRIBUTED OPERATING SYSTEM   **9**

Goals, Hardware & Software Concepts, Design Issues, Communication , synchronization and dead Locks in Distributed OS, Election Algorithm, Concurrency Control, Andrew File System, Mobile Users, Wide Area Networking Fault Tolerance.

CASE STUDIES   **9**

History, Overview, Fundamental Concepts, System Calls and Implementation of UNIX, MS-DOS, AMOEBA and MACH.

Total Number of Hours : 45

Text Books :
1. Ida.m. Flynn, "Understanding operating systems, 3rd Edition, Thomson Learning 2003.
2. Andrew S.Tanenbabeb, "Modern Operating Systems", Prentice Hall of India Ltd., May 1996.
3. Charles Crowley, "Operating System", Tata McGraw Hill, 1998.
4. H.M. Deited, "Operating System", Addison – Wesley, 2nd Edition, 1990.
Reference Books
1. Achyut S. Godbole, "Operating Systems", Tata McGraw Hill, 1996.
2. M. Mileukovic, "Operating Systems Concepts and Design" Tata McGraw Hill, 1992.
3. Silberschatz.A and P.B. Galvur, "Operating Systems Concepts", Addison – Wesley, 1994.
4. A.Gosciuski, "Distributed Operating Systems the Logical Design", Addison – Wesley, Reading, MA, 1991.

| BECE15 | POWER ELECTRONICS | 3 | 0 | 0 | 3 |

Equivalent subject code of the previous years / Part-Time / Other departments: **BECE15/BECE11**

UNIT – I 9

SCR characteristics – Two transistor analogy – Methods of turning on and turning off – Device specifications- other members of SCR family and their applications – Series and Parallel connection of SCR's – Cooling and Protection – Snubber circuits. Other Semiconductor devices – Power transistors – Power MOSFETs GTOs – Insulated gate transistors.

UNIT – II 9

Single phase controlled rectifier – half wave controlled rectifier with (i) resistive load (ii) RL load (iii) RL Load and fire wheel diode (vi) RL Load and battery – Full wave controlled rectifier with the above four types loads –Half controlled bridge rectifier – Fully controlled bridge rectifier. Three phase controlled rectifier – Half controlled Bridge – Double Y Type controlled rectifier.

UNIT – III 9

Single phase and three phase inverters – Series inverter – Parallel inverter – Bridge inverters – Source inverter – Choppers- Various types of DC choppers – Step – up chopper – AC chopper – Integral cycle triggering – Cycle – converter. Single phase cycle – converter.

UNIT – IV 9

DC Motor control – Single phase and three phase SCR Drivers – Reversible SCR drives – Chopper controlled DC drives. AC motor control: Speed control methods of induction motor – Controlled slip system – Slip power recovery scheme – Breaking of induction motor – synchronous motor control.

UNIT – V 9

Control Circuits and Application : Generation of control pulses – Microprocessor based 87implementation – Applications: Static circuit breakers for DC and AC circuits – Soft start circuit – solid state tap changer using ant parallel Scars – Regulated power supply – UPS – SMPS. High frequency induction heating.

Total Number of Hours : 45

Text Book:
   1. Ranall Schafter, "Fundamentals of Power Electronics", first Edition, Thomson Learning.
   2. Michael Jacob, Power Electronics, First Edition, Thomson Learning 2002.
   3. M.Ramamoorthy, An introduction to Thyristors and Their applications – Second Edition East West press, 1991
   4. M.H.Rahid, Power Electronics – Prentice Hall , New Hersey, 1988.
   5. P.C. Sen, Power Electronics- Tata McGraw Hill, 1987.
   6. Dubey GK, Thyristorised Power Controllers – Willey Eastern Ltd., 1985.

| BECE16 | VISUAL PROGRAMMING | 3 | 0 | 0 | 3 |

Equivalent subject code of the previous years / Part-Time / Other departments: **BECE16**

Introduction to Windows Programming : 9

GUI Concepts – Overview of Windows programming – Creating the window – Displaying the window – message Loop – windows procedure – WM_PAINT message – WM_DESTROY message – An Introduction to GDI – Scroll Bars – Keyboard – Mouse – Menus.

Visual Basic Programming: 9

IDE – First Visual Basic Program – Introduction to Forms – Intrinsic Controls – Working with Files – Accessing Databases with Data Control – Classes and Objects – ADO Object Model.

Visual C++ Programming: 9

Windows Programming Model – Visual C++ Components – Microsoft Foundation Classes Library Application Framework – Getting Started with Appwizard – Basic Event Handling, Mapping Modes, and a Scrolling view – Graphics Device Interface, Colors and Fonts – Modal Dialog and Windows Common Dialogs – Modeless Dialog and Windows Common Dialogs – Using Activex Controls – Windows Message Processing and Multithreading.

Advanced Concepts: 8

Menus – Keyboard Accelerators – Rich Edit Control – Tool Bars – Status Bars – A Reusable Frame Window Base Class – Reading and Writing Documents – SDI and MDI Environments – Splitter Windows and Multiple Views.

Applications of Windows Programming : 10

Dynamic Link Library – Component Object Model – Object Linking and Embedding – Data Base Management with Microsoft ODBC.

Total Hours : 45

Text books:
1. Charles Petzold, "Windows Programming", Microsoft Press, 1996. Chapters: 2,5,6,9,10.
2. Francesco Balena, "Programming Microsoft Visual Basic 6.0", Microsoft Press, Indian Repreint, 2001. Chapters: 1,2,3,5,6,13.
3. David Kruglirski.J, "Programming Microsoft Visual C++", Fifth Edition, Microsoft Press, 1998, Chapters: 1,2,3,4,5,6,7,8,12,13,14,15,17,18,20,22,24,31.
Reference book:
1. G.Cornell, "Visual Basic 6", Tata McGraw Hill, 1998.
2. Deital & Deital, T.R.Nieto, "Visual Basic 6, How to Program", Prentice Hall of India, 1999.

BECE17   **DATABASE MANAGEMENT SYSTEM**   3   0   0   3
                            Equivalent subject code of the previous years / Part-Time / Other departments: **BECE17/BECE15**

Introduction: 9
Definition -Need for a DBMS-Uses of DBMS- Advantages and disadvantages of DBMS
Database and database users- view of data –Architecture-data models-data dictionary –database languages

Relational approach   9
Relational model-Structure of a relational database-Relational algebra- Tuple relational calculus-Domain relational calculus-SQL-Embedded SQL-Query
languages

Relational database design   9
Relational database design-Integrity constraint-Pitfalls and design –Functional dependency-Normalization-Entity relationship model-Storage and file structure-
Indexing and hashing-Basic concepts-B$^+$ tree index file-B tree index file-Static hashing –Dynamic hashing

Object Oriented Relational Database Technology   9
Concepts for Object oriented data model – Object oriented database Languages -Persistent programming language-Object relational Databases.

System Implementation techniques:
Query processing-Transaction processing-Concurrency control-Recovery system

Enhanced Data models for advanced applications   9
Database system architecture- Client server system-centralized systems—parallel systems-Distributed system-distributed databases.
                                                                                                Total Hours : 45
Text book:
 1.   Rob and Corone, Data base systems, 5th Edition, Thomson Learning, 2003.
 2. Abraham Silberschatz, Henry F.korth, S.Sudharshan, " Database system concepts" 4thEdition, Tata McGraw-Hill ,1997
References:
 1. Ramez Elmasri, Shamkant B.Navathe, " Fundamentals of database systems",4th edition
      Pearson Education-2002
 2. C.J.Date, "An Introduction to Database systems",7th Edition, Pearson Education,1997
 3. Raghu Ramakrishnan, "Database Management Systems", WCB McGraw Hill,1998