DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

B.Tech. – Electrical and Electronics Engineering (Full Time)

3rd to 8th Semester Curriculum & Syllabus - 2007

Semester – III					
Code	Course Title	L	T	P	C
BMA205	Mathematics – III	3	1	0	4
BEC201	Solid State Devices	3	0	0	3
BME233	Thermodynamics	3	0	0	3
BCE233	Fluid Mechanics & Machinery	2	0	3	3
BEE201	Circuit Theory	3	1	0	4
BEE203	Electrical Machines - I	3	1	0	4
Practical					
BEC221	Circuits & Devices Lab	0	0	3	1
BEE221	Electrical Machines lab – I	0	0	3	1
				Total	**23**

Code	Equivalent of the previous years / Part-Time / Other departments
BMA205	BMA202A
BEC201	BEC151/152
BME233	BME209/163
BCE233	---
BEE201	BEE203A/151
BEE203	BEE153/202A/207A

NOTE:

All students have to undergo in-plant training in a reputed industry for a minimum of two weeks duration and submit a report. They are allowed to take up in-plant training during vacation after 4th semester, but must complete the same before the beginning of 7th semester. The reports are evaluated and result declared as satisfactory / unsatisfactory. In case the result is unsatisfactory the student has to undergo in-plant training again. The in-plant training is compulsory but with out credit.

Semester – IV					
Code	Course Title	L	T	P	C
BMA204	Numerical Methods for Electrical Engineering	3	0	0	3
BEC202	Digital Electronics	3	1	0	4
BEC204	Electronic Circuits	3	0	0	3
BEE202	Network Analysis & Synthesis	3	1	0	4
BEE204	Electrical machines – II	3	1	0	4
BEE206	Electromagnetic Fields	3	1	0	4
Practical					
BEC222	Electronics Circuits Lab	0	0	3	1
BEE222	Electrical Machines Lab – II	0	0	3	1
				Total	**24**

Code	Equivalent of the previous years / Part-Time / Other departments
BMA204	BMA213A/301
BEC202	BEC251/229/234
BEC204	BEC257
BEE202	BEE152/203/204A
BEE204	BEE154/206A
BEE206	BEE205A/253/205/235/155

Semester – V					
Code	Course Title	L	T	P	C
BCS331	Object Oriented Programming	3	0	3	4
BEC303	Linear Integrated Circuits	3	0	0	3
BEE301	Control Engineering	3	1	0	4
BEE303	Transmission & Distribution	3	1	0	4
BEE305	Design of Electrical Machines*	3	1	0	4
BEE307	Electrical Measurements & Instrumentation	3	0	0	3
Practical					
BEC321	Linear & Digital Integrated Circuits Lab	0	0	3	1
BEE321	Control & Instrumentation Lab	0	0	3	1
				Total	**24**

Code	Equivalent of the previous years / Part-Time / Other departments
BCS331	BCS203
BEC303	BEC256
BEE301	BEE252
BEE303	BEE256
BEE305	BEE251
BEE307	BEE302/254

*** The end semester examination will be conducted as Practical Examination with External and Internal Examiners.**

Semester - VI					
Code	Course Title	L	T	P	C
BMG332	Management Concepts and Organizational Behaviour	3	0	0	3
BEC332	Microprocessor and its Applications	3	0	0	3
BEC336	Analog and Digital Communication	3	0	0	3
BEE302	Advanced Control Theory	3	1	0	4
BEE304	Power System Analysis	3	1	0	4
BEE306	Power Electronics	3	1	0	4
Practical					
BEC342	Microprocessor Lab	0	0	3	1
BEE322	Power Electronics Lab	0	0	3	1
				Total	**23**

Code	Equivalent of the previous years / Part-Time / Other departments
BMG332	BMG351/352/331
BEC332	BEC301/333/213/252/359/216
BEC336	BEC361
BEE302	-----
BEE304	BEE351
BEE306	BEE353

Semester - VII					
Code	Course Title	L	T	P	C
BMG431	Entrepreneurship	2	0	0	2
BCS431	Computer Architecture	3	0	0	3
BEC431	Digital Signal Processing	3	1	0	4
BEE401	Power System Protection & Switchgear	3	0	0	3
BEE403	Electrical Drives & Control	3	1	0	4
BEE405	High Voltage Engineering	3	0	0	3
Practical					
BEE421	Digital Simulation Lab	0	0	3	1
BEE423	Comprehensive Test	0	2	0	2
BEE425	Project Work – Phase-I	0	0	6	2
				Total	**24**

Code	Equivalent of the previous years / Part-Time / Other departments
BMG431	BMG611
BCS431	BCS303
BEC431	BEC230/304/351
BEE401	BEE352
BEE403	BEEE62
BEE405	BEE451

Semester - VIII					
BMG432	Total Quality Management	2	0	0	2
BEEE02 BEEE04 BEEE06 BEEE08 BEEE10 BEEE12	Elective –I	3	0	0	3
BEEE14 BEEE16 BEEE18 BEEE20 BEEE22 BEEE24	Elective – II	3	0	0	3
BEEE26 BEEE28 BEEE30 BEEE32 BEEE34 BEEE36	Elective – III	3	0	0	3
Practical					
BEE426	Project Work – Phase-II	0	0	21	7
				Total	**18**

Code	Equivalent of the previous years / Part-Time / Other departments
BMG432	----
BEEE02	BEEE52
BEEE04	BEEE54
BEEE06	BEEE64
BEEE08	BEEE51
BEEE10	BEEE58
BEEE12	----
BEEE14	----
BEEE16	BEEE61
BEEE18	BEEE56
BEEE20	BEEE65
BEEE22	BEEE66
BEEE24	BEEE53
BEEE26	BEEE59
BEEE28	BEEE57
BEEE30	----
BEEE32	BECE19/E07/E63
BEEE34	BEEE55
BEEE36	----

Total Credits (3rd to 8th Semesters): 136

LIST OF ELECTIVES

Elective Group I

Code	Course Title	L	T	P	C
BEEE02	Power System Control & Operation	3	0	0	3
BEEE04	Advanced Power Electronic Systems	3	0	0	3
BEEE06	Special Electrical Machines	3	0	0	3
BEEE08	Utilization of Electrical Energy	3	0	0	3
BEEE10	Neural Networks	3	0	0	3
BEEE12	EMC & EMI	3	0	0	3

Elective Group II

Code	Course Title	L	T	P	C
BEEE14	Power System Transients	3	0	0	3
BEEE16	Intelligent Controllers	3	0	0	3
BEEE18	Solid State Relays	3	0	0	3
BEEE20	Non-Conventional Energy Sources	3	0	0	3
BEEE22	Fuzzy Logic & Applications	3	0	0	3
BEEE24	Micro-controller and its Applications	3	0	0	3

Elective Group III

Code	Course Title	L	T	P	C
BEEE26	Power Plant Instrumentation	3	0	0	3
BEEE28	Computer Aided Design of Electrical Machines	3	0	0	3
BEEE30	EHV AC and DC Transmission	3	0	0	3
BEEE32	Bio-Medical Instrumentation	3	0	0	3
BEEE34	Principles of Robotics	3	0	0	3
BEEE36	Digital Image processing	3	0	0	3

BMA205	MATHEMATICS – III	3	1	0	4

(Common for EEE, ECE and ICE)

Equivalent subject code of the previous years / Part-Time / Other departments: **BMA202A/205**

UNIT-I Laplace Transform 9-Hours

Transforms of simple functions- Basic operational properties- transforms of derivative and integrals-Initial and Final value theorems- Inverse Transforms- Convolution theorem-Periodic functions-Applications of Laplace transform for solving linear ordinary differential equations of first order with constant coefficients.

UNIT-II Fourier Series 9-Hours

Dirichlet's conditions- General Fourier series-Half range Sine and Cosine series Parsevals's identity - Complex form of Fourier series – Harmonics analysis

UNIT-III Fourier Transforms 9-Hours

Statement of Fourier integral theorem - Fourier Transforms pairs- Fourier Sine and Cosine Transforms- Properties- Transforms of simple functions-Convolution theorem- Parseval's Identity

UNIT-IV Analytic Functions 9-Hours

Cauchy Riemann equations-Properties of analytic functions-Determination of harmonic conjugate – Milne Thomson's method – conformal mappings Mappings $w=z+a$, az, $1/z$,z^2 and bilinear transformation

UNIT-V Complex Integration 9-Hours

Cauchy's theorem- Statement and applications of Cauchy's integral formulae - Taylor's and laurent's expansions Singularities: Classification - Residues, Cauchey's residue theorem - Contour Integration (excluding poles on real axis)

Tutorials = 45

Total no. of Hours = 60

Text Books:

1. P.Kandaswamy, K.Thilakavathy and Gunavathy "EngineeringMathematics Vol II&II", S.Chand & Co Publishers, New Delhi, 2000.
2. B.S Grewal, "Higher Engineering Mathematics", 35th Edn., Khanna Publishers, New Delhi 2002.

Reference Books:

1. E.Kreyszig "Advanced Engineering Mathematics" 8th Edn., John Wiley and Sons (Asia) Pvt. Ltd., Singapore, 2001.
2. S.Narayanan, T.K.Manikavachagam Pillai, and G.Ramanaiah, "Advanced Mathematics for Engineering Students", Vol.I, 2nd Edn., 2002.
3. R.V Churchill, "Complex Variables and Applications", McGraw Hill Book Co., New Delhi, 2003.
4. M.R.Speigel, "Laplace Transform", Schaum Outline Series, McGraw Hill Book Co., New Delhi, 2000.

BEC201	SOLID STATE DEVICES	3	0	0	3

(Common for ECE, EEE and ICE)

Equivalent subject code of the previous years / Part-Time / Other departments: **BEC151/152/201**

UNIT- I PN Junction Diode **9-Hours**

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 breakdown mechanisms- Zener diode as a voltage regulator.

UNIT –II **9-Hours**

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 - III **9-Hours**

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

UNIT – IV **9-Hours**

Change transfer device, UJT, SCR, DIAC, TRIAC, GTO and introduction to Gallium Arsenide Devices, Device Technology, Planar Process, Diffusion, Ion Implementation and Vapour deposition, Addition and subtractive sequences, Process sequence for bipolar, NMOS and CMOS integrated circuits.

UNIT V **9-Hours**

Small Signal mode of Transistor – Analysis of Amplifiers using small signal model. Common Emitter, Common Base, Common Collector, Common source, Common Drain, Common gate, Multi stage amplifier.

Total no. of Hours = 45

Text Books:

1. Nandita Das Gupta, Amitava Das Gupta, "Semiconductor devices", Prentice hall of India, 2005.
2. Sedra and Smith. "Microelectronic Circuits", Oxford University Press, 2004.
3. Mohammed Gausi and Spencer, "Introduction to Electronics circuit design", Pearson Education, 2004.

Reference Books:

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.

BME233	THERMODYNAMICS	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BME209/233/163**

UNIT-I SYSTEM AND LAWS OF THERMODYNAMICS 9-Hours

Closed and open systems – equilibrium – first law – second law – reversibility – Entropy – processes – heat and work transfers- entropy change – Carnot's Theorem.

UNIT-II POWER CYCLES AND INTERNAL COMBUSTIONS ENGINES 9-Hours

Carnot's cycle – Otto cycle – diesel cycle – Air standard efficiency – Two stroke and four-stroke engines – SI and CI engines - Gas turbine operation.

UNIT-III STEAM BOILERS AND TURBINES 9-Hours

Steam properties – use of steam tables and charts – boilers and accessories – layout of thermal power stations – steam turbines – impulse and reaction turbine – compounding of turbines – simple velocity diagrams.

UNIT-IV AIR COMPRESSORS, REFRIGERATION AND AIR CONDITIONING 9-Hours

Reciprocating and rotary compressors – Vapour compression - refrigeration cycle – Applications - air conditioning system layout - selection.

UNIT-V HEAT TRANSFER 9-Hours

Conduction – plane wall, cylinder, sphere, composite walls – critical insulation thickness – simple fins – convection – free convection and forced convection – radiation – Black body – grey body radiation exchanges – cooling of machines.

Total no. of Hours = 45

TEXT BOOKS:

1. T. Roy Choudhury, "Basic Engineering Thermodynamics", Tata McGraw Hill Publishing Co. Ltd., 1997.
2. Sachdeva R. C, "Heat Transfer", Wiley Eastern Ltd., 1992.

REFERENCE BOOKS:

1. Nag P. K, "Engineering Thermodynamics", Tata McGraw Hill, 1995.
2. Ballancy P. L, "Applied Thermodynamics", Khanna Publishers, 2001.
3. Rai and Sorao, "Applied Thermodynamics", Satya Prakasm 1985.

BCE233	FLUID MECHANICS AND MACHINERY	2	0	3	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BCE233**

UNIT-I FLUID PROPERTIES 6-Hours

Fundamental units – mass density – specific weight – viscosity – surface tension – capillary compressibility– Power required to overcome friction in bearings.

UNIT-II FLUID KINEMATICS AND DYNAMICS 6-Hours

Streamline – streak line – path line – continuity equation – stream and potential functions – Bernoulli's equation – Darcy's equation.

UNIT-III FLOW THROUGH PIPES 6-Hours

Pipes in series and parallel – major and minor losses – hydraulic grade lines – venturi meter – orifice meter – manometer.

UNIT-IV HYDRAULIC MACHINERY 6-Hours

Classification of turbines – efficiency and performance of turbines – specific speed Velocities triangles – Kaplan turbine – Pelton wheel turbine – Francis turbine – Draft tubes.

UNIT-V PUMPS 6-Hours

Types of pumps – positive displacement pumps – Centrifugal pumps – Construction details – Effect of vane angle – Pumps in series and parallel – Pump characteristics – Specific speed separation.

PRACTICAL DEMONSTRATION

THERMAL LAB

1. Performance test on IC Engine using Electrical Dynamometer
2. Performance test on IC Engine using Hydraulic Dynamometer
3. C.O.P of a Refrigeration plant
4. Performance test on Air Conditioning plant
5. Dynamic balancing of rotors
6. Determination of critical speed of whirling shafts

FLUID MACHINERY

1. Performance study of Centrifugal Pump
2. Performance study of Reciprocating pump
3. Performance study of Gear oil pump
4. Performance study of Jet pump / Deep Well pump
5. Performance study of Submersible pump
6. Performance study of Pelton Wheel / Francis Turbine

Practical = 15

Total no. of Hours = 45

TEXT BOOK:

R.K.Rajput, "Fluid Mechanics and Hydraulic Machinery", S.Chand Publication, 2003.

REFERENCES:

1. Bansal.R.K, "Fluid Mechanics and Hydraulic Machinery", Laxmi Publications (P) Ltd., 1995.
2. Ramamirtham.S, "Fluid Mechanics, hydraulics & Fluid Machines", Dhanpat Rai & Sons, 1988.
3. Kumar.K.L, "Engineering Fluid Mechanics", Eurasia Publishing House (P) Ltd., 7th Edition, 1995.
4. Modi P. N. and Seth S. M, "Hydraulics and Hydraulic Machinery", Dhanpat Rai and Sons, 1994.

BEE201	CIRCUIT THEORY	3	1	0	4

(Common for EEE, ECE and ICE)

Equivalent subject code of the previous years / Part-Time / Other departments: **BEE201/203A/151**

UNIT-I BASIC CIRCUIT CONCEPTS 9-Hours

V-I relationships of R, L and C – Independent sources – Dependent sources – Kirchhoff'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.

UNIT-II AC FUNDAMENTALS 9-Hours

AC quantity, Phasor representation – Sinusoidal steady state analysis of simple series and parallel circuits – power and power factor- analysis by mesh current and node voltage methods - Series resonance and Parallel resonance.

UNIT-III NETWORK THEOREMS 9-Hours

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.

UNIT-IV THREE PHASE CIRCUITS 9-Hours

Three-phase systems – phase sequence - Solution of three-phase balanced circuits – Solution of three-phase unbalanced circuits - Power measurement and two-wattmeter method.

UNIT-V COUPLED CIRCUITS 9-Hours

Mutual inductance - Coefficient of coupling – Ideal Transformer - Analysis of multi winding coupled circuits – Single and Double Tuned circuits – Critical coupling.

Tutorial = 15

Total no. of Hours = 60

TEXT BOOK:

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.

BEE203	ELECTRICAL MACHINES – I	3	1	0	4

Equivalent subject code of the previous years / Part-Time / Other departments:
BEE153/202A/203/207A

UNIT-I INTRODUCTION 9-Hours

Electrical machine types – Magnetic circuits – Magnetically induced EMF and force – AC operation of magnetic circuits - core losses.

Principles of Electromechanical energy conversion: Energy conversion process – Energy in magnetic system – Field energy and mechanical force – Multiply excited magnetic field systems.

UNIT-II TRANSFORMERS 9-Hours

Construction – Principle of operation – Equivalent circuit – Losses – Testing – Efficiency and Voltage regulation – All day efficiency.

UNIT-III 9-Hours

Auto transformer – Three phase transformer connections – Parallel operation of transformers – Three winding transformers - Phase conversion – Tap changing transformers.

UNIT-IV DC MACHINES 9-Hours

Construction – Armature windings – EMF and Torque – Methods of excitation - Circuit model – Armature reaction – Commutation — Performance characteristics of generators.

UNIT-V 9-Hours

Performance characteristics of motors – Starting - Speed control – Testing - Losses and efficiency – Parallel Operation.

Tutorials = 15
Total no. of Hours = 60

TEXT BOOK:

Nagrath I.J and Kothari D. P., “Electric Machines”, Tata McGraw Hill Publishing Company Ltd, 1990.

REFERENCES:

1. P.C.Sen, “Principles of Electrical Machines & Power Electronics”, John Wiley & Sons, Second Edition, 1997.
2. Fitzgerald.A.E., Charles Kingsely. Jr, Stephen D.Umans, “Electric Machinery”, McGraw Hill Books Company, 1992.
3. Syed.A.Nassar, “Electric Machines and Power system”, Volume – I Electric Machines, McGraw Hill Inc., New York, 1995.

BEC221	CIRCUIT & DEVICES LAB	0	0	3	1

(Common for EEE and ECE)

1. Verification of ohm's law & Kirchoff's Laws.
2. Verification of super position Theorem, Maximum power transfer theorem, Thevenin's theorem.
3. Study of Transients.
4. Resonance Circuits.
5. Study of CRO
6. Characteristics of P-N junction & Zener Diode.
7. I/P & O/P of characteristics of BJT.
8. Characteristics of JFET.

Total no. of Hours = 45

BEE221	ELECTRIC MACHINES LAB – I	0	0	3	1

1. Open circuit characteristics and load characteristics of DC shunt generator.
2. Load characteristics of DC compound generator.
3. Load test on DC shunt motor.
4. Load test on DC series motor.
5. Speed Control of DC shunt motor.
6. Swinburne's Test.
7. Hopkinson's Test.
8. Load test on single-phase Transformer.
9. Open circuit and short circuit test on single-phase Transformer.
10. Separation of no load losses in a single-phase Transformer.
11. Sumpner's Test.
12. Three-phase transformer connections.
13. Scott connection
14. Parallel operation of single-phase transformers.

Total no. of Hours = 45

BMA204	NUMERICAL METHODS FOR ELECTRICAL ENGINEERING	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BMA213A/301/204**

UNIT-I **9-Hours**

Curve Fitting-Method of Group Averages-Principle of Least Squares-Method of Moments-Finite Differences-Operators E & Δ -Relationship between the Operators.

UNIT-II **9-Hours**

Interpolation-Newton & Lagrange's Methods-Trapezoidal, Simpsons's$1/3^{rd}$ rule&$3/8^{th}$ & Waddle's rule- Numerical Different ion & Integration -Finite Difference Equations.

UNIT-III **9-Hours**

The Numerical Solution of Algebraic &Transcendental Equations- Regula- Falsi Method-Newton-Raphson's Method-Graffe's Root Square Method-Simultaneous Linear Algebraic Equations - Gauss-Jordan Method—Crout's Method - Gauss-Seidal Iteration Method - Relaxation Method.

UNIT-IV **9-Hours**

Numerical Solution of Ordinary Differential Equations- Taylor's series - Modified Eulers's Method - Runge –kutta's Method of Fourth Order - Predictor –Corrector methods - Milne's Method - Adam-Bashforth Method.

UNIT-V **9-Hours**

Introduction-Finite Difference Approximation to Derivatives-Lap lace's Equation-Jacobian's Method-Gauss Seidal Method-S.O.R Method-Poisson's Equation- Liebmann's Method-Parabolic Equations – Iterative Methods for the Equations –Hyberbolic Equations

Total no. of Hours = 45

Text Books:

1. Sastry, S.S., "Introductory Methods of Numerical Analysis" 3^{rd} edition, Prentice Hall of India, New Delhi, 2003.
2. Kandasamy, P.,Thilakavathy & Gunavathy.K., "Numerical Methods.", S.Chand & Co., New Delhi, 2001.

Reference Books:

1. Grewal, B.S., & Grewal, J.S., "Numerical Methods in Engineering & Science", Khanna Publishers, New Delhi, 2001.
2. Jain, M.K., Iyengar,S.R,K & Jain, R.K., " Numerical Methods in Engineering & Scientific Computation", New Age International Pvt, Ltd., New Delhi, 2000.
3. Gerald, C.F. & Wheatley, P.O, "Applied Numerical Analysis", Addison Wesley, Singapore, 2003.
4. Narayanan.S Manicanachagam Pillai., T.K.,& Ramniah., G., "Advanced Mathematics for Engineering Students-Volume III.", S.Viswanathan Pvt. Ltd., 2003.

BEC202	DIGITAL ELECTRONICS	3	1	0	4

(Common for ECE, EEE and ICE)

Equivalent subject code of the previous years / Part-Time / Other departments: **BEC202/251/229/234**

UNIT-I Number Systems 9-Hours

Review of Binary, Octal and Hexa decimal number systems – Conversions, Binary Arithmetic magnitude form – 1's, 2's complement representation, Codes: -BCD, Excess –3, Greycode, ASCII codes, Error detecting codes (Haming code)

UNIT-II Boolean Algebra 9-Hours

Boolean Algebra - De Morgan's law – Simplifications of Boolean expression – sum of products and product of sums – Karnaugh Map – Quince McClusky method of simplication (Including Don't care conditions)

UNIT-III Combinational Logic 9-Hours

Logic gates – AND, OR, NOT, NOR, NAND and EX-OR – combinational logic – Arithmetic circuits – Half adder – Full adder, Half Subtractors – Decimal Adder – Excess 3 adder - code converters – Multiplexers – Demultiplexer – Encoder - Decoder – Design of any combinational logic circuit

UNIT-IV Sequential Logic Design 9-Hours

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 Sequential synchronous circuits

UNIT-V Logic Families 9-Hours

Characteristics of RTL, TTL, DTL, families – Schotty, clamped TTL, ECL, IIL – MOS Invertors – Complementary MOS Inverters

Tutorials = 15
Total no. of Hours = 60

TEXT BOOKS:

1. Albert Paul, Malvino and Donald.P.Leach , "Digital Principles and Applications", McGraw Hill Publications,1997.
2. Floyd, "Digital Fundamentals", Universal Book Stall, New Delhi, 1993.

REFERENCES:

1. Moris Mano, "Digital Electronics and Design ", Prentice Hall of India, 2000.
2. "Digital Logic & Computer Design", Prentice Hall of India, 2000.
3. "Digital Circuits and Logic Design", Prentice Hall of India.

BEC204	ELECTRONIC CIRCUITS	3	0	0	3

(Common for ECE, EEE and ICE)

Equivalent subject code of the previous years / Part-Time / Other departments: **BEC204/257**

UNIT-I RECTIFIER & POWER SUPPLY 9-Hours

Half & Full wave rectifier-filters-shunt, inductor, LC section & Ripple factor,Π Calculation for C, L and LC filters-Voltage regulators-Zener –Series voltage regulator-SMPS.

UNIT-II AMPLIFIERS 9-Hours

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.

UNIT-III FEEDBACK AMPLIFIER & OSCILLATORS 9-Hours

Four basic type of feedback-effect of feedback on amplifier performance-condition for oscillation-Barkhunsen criteria-LC oscillators-Hartley & Colpitts-RC oscillators- Wein bridge, RC phase shift crystal Oscillator.

UNIT-IV MULTIVIBRATORS 9-Hours

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.

UNIT-V POWER AMPLIFIER 9-Hours

Classification - class A, B, C & AB - Class B push pull – Class B Complimentary – symmetry - Class S, Power sections classifications – Efficiency - Distortion in amplifiers.

Total No. of Hours: 45

TEXT BOOK:

Jacob Millman, Cristas C. Halkias, “Integrated Electronics”, Tata Mc Graw Hill, Edition 1991.

REFERENCES:

1. David.A.Bell, “Solid State Pulse Circuits”, Prentice Hall of India, 4th Edition, 2001
2. Millman Taub.H, “Pulse Digital & switching waveform”, Tata McGraw Hill International, 2001.

BEE202	NETWORK ANALYSIS AND SYNTHESIS	3	1	0	4

(Common for EEE, ECE and ICE)

Equivalent subject code of the previous years / Part-Time / Other departments: **BEE152/202/203/204A**

UNIT-I TRANSIENT ANALYSIS 9-Hours

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

UNIT-II TWO PORT NETWORKS 9-Hours

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.

UNIT-III NETWORK TOPOLOGY 9-Hours

Network graphs, tree and cut – sets – tie set and cut – set schedules – primitive impedance and admittance matrices – Application to network solutions.

UNIT-IV S-DOMAIN ANALYSIS & NETWORK SYNTHESIS 9-Hours

S - domain network – driving point and transfer impedances and their properties – transform network analysis – poles and zeros of network functions – time domain response of pole-zero plot.

Realizability of one port network – Hurwitz polynomials and properties – Positive Real functions and properties – synthesis of RL, RC and LC one port networks.

UNIT-V FILTERS & ATTENUATORS 9-Hours

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.

Tutorials = 15

Total no. of Tutorials = 60

TEXTBOOKS:

1. Sudhakar. A., and Shyammohan, "Circuits and Networks Analysis and Synthesis" Tata McGraw Hill Publishing Co.Ltd. New Delhi, 1994.
2. 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. Roy Choudhury, "Networks and Systems", New Age International Ltd, 1992.

BEE204	ELECTRICAL MACHINES - II	3	1	0	4

Equivalent subject code of the previous years / Part-Time / Other departments: **BEE154/204/206A**

UNIT-I AC MACHINE FUNDAMENTALS 9-Hours

Introduction – AC windings – EMF Equation – MMF of AC windings – MMF of three-phase windings (Rotating magnetic field) – Torque in AC machines.

SYNCHRONOUS MACHINES

Construction – Equivalent circuit and phasor diagram – Synchronous impedance - Voltage regulation – EMF method, MMF method and POTIER method – Effect of power factor on characteristics – Short circuit ratio.

UNIT-II 9-Hours

Salient pole synchronous machines - Two Reaction theory – Determination of X_d and X_q (Slip Test) – Power angle characteristics of cylindrical rotor and salient pole machines – Operating limits on alternators - Parallel operation of alternators – Synchronizing power and torque – Two alternators in parallel – Operation of alternator on infinite bus bar.

UNIT-III 9-Hours

Synchronous motor – Principle of operation – Construction – Equivalent Circuit and phasor diagram – Power and Torque – Speed-Torque characteristics – Effect of change in excitation - V curves and inverted V curves – synchronous condenser – Starting methods - Hunting.

UNIT-IV THREE PHASE INDUCTION MACHINES 9-Hours

Construction – types – Principle of operation – Equivalent circuit – Torque and Power output – Torque-slip characteristics – Testing - Circle diagram – Starting - Cogging and Crawling - Speed control - Deep bar rotor - Double cage rotor – Induction generator.

UNIT-V FRACTIONAL HORSEPOWER MOTORS 9-Hours

Single phase induction motor – Double revolving field theory – equivalent circuit – Speed-torque characteristics – starting methods – Split-phase motor - shaded-pole induction motor – Universal motor – Repulsion motor – Reluctance motor – Hysteresis motor – Stepper motor – Two-phase servo motor - AC tachometer - Linear induction motor.

Tutorial =15

Total no. of Hours = 60

TEXT BOOK:

Nagrath,I.J. and Kothari.D.P., “Electric Machines”, T.M.H publishing Co Ltd., New Delhi, Second Edition, 1990.

REFERENCES:

1. B.R.Gupta, Vandana Singhal, “Fundamentals of Electric Machines”, New Age International Publishers, Second Edition, 1996.
2. Fitzgerald, A.E.Charles Kingsley Jr.Stephen D.Umans, “Electric Machinery”, McGraw Hill Book Company, 1992.

BEE206	ELECTROMAGNETIC FIELDS	3	1	0	4

(Common for EEE and ECE)

Equivalent subject code of the previous years / Part-Time / Other departments:
BEE205A/206/253/205/235/155

UNIT-I GENERAL PRINCIPLES & ELECTROSTATICS 9-Hours

The field concept – sources of electromagnetic fields, Changes – Columb's Law – Electric field intensity – Electric flux – Gauss's law – Potential – Boundary value problems – Laplace and Poisson's equations – Electrostatic energy – dielectrics – capacitance.

UNIT-II MAGNETOSTATICS 9-Hours

Current density – Magnetic field – Magnetic flux – Biot-Savart's law – Ampere's law – Torque – Force – Vector potential – Boundary value problems.

UNIT-III ELECROMAGNETIC FIELDS 9-Hours

Faraday's Law – Lenz's law – Maxwell's equations – Displacement current – Eddy current – relation between field theory and circuit theory.

UNIT-IV ELECTROMAGNETIC WAVES 9-Hours

Generation – Propagation of waves in dielectrics – Conductors and transmission lines – Pointing vector – Skin effect.

UNIT-V INTRODUCTION TO FIELD MODELLING AND COMPUTATION 9-Hours

Problem formulation – Boundary conditions – solutions – Analytical methods – variables separable methods – Method of images – Numerical methods – Finite difference method – Finite element method.

Tutorial = 15
Total no. of Hours = 60

TEXT BOOK:

William H.Hayt, Jr., "Engineering Electromagnetics", Tata McGraw Hill Edition, New Delhi, 1998.

REFERENCES:

1. John D Kraus, "Electromagnetics", McGraw Hill Book Co., New York, Third Edition, 1989.
2. Joseph A Edminister, "Theory and Problems of Electro Magnetics", Schaums outline series McGraw Hill book company New York, 1986.
3. David J Griffith, "Introduction to Electrodynamics", Prentice Hall of India Pvt. Ltd, New Delhi, Second Edition, 1997.
4. Richard E. Dubroff, S.V.Marshall, G.G.Skitek, "Electromagnetic Concepts and Applications", Fourth Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 1996.
5. Kraus and Fleish, "Electromagnetics with Applications", McGraw Hill International Editions Fifth Edition 1999.

BEC222	ELECTRONIC CIRCUITS LAB	0	0	3	1

(Common for EEE and ECE)

1. Rectifier- Half wave, Full wave without filter
2. Full Wave Rectifier with shunt, L and Π filters.
3. Voltage Regulator.
4. RC Coupled amplifier (with and without feedback)
5. Feedback Circuits.
6. LC Oscillator.
7. RC Oscillator –Wein bridge oscillator.
8. Schmitt trigger.
9. Multi vibrators, Mono stable, Astable, Bistable.
10. Power amplifier.

Total no. of Hours = 45

BEE222	ELECTRIC MACHINES LAB – II	0	0	3	1

1. Regulation of 3-phase alternator by EMF and MMF methods.
2. Regulation of 3-phase alternator by ZPF and ASA method.
3. Regulation of Salient pole alternator - Slip Test.
4. Load Test on Alternator.
5. Synchronizing and Parallel operation of alternators.
6. V and inverted V curve of synchronous motors.
7. Load test on three-phase induction motor.
8. No load and blocked rotor test on three-phase induction motor.
9. Load Test on single-phase induction motor.
10. Speed control of three-phase induction motor.
11. Separation of losses in three-phase induction motor.
12. Equivalent circuit and pre-determination of performance characteristics of single-phase induction motor.

Total no. of Hours = 45

BCS331	OBJECT ORIENTED PROGRAMMING	3	0	3	4

Equivalent subject code of the previous years / Part-Time / Other departments: **BCS203/331**

UNIT-I INTRODUCTION 9-Hours

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

UNIT-II CLASSES 9-Hours

Definition - Data members - Function members - Access specifiers - Constructors - Default constructors - Copy constructors – Destructors - Static members-This pointer-Constant members - Free store operators -Control statements

UNIT-III INHERITANCE AND POLYMORPHISM 9-Hours

Overloading operators – Functions – Friends - Class derivation -Virtual functions - Abstract base classes - Multiple inheritance - Microsoft Foundation Class Libraries

UNIT-IV TEMPLATES 9-Hours

Class templates-Function templates-Exception handling-Streams.

UNIT-V JAVA PROGRAMMING 9-Hours

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.

Practical = 15
Total no. of Hours = 60

TEXTBOOKS:

1. Stanley B.Lippman, "The C++ Primer" Pearson Education, 3rd edition 2000.
2. H.M.Deitel and P.E.Deitel, "Java How to Program", Pearson Education, 5th edition 2003.

REFERENCES:

1. Deitel and Deitel, "C++ How to Program" Pearson Education, 4th edition 2000.
2. N.Barkakati, “Object Oriented Programming in C++”, Prentice Hall of India Private Ltd, 1997.
3. Ken Arnold and James Gosling, “The Java Programming Language with updated 1.3”, Pearson Education, 2000

BEC303	LINEAR INTEGTRATED CIRCUITS	3	0	0	3

(Common for EEE & ECE)

Equivalent subject code of the previous years / Part-Time / Other departments: **BEC256/303**

UNIT-I OP-AMP CHARACTERISTICS AND APPLICATIONS 9-Hours

Ideal Op-amp – IC Op-amp – FET OP – amp – DC characteristics. Bias, offset and drift – AC characteristics: BW, slew rate, noise and frequency compensation – Bias Op-amp. Application: Scale changer- inverter and non-inverter - Summer and subtract or – Multiplier and divider – Differentiator and integrator – Instrumentation amplifier – AC amplifier – V to I and I to V converters - Op- amp circuits using diodes; Precision rectifier – Clipper and clamper – Sample and Hold circuit – log and antilog amplifiers.

UNIT-II COMPARATORS AND SIGNAL GENERATORS 9-Hours

Applications of comparators – Regenerative comparators (Schmitt trigger) – Square wave generator (Astable Multivibrator) – Monostable multivibrator –Triangular wave generator – Saw tooth wave generator – Sine wave generators.

UNIT-III VOLTAGE REGULATORS AND MULTIPLIERS 9-Hours

Series Op-amp regulator - IC voltage regulators – general purpose regulator – Switching regulator – Multiplying DC voltages - Frequency doubling – phase – angle detection – AM Modulation / Demodulation.

UNIT-IV ACTIVE FILTERS AND TIMERS 9-Hours

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 – their application – Schmitt trigger – Counter timers.

UNIT-V PLL, ADC and DAC 9-Hours

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 no. of Hours = 45

TEXT BOOK:

Roy Choudhry and Shail Jain, “Linear Integrated Circuits”, Wiley Eastern Ltd., 1991.

REFERENCES:

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.

BEE301	CONTROL ENGINEERING	3	1	0	4

(Common for EEE and ECE)

Equivalent subject code of the previous years / Part-Time / Other departments: **BEE301/252**

UNIT-I INTRODUCTION 9-Hours

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

UNIT-II MATHEMATICAL MODELS OF PHYSICAL SYSTEMS 9-Hours

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, Servomotors, Stepper motors, Tachogenerators.

UNIT-III STABILITY 9-Hours

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.

UNIT-IV FREQUENCY RESPONSE 9-Hours

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.

UNIT-V ROOT LOCUS METHOD 9-Hours

Rules for sketching of root loci, Root contours.

Synthesis: Lag and Lead networks, proportional, derivative and integral controllers.

Tutorials = 15

Total no. of Hours = 60

TEXT BOOK:

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. Ogata, "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.

BEE303	TRANSMISSION AND DISTRIBUTION	3	1	0	4

Equivalent subject code of the previous years / Part-Time / Other departments: **BEE256/303**

UNIT-I INTRODUCTION 9-Hours

Structure of Electric Power system –Transmission and Distribution systems - Typical power station and substation layouts - Single line diagram - Recent trends in Power transmission - EHV AC and HVDC transmission.

Mechanical Design of Transmission Lines – Sag, Calculation of Sag and Tension, Effect of ice and wind loading, Sag Template, Vibrations of conductors and Dampers.

UNIT-II TRANSMISSION LINE PARAMETERS 9-Hours

Resistance, Inductance and Capacitance of single and three phase transmission lines - Stranded and Bundled conductors -Symmetrical and unsymmetrical spacing -Transposition -Application of self and mutual GMD -Skin and Proximity effect -Inductive interference with neighbouring circuits.

UNIT-III CHARACTERISTICS AND PERFORMANCE OF TRANSMISSION LINES 9-Hours

Equivalent circuits for short, medium and long lines –Attenuation constant, phase constant, Surge impedance -Transmission efficiency and voltage regulation -Real and Reactive Power flow in lines – Power angle diagram -Receiving end power circle diagram -Limiting factors of transmission line load ability –Shunt and Series compensation –Ferranti effect and Corona loss.

UNIT-IV INSULATORS AND CABLES 9-Hours

Insulators: Types of insulators for overhead lines, Voltage distribution in insulator string and grading - String efficiency.

Underground cables: Constructional features of LT and HT cables – Capacitance – Dielectric stress and Grading –Thermal characteristics.

UNIT-V ECONOMICS OF POWER SUPPLY SYSTEMS 9-Hours

Economic choice of conductor size and voltage level, maximum demand and diversity factor, Tariffs, Power factor correction, Energy conservation.

Tutorials = 15
Total no. of Hours = 60

TEXT BOOK:

Wadhwa, C.L., “Electrical Power Systems”, Wiley Eastern Limited India, 1985.

REFERENCES:

1. Nagarath I.J and Kothari D.P., “Modern Power System Analysis”, Tata McGraw Hill Publishing Company, 1990.
2. Despande, M.V., “Electrical Power Systems Design”, Tata McGraw Hill Publishing Company New Delhi, 1990.

BEE305	DESIGN OF ELECTRICAL MACHINES*	3	1	0	4

Equivalent subject code of the previous years / Part-Time / Other departments**: BEE251/305**

UNIT-I INTRODUCTION 9-Hours

Major considerations – Limitations – Electrical Engineering Materials – Space factor temperature gradient – Heat flow in two dimensions – Thermal resistivity of winding – Temperature gradient in conductors placed in slots – Rating of machines – Eddy current losses in conductors – Standard specifications

UNIT-II DC MACHINES 9-Hours

Magnetic circuit calculations –Net length of Iron –Real & Apparent flux densities – Design of rotating machines – D.C machines output equations – Selection of number of poles – Design of shunt and series field windings - Armature design – Design of Commutator and brushes.

UNIT-III TRANSFORMERS 9-Hours

KVA output for single and three phase transformers – Window space factor – Overall dimensions – Operating characteristics – Regulation – No load current – Temperature rise of Transformers – Design of Tank with & without cooling tubes – Thermal rating – Methods of cooling of Transformers.

UNIT-IV INDUCTION MOTORS 9-Hours

Magnetic leakage calculations – Leakage reactance of poly-phase machines- Magnetizing current – Output equation of Induction motor – Main dimensions –Length of air gap- Rules for selecting rotor slots of squirrel cage machines – Design of rotor bars & slots – Design of end rings – Design of wound rotor - Operating characteristics –Short circuit current – circle diagram – Dispersion co-efficient – relation between D & L for best power factor.

UNIT-V SYNCHRONOUS MACHINES 9-Hours

Runaway speed – construction – output equations – choice of loadings – Design of salient pole machines – Short circuit ratio – shape of pole face – Armature design – Armature parameters – Estimation of air gap length – Design of rotor –Design of damper winding – Determination of full load field mmf – Design of field winding – Design of turbo alternators – Rotor design - Introduction to computer aided design – Program to design main dimensions of Alternators.

Tutorials = 15
Total no. of Hours = 60

TEXT BOOK:

Sawhney, A.K., "A Course in Electrical Machine Design", Dhanpat Rai & Sons, New Delhi, 1984.

REFERENCES:

Sen, S.K., "Principles of Electrical Machine Designs with Computer Programmes", Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 1987.

*** The end semester examination will be conducted as Practical Examination with External and Internal Examiners.**

BEE307	ELECTRICAL MEASUREMENTS & INSTRUMENTATION	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BEE302/307/254**

UNIT-I INTRODUCTION 6-Hours

Functional elements of an Instrument -Static and Dynamic characteristics -Errors in measurement - Statistical evaluation of measurement data -Standard and Calibration.

UNIT-II ELECTRICAL AND ELECTRONICS INSTRUMENTS 12-Hours

Principle and types analog and digital ammeters and voltmeters -Single and three phase Wattmeter and Energy meter - magnetic measurements -Instrument Transformers -Instruments for measurement of frequency and phase.

UNIT-III SIGNAL CONDITIONING CIRCUITS 9-Hours

Bridge circuits – Differential and Instrumentation amplifiers -Filter circuits - V/f and f/V converters – P/I and I/P converters – S/H Circuit, A/D and D/A converters -Multiplexing and De-multiplexing - Data acquisition systems –Grounding techniques.

UNIT-IV STORAGE AND DISPLAY DEVICES 8-Hours

Magnetic disc and Tape Recorders -Digital plotters and printers -CRT displays -Digital CRO – LED, LCD and Dot matrix displays.

UNIT-V TRANSDUCERS 10-Hours

Classification of Transducers -Selection of Transducers – Resistive, Capacitive and Inductive Transducers - Piezo electric Transducers -Optical and Digital Transducers -PH electrodes - Transducers for measurement of displacement, temperature, level, flows, pressure, velocity, acceleration, torque, speed, viscosity and moisture.

Total no. of Hours = 45

TEXT BOOKS:

1. Doebeling,E.O., “Measurement Systems – Application and Design”, McGraw Hill Publishing Company, 1990.
2. H.S. Kalsi, “Electornic Instrumentation”, TMH Co., 1995.

REFERENCES:

1. Stout M.B., “Basic Electrical Measurement”, Prentice Hall of India, 1986.
2. Dalley, J.W., Riley, W.F. and Meconnel, K.G., “Instrumentation for Engineering Measurement”, John Wiley & Sons, 1993
3. Moorthy, D.V.S., “Transducers and Instrumentation”, Prentice Hall of India Pvt. Ltd., 1995.

BEC321	LINEAR & DIGITAL INTEGRATED CIRCUITS LAB	0	0	3	1

(Common for EEE & ECE)

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, Multi-vibrators
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 de-multiplexers
11. Study of Flip-flops
12. Study of Registers
13. Study of Counters
14. Implementation of any general combinational / sequential logic circuits

Total no. of Hours = 45

BEE321	CONTROL & INSTRUMENTATION LAB	0	0	3	1

1. Transfer function of self excited DC Generator
2. Transfer function of Armature controlled DC Motor.
3. Transfer function of Field controlled DC Motor.
4. Transfer function of AC Servomotor.
5. Frequency response of Lag, Lead & Lag – Lead networks.
6. Study of DC Position Control system.
7. Study of P, PI and PID Controllers (First Order).
8. Study of temperature measuring transducers (Thermocouples).
9. Study of displacement and pressure transducers (LVDT).
10. AC Bridges.
11. DC Bridges.
12. Calibration of Single phase Energy meter.
13. Calibration of Three-phase Energy meter.
14. Measurement of Three-phase power and power factor.

Total no. of Hours = 45

BMG332	MANAGEMENT CONCEPTS AND ORGANIZATIONAL BEHAVIOR	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BMG332/351/352/331**

Objective:

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, Organizing, Leading, Motivating, Control and Operations / Marketing / Finance /HR
3. Organizing and Managing HR and communicating
4. Motivating and Leading
5. Behaviour 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 – leadership, communication – theories.
7. Power and politics, Organizational culture
8. Oraganization work culture, and work design.
9. HR policies and practices.
10. Managing the future – new worker/new manager/new organization etc.

Text Books:

1. Stephen P.Robbins, "Organisational Bahavior", PHI, 9th Edition, 2001.
2. Koontz O'Dannel, "Principles of Management", McGraw Hill Publishing Co. Ltd., 2000.
3. Peter Drucker, "The Practice of Management", Allied Publications, 1998
4. L.M.Prasad, "Management Principles", Sultan chand & Sons,1995.

Reference Books:

1. Stephen P.Robbins and David A. Decenzo, "Fundamentals of Management", Pearson Education, 3rd edition, 2001
2. Koontz, "Essentials of Management", Tata McGraw Hill, 5th Edition, 2001.
3. Gupta, C.B., "Management Theory and Practice", Sultan Chand & Sons, 2000.
4. Steward Black & Lyman W.Porter, "Management – Meeting new challenges", Prentice Hall, 2001.

BEC332	MICROPROCESSOR AND ITS APPLICATION	3	0	0	3

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

UNIT-I **9-Hours**

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

UNIT-II **9-Hours**

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

UNIT-III **9-Hours**

Programmable DMA controller (8257)- Programmable Interrupt controller (8259)-Keyboard display Interface (8279) – ADC / DAC Interfacing.

UNIT-IV **9-Hours**

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

UNIT-V **9-Hours**

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

Total no. of Hours = 45

TEXT BOOKS:

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.

BEC336	ANALOG AND DIGITAL COMMUNICATION	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BEC336/361**

UNIT- I **9-Hours**

Basic communication Systems – Need for modulation in communication Systems – Amplitude modulation – Double side band amplitude modulation, single side band modulation and vestigial side band modulation – Frequency and Phase modulation - Narrow band and wide band FM.

UNIT – II **9-Hours**

AM, FM detectors, AM, FM Transmitters, Receivers – Performance measurement.

UNIT-III **9-Hours**

Digital communication advantages – Basic block diagram – Sampling theorem – Quantization – PCM –DPCM –Delta modulation –ADM – Application.

UNIT – IV **9-Hours**

Power spectra of PAM signals, Inter symbol interface ideal Nyquist channel, raised cosine channel. Correlative and Precoding – Eye pattern and Equalizations Techniques.

UNIT – V **9-Hours**

History and Evaluation of Mobile Radio Systems, types of Mobile wireless Services/Systems – Cellular, WLL, Paging, Satellite Systems, Standard, Future trends in Personal Wireless systems. Cellular concepts and Frequency reuse, Multiple Access Schemes, Channel Assignment and handoff, interface and System Capacity, Trunkig and Erlang Capacity calculations.

Total no. of Hours = 45

TEXT BOOK:

P.B.Lathi, "Modern digital and Analog Communications Systems", 3rd Edition, Oxford University Press, 1998.

REFERENCES:

1. Taub and Scilling, "Principles of Communications Systems", TMH, New Delhi, 1995.
2. Simon Hawkins, "Digital Communications", John Wiley and Sons, 1988.
3. K.Feher, "Wireless Digital Communication", Prentice Hall of India, New Delhi, 1995.

BEE302	ADVANCED CONTROL THEORY	3	1	0	4

Equivalent subject code of the previous years / Part-Time / Other departments: **BEE302**

UNIT-I **9-Hours**

Linear system design- Introduction of Compensating networks - Lag, lead Compensation –Feedback compensation – P, PI, PID controllers – Design using Bode plot and root locus techniques.

UUNIT-II **9-Hours**

State space analysis - State space formulation -State variables - Phase variables and Canonical variables - State space models from differential equations - State transition matrix- - Eigen values and Eigen vectors-Diagonalisation -Canonical and Jordan forms

UNIT-III **9-Hours**

Controllability and Observability - Pole placement - Design of feedback controllers - Full and reduced order observers.

UNIT-IV **9-Hours**

Sampled data system – sampling process – Analysis of sampling process – frequency domain – reconstruction of sampled signals – hold circuits – Z and inverse Z transform – mapping between s and z planes – pulse transfer function – step response – stability analysis.

UNIT-V **9-Hours**

Non-linear systems –Properties of Non Linear system – Jump Resonance - Phase Plane method - Singular points – Construction of Phase Trajectories - System analysis by Phase Plane method - Describing function method - Describing function of Non-linear systems - Stability analysis by Describing function method - Liapunov's stability criteria.

Tutorials = 15

Total no. of Hours = 60

TEXT BOOK:

Nagrath.I.J and Gopal.M, "Control system Engineering", 2nd Edition, Wiley Eastern, 1995.

REFERENCES:

1. M.Gopal, "Digital Control & State Variable methods", TMH, 1997
2. Ogata, "Modern Control Engineering", TMH, 1997.

BEE304	POWER SYSTEM ANALYSIS	3	1	0	4

Equivalent subject code of the previous years / Part-Time / Other departments: **BEE304/351**

UNIT-I INTRODUCTION 9-Hours

Need for Power system analysis in planning and operation of power system - Per Unit representation – Single line diagram – Symmetrical components – Sequence impedance and sequence networks of transmission line, synchronous machine and transformers.

UNIT-II NETWORK MODELLING 9-Hours

Primitive network and its matrices – Bus incidence matrix – Bus admittance matrix by Singular transformation and inspection methods - Bus impedance matrix – Z-Bus building algorithm - Modeling of transformer with off-nominal tap ratio, synchronous generator, transmission line and loads for Short circuit, Power flow and Stability studies.

UNIT-III POWER FLOW ANALYSIS 9-Hours

Problem definition – Bus classification –Derivation of power flow equation –Solution by Gauss–Seidel, Newton-Raphson methods and FDLF – Modifications when P-V buses are present - Computation of slack bus power, transmission loss and line flows.

UNIT-IV SHORT CIRCUIT ANALYSIS 9-Hours

Need for Short circuit study - Symmetrical short circuit analysis – Short circuit of synchronous machine (both no-load and load condition) – Selection of circuit breakers.
Unsymmetrical fault analysis – LG, LL, LLG and open conductor faults.

UNIT-V STABILITY ANALYSIS 9-Hours

Dynamics of a Synchronous machine – Swing equation and Power angle equation – Steady state Stability and Transient state Stability - Equal area criterion – Clearing angle and time- Numerical solution of Swing equation for single machine.

Tutorials = 15
Total no. of Hours = 60

TEXT BOOK:

Nagarath .I.J, Kothari .D.P, “Power system Engineering”, TMH Pub. Co. Ltd., 1994.

REFERENCES:

1. John J. Grainger and Stevenson Jr. W.D., “Power System Analysis”, McGraw Hill International Edition, 2004.
2. Stagg, G.W. and El-Abaid, A. H., “Computer Methods in Power System Analysis”, McGraw-Hill International Book Company, 2000.

BEE306	POWER ELECTRONICS	3	1	0	4

Equivalent subject code of the previous years / Part-Time / Other departments: **BEE306/353**

UNIT-I POWER SEMI-CONDUCTOR DEVICES 9-Hours

Principle of operation - characteristics and modeling of power diodes, SCR, TRIAC, GTO, power BJT, power MOSFET and IGBT.

UNIT-II PHASE CONTROLLED CONVERTERS 9-Hours

Single-phase semi-converter and full converter with RL load – Three-phase semi-converter and full converters with RL load – Effect of source and load inductance – Single-phase and three-phase Dual converters- firing circuits.

UNIT-III DC CHOPPERS 9-Hours

Thyristor commutation techniques - natural and forced commutation – Principle of chopper operation – Step up and Step down choppers – Switching mode regulators – Thyristor chopper circuits.

UNIT-IV INVERTERS 9-Hours

Single-phase voltage source inverters – Three-phase bridge inverters – Voltage control of single-phase inverters – Voltage control of three-phase inverters – Forced commutated Thyristor inverters - Series inverter- PWM inverters – Current source inverters.

UNIT-V AC VOLTAGE CONTROLLERS 9-Hours

Single-phase and three-phase AC voltage controllers - Sequence control of AC voltage regulators. Cycloconverters – single-phase and three-phase cycloconverters

Tutorials = 15
Total no. of Hours = 60

TEXT BOOK:

Rashid, M.H., "Power Electronics - Circuits Devices and Applications", Prentice Hall of India, 2nd Edition, 1995.

REFERENCES:

1. Singh.M.D and Kanchandani, "Power Electronics", Tata McGraw Hill & Hill publication Company Ltd, New Delhi, 2002.
2. Dubey, G.K., Doradia, S.R., Joshi, A. and Sinha, R.M., "Thyristorised Power Controllers", Wiley Eastern Limited, 1986.
3. Lander,W., "Power Electronics", McGraw Hill and Company, Third Edition, 1993.
4. P.S. Bimbhra, "Power Electronics", Khanna Publishers, 3rd Edition, 1999.

BEC342	MICROPROCESSOR LAB	0	0	3	1

(Common for EEE and ECE)

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

Total no. of Hours = 45

BEE322	POWER ELECTRONICS LABORATORY	0	0	3	1

LIST OF EXPERIMENTS

1. SCR, MOSFET & IGBT Characteristics
2. UJT, R, RC Firing circuits for SCR.
3. SCR DC Voltage Commutated chopper.
4. SCR DC Current Commutated chopper.
5. SCR phase control circuit.
6. TRIAC phase control circuit
7. SCR half controlled & fully controlled converters.
8. SCR three phases AC regulator.
9. Speed control of DC shunt motor using three- phase fully controlled converter.
10. SCR single-phase cyclo-converter.
11. SCR series inverter.
12. SCR Parallel inverter.
13. IGBT chopper.
14. IGBT Based PWM inverter (Single Phase).

Total no. of Hours = 45

BMG431	ENTREPRENEURSHIP	2	0	0	2

Equivalent subject code of the previous years / Part-Time / Other departments: **BMG431/611**

Objective:

Starting & 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 structured approach to young entrepreneurs to succeed in their pursuit of new, unknown but promising ventures.

Contents:

1. Creativity for generating business ideas – 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 and 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 BOOK:

Hisrich, “Enterpreneurship”, Tata McGraw Hill, New Delhi, 2001.

REFERENCES:

1. Prasanna Chandra, “Projects – Planning, Analysis, Selection, Implementation and reviews”, Tata McGraw Hill, 1996.
2. P.C.Jain, “Handbook for New Entrepreneurs”, Oxford University Press, New Delhi, 1999.
3. Staff College for Technical Education, Manila and Centre for Research and Industrial Staff Performance, Bhopal, “Entrepreneurship Development”, Tata McGraw Hill Publishing, New Delhi, 1998.
4. P. Saravanavel, “Entrepreneurial Development”, Ess Pee Kay Publishing House, Chennai.
5. S.S. Khanka, “Entrepreneurial Development”, S.Chand and Company Ltd., New Delhi.

BCS431	COMPUTER ARCHITECTURE	3	0	0	3

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

UNIT-I INTRODUCTION 9-Hours

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

UNIT-II ARITHMETIC AND LOGIC UNIT 9-Hours

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

UNIT-III PROCESSOR UNIT 9-Hours

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

UNIT-IV MEMORY SYSTEM 9-Hours

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

UNIT-V INPUT/OUTPUT AND PERIPHERALS 9-Hours

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

Total no. of Hours = 45

TEXT BOOK:

Hayes, “Computer Architecture and Organization”, Tata McGraw Hill, 1998.

REFERENCES:

1. Heuring V.P., Jordan H.F., “Computer System Design and Architecture”, Addison Wesley, 1999.
2. Patterson and Hennessey, “Computer Organization and Design -The Hardware/Software Interface”, Harcourt Asia Morgan Kaufmann, 1999.
3. Carl Hamacher V.,Zvonko G.Vranesic, Safwat G. Zaky, "Computer Organization", Tata McGraw Hill, 2001.
4. Morris Mano, “Computer System Architecture”, 3rd Edition, PHI, 2000.

BEC431	DIGITAL SIGNAL PROCESSING	3	1	0	4

(Common for EEE & ECE)

Equivalent subject code of the previous years / Part-Time / Other departments: **BEC230/304/351/431**

UNIT-I SIGNALS & SYSTEMS 9-Hours

Signal classifications – Signal Representation – Classification of Discrete time signals – Typical Discrete time signals – operation on signals – Discrete time system – Classification of Discrete time systems – solution of difference Equations.

UNIT-II Z TRANSFORM & REALIZATIONS 9-Hours

Z Transform – Properties – System function – Inverse Z Transform – Realization of Digital filters – Direct Form-I, Direct Form-II, Transposed, parallel, cascade, Lattice- Ladder structure.

UNIT-III DFT & FFT 9-Hours

Discrete Fourier Transform (DFT) – Definition – 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

UNIT-IV DESIGN OF DIGITAL FILTER 9-Hours

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

UNIT-V EFFECTS OF FINITE REGISTER LENGTH 9-Hours

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

Tutorial = 15

Total no. of Hours = 60

TEXT BOOK:

Sanjit K.Mitra, "Digital Signal Processing - A computer Based Approach", Tata McGraw Hill, New Delhi, 1998.

REFERENCES:

1. John G.Proakis and Dimitris G.Manolakis, "Digital Signal Processing, Algorithms and Applications", PHI of India Ltd, New Delhi, 3rd Edition, 2000.
2. Johnny R.Johnson, "Introduction to Digital Signal Processing", 9th Printing, September 2001.

BEE401	POWER SYSTEM PROTECTION & SWITCHGEAR	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BEE401/352**

UNIT-I RELAYS 12-Hours

Need for protection – essential qualities of protective relays – Electromagnetic relays, Induction relays – Over current relays - Directional, Distance, Differential and negative sequence relays.

Static relays – components of static relays – over current relays, differential protection and distance protection - microprocessor-based relays.

UNIT-II APPARATUS PROTECTION 8-Hours

Transformer, Generator, Motor, Bus bar and Transmission line protection – Feeder protection.

UNIT-III THEORY ARC QUENCHING 7-Hours

Arc phenomena – arc interruption – Current zero interruption theories – recovery voltage and restriking voltage - RRRV – current chopping – Resistance switching.

UNIT-IV CIRCUIT BREAKERS 9-Hours

Various types of circuit breakers - selection of circuit breakers – Testing of circuit breakers – Auto reclosing.

UNIT-V PROTECTION AGAINST OVERVOLTAGES 9-Hours

Mechanism of lightning – Over voltage due to lightning – Protection against lightning –Protection of electrical apparatus against traveling waves – types of lightning arresters – Surge absorbers.

Total no. of Hours = 45

TEXT BOOKS:

1. Ravindranath, B and Chander, N, "Power System Protection and Switchgear", Wiley Eastern Ltd., 1977
2. Chakrabarti.A, Soni.M.L, Gupta .P.V, Bhatnagar.U.S, "A Text Book on Power System Engineering", Dhanpat Rai & Co. Pvt. Ltd., 2002.

REFERENCES:

1. Patra, S.P., Basu, S.K. and Chowduri, S., "Power systems Protection", Oxford and IBH Publishing Co, 1983.
2. Sunil.S.Rao, "Switchgear and Protection", Khanna Publishers, New Delhi, 1986.

BEE403	ELECTRICAL DRIVES & CONTROL	3	1	0	4

Equivalent subject code of the previous years / Part-Time / Other departments: **BEE403/E62**

UNIT-I DRIVE CHARACTERISTICS 9-Hours

Mechanical characteristics - constant torque and constant HP operations – Multi-quadrant operation – Drive specifications - Rating of motors – selection of drives.

UNIT-II DC DRIVES 9-Hours

Single phase and three-phase converter fed drives – continuous and discontinuous conduction modes – chopper fed drives - four-quadrant operation – closed loop drive system.

UNIT-III STATOR CONTROLLED INDUCTION MOTOR DRIVES 9-Hours

Variable terminal voltage control – Variable frequency control – V/f control - AC voltage controllers – Four-quadrant control and closed loop operation - Frequency controlled drives- VSI and CSI fed drives – closed loop control.

UNIT-IV ROTOR CONTROLLED INDUCTION MOTOR DRIVES 9-Hours

Rotor resistance control – slip power recovery schemes - sub synchronous and super synchronous operations – closed loop control – Braking in induction motors.

UNIT-V SYNCHRONOUS MOTOR DRIVES 9-Hours

Wound field cylindrical rotor motor – operation from constant voltage and frequency source – operation from current source – operation from constant frequency – Brushless excitation – Permanent magnet synchronous motor.

Self-controlled Synchronous motor drives – Brushless dc and ac motor drives – CSI with load commutation – Cycloconverter with load commutation.

Tutorial = 15

Total no. of Hours = 60

TEXT BOOK:

Dubey. G.K., “Power Semiconductor Controlled Drives”, Prentice Hall International, 1989.

REFERENCES:

1. Vedam Subrahmanyam, “Electric drives concepts and applications”, TMH Pub. Co.Ltd., 1994.
2. Murphy, J.M.D and Turnbull.F.G. , “Thyristor control of AC Motors”, Pergamon Press, 1988.
3. Sen. P.C., “Thyristor D.C. Drives”, John Wiley and Sons, 1981.
4. B. K.Bose, “Modern Power Electronics and AC Drives”, Prentice Hall Onglewood cliffs, New Jersey, 2002.

BEE405	HIGH VOLTAGE ENGINEERING	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BEE405/451**

UNIT-I OVERVOLATGES AND INSULATION COORDINATION 6-Hours

Natural causes of over voltages - lightning phenomena - over voltages due to switching surges - system faults and other abnormal conditions - principles of insulation co-ordination.

UNIT-II ELECTRICAL BREAKDOWN IN GASES, SOLIDS AND LIQUIDS 12-Hours

Classical gas laws - Ionization and decay processes – Townsend's current growth equation -secondary processes – Townsend's criterion for breakdown – Breakdown in electro negative gases - Streamer theory - Paschen's law - breakdown in non-uniform fields and corona discharges – Practical considerations in using gases for insulation purposes - Vacuum insulation. Conduction and breakdown in pure and commercial liquids. Intrinsic breakdown in solids - electromechanical breakdown - thermal breakdown - breakdown in solid and composite dielectrics.

UNIT-III GENERATION OF HIGH VOLTAGES AND HIGH CURRENTS 9-Hours

Generation of high DC voltage, alternating voltage, impulse voltages and impulse currents

UNIT-IV MEASUREMENT OF HIGH VOLTAGE AND HIGH CURRENTS 9-Hours

Measurement of high voltage ac, dc and impulse voltage – CRO for impulse voltage and current measurements – Measurement of high dc, ac and impulse currents.

UNIT-V HIGH VOLTAGE TESTING 9-Hours

Testing of insulators and bushings – Testing of isolators and circuit breakers – Testing cables – Testing of transformers – Testing Surge Diverters.

Non-destructive testing of materials – measurement of dc resistivity, measurement of dielectric constant and loss factor – Partial discharge measurement.

Total no. of Hours = 45

TEXT BOOK:

M.S. Naidu and V.Kamaraju, "High Voltage Engineering", Tata McGraw Hill, 2nd Edition, 1995.

REFERENCES:

1. Kuffel, E and Zaengl, W.S, "High Voltage Engineering Fundamentals", Pargamon Press, Oxford, London, 1986.
2. Kuffel, E and Abdullah, M., "High Voltage Engineering", Pergamon Press, Oxford, 1970.
3. Pearmain, A.J., "High Voltage Measurement", Testing and Design, John Wiley and Sons, New York, 1982.

BEE421	DIGITAL SIMULATION LAB	0	0	3	1

List of Experiments:

1. Formation of Y-Bus Matrix by Inspection and Singular transformation methods.
2. Load flow solution using Gauss Seidal method
3. Load flow solution using Newton-Raphson method
4. Load flow solution by Fast Decoupled method
5. Symmetrical short circuit analysis
6. Unsymmetrical Fault analysis
7. Solution of swing Equation using modified Euler method
8. Power Electronic Circuits, design and simulation using Pspice
9. Simulation of Electrical drives using MATLAB, PSCAD
10. Control system design using MATLAB

Total no. of Hours = 45

BMG432	TOTAL QUALITY MANAGEMENT	2	0	0	2

Objective:

Quality is considered as a major strategic competitive weapon in today's globalized market scenario. TQM has emerged as the most effective tool in achieving 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 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: JIT, Kan Ban, Cellular Manufacturing, Juran's Trilogy, PDSA, Kaizan, Re-Engineering.
5. Supplier Partnerships.
6. Performance measures.
7. Quality System – ISO 9000, others.
8. QFD.
9. Quality by Design: Tools and pitfalls.
10. Design of Experiments: Statistical Tests (F,T and etc.),Orthogonal Design.
11. Taguchi and quality Engineering: Loss function, Orthogonal Arrays, Signals,/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:

Dale H.Besterfield etal, "Total Quality Management", 2nd edition, Pearson Education, 2004.

REFERENCES:

1. James R.Williams and Lindsey M., "The Management and Control of Quality", Thompson Press, SW, 2002.
2. Feignbaum A.V., "Total Quality Management", Tata McGraw Hill and Company, 2001.
3. Oakland, J.S., "Total Quality Management", Butterworth-Heineman Ltd., 2000.
4. Subbraj Ramaswamy, "Total Quality Management", Tata McGraw Hill, 2005

BEEE02	POWER SYSTEM CONTROL & OPERATION	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BEEE02/E52**

UNIT-I INTRODUCTION 6-Hours

Need for Voltage regulation and frequency regulation in power system-system load characteristics-Basic P-f and Q-v control loops - cross coupling between control loops - Plant level and System level controls.

UNIT-II REAL POWER AND FREQUENCY CONTROL 12-Hours

Fundamentals of Speed Governing mechanisms and modeling - Speed-Load characteristics-regulation of two Synchronous Machines in parallel - Control areas - LFC of single & Multi areas - Static & Dynamic Analysis of uncontrolled and controlled cases –Tie line with frequency bias control – Steady state instabilities.

UNIT-III REACTIVE POWER AND VOLAGE CONTROL 9-Hours

Excitation system Modeling - Static & Dynamic Analysis - stability compensation - Effect of Generator loading – static shunt capacitor, Reactive VAR compensator, Synchronous condenser, tap changing Transformer - static VAR System Modeling - System Level Voltage control.

UNIT-IV ECONOMIC DISPATCH CONTROL 9-Hours

Need for Economic Dispatch-Characteristics curve for Steam and hydroelectric Units - Co-ordination Equation with Loss and without losses - Solution by Iteration method & Gradient method (no derivation of loss co-efficient) - Base point and Participation Factor.

UNIT-V UNIT COMMITMENT 9-Hours

Constraints in Unit Commitment -Unit Commitment Solution methods-Priority List methods- Dynamic Programming solution – Lagrange Relaxation solution.

Total no. of Hours = 45

TEXT BOOKS:

1. Olle I.Elgerd, “Electric energy and System Theory-An Introduction”, Tata McGraw hill publishing company, 1996.
2. Allen J.Wood, Bruce F.Wollenberg, “Power Generation system and control”, John Wiley and sons, 1998.

REFERENCES:

1. Kundur, “Power System Stability and Control”, McGraw hill publishing company, 1994.
2. Kirchmayer L.K., “Economic Operation of Power System”, John Wiley & sons, 1982.
3. Mahalanbis, A.K.Kothari,D.P and Ahson,S.I., “Computer Aided power system analysis and control”, Tata McGraw Hill publishing company, 1995

BEEE04	ADVANCED POWER ELECTRONIC SYSTEMS	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BEEE04/E54**

UNIT-I REACTIVE POWER COMPENSATION 9-Hours

TSC and TCR Systems – Systems – Theory Of Load Compensation – Power Factor Improvement Using Forced Commutation Methods – Suitable Core Reactors – Control Strategies

UNIT-II CONTROL USING STATIC TAP CHANGERS 9-Hours

Conventional and Static Tap Changing Methods, Control Schemes and Comparison

UNIT-III EXCITATION CONTROL 9-Hours

Solid-State Excitation of Synchronous Generators – Static Brushless Systems and Governor Excitation System And Control Strategies

UNIT-IV UPS SYSTEMS 9-Hours

Quasi – Resonant Converters, Resonant Inverters, Parallel Redundant and Non - redundant Ups Using Resonant Power Converters, Switched Mode Power Supply.

UNIT-V OTHER APPLICATIONS 9-Hours

HVDC System, Facts, Induction Heater Control Using Phase Control and Resonant Inverters.

Total no. of Hour = 45

TEXT BOOK:

Mohan, N., et al., "Power Electronics: Converter, Applications and Design", John Wiley and sons, 1989.

REFERENCES:

Miller, T.J.E., "Reactive Power Control in Electric systems", Wiley Inter Science Publication 1982.

BEEE06	SPECIAL ELECTRICAL MACHINES	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BEEE06/E64**

UNIT-I SYNCHRONOUS RELUCTANCE MOTORS 9-Hours

Constructional Features – Types – Axial and Radial Air Gap Motors – Operating Principle – Reluctance – Phasor Diagram – Characteristics – Vernier Motor

UNIT-II STEPPING MOTORS 9-Hours

Constructional Features – Principle of Operation – Variable Reluctance Motor – Hybrid Motor – Single and Multi Stack Configurations – Theory of Torque Predictions – Linear and Non-linear Analysis – Characteristics – Drive Circuits.

UNIT-III SWITCHED RELUCANCE MOTORS 9-Hours

Constructional Features – Principle of Operation – Torque Prediction – Power Controllers – Nonlinear Analysis – Microprocessor Based Control – Characteristics – Computer Control.

UNIT-IV PERMANENT MAGNET BRUSHLESS D.C MOTORS 9-Hours

Principle of Operation – Types – Magnetic Circuit Analysis – EMF and Torque Equations – Power Controllers – Motor Characteristics and Control.

UNIT-V PERMANENT MAGNET SYNCHRONOUS MOTORS 9-Hours

Principle of Operation – EMF and Torque Equations – Reactance – Phasor Diagram – Motor Controllers – Converters – Volt-amp Requirements – Torque Speed Characteristics – Microprocessor Based Control.

Total no. of Hours = 45

TEXT BOOKS:

1. Miller,T.J.E., “Brushless Permanent Magnet and Reluctance Motor and Drives”, Clarendon Press, Oxford, 1989.
2. Aearnley, P.P., “Stepping Motors – A Guide to Motor Theory and Practice”, Peter Perengrinus, London, 1982.

REFERENCES:

1. Kenjo, T., “Stepping Motors and their Microprocessor controls”, Clarendon Press, London, 1984.
2. Kenjo, T., and Nagamori, S., “Brushless Permanent Magnet and DC Motors”, Clarendon Press, London, 1988.

BEEE08	UTILIZATION OF ELECTRICAL ENERGY	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BEEE08/E51**

UNIT-I ELECTRIC LIGHTING 9-Hours

Production of light – Definition of terms – Lighting calculations – Types of lamps – Interior and Exterior illumination systems – Lighting schemes – Design of Lighting schemes – Factory lighting – Flood lighting – Energy saving measures.

UNIT-II ELECTRIC HEATING 9-Hours

Resistance heating – Induction heating – Dielectric heating – Arc furnace – Control equipment, efficiency, and losses – Energy conservation in Arc Furnace Industry.

UNIT-III ELECTRIC WELDING 9-Hours

Welding equipment – Characteristics of carbon and metallic arc welding – Butt welding – Spot welding – Energy conservation in welding.

UNIT-IV ELECTRIC VEHICLE 9-Hours

Railway electrification – Definition and analysis of Traction effort – Speed ~ Time curve – Traction motors – Battery driven vehicles – Energy efficiency drives – Advanced speed control measures.

UNIT-V ELECTRO CHEMICAL PROCESS 9-Hours

Electrolysis – Electroplating – Electro deposition – Extraction of metals – Current, efficiency – Batteries – Types – Charging methods.

Total no. of Hours = 45

TEXT BOOKS:

1. Tripathy,S.C., "Electric Energy Utilization & Conservation" – Tata McGraw Hill Publishing Company, 2000.
2. Uppal,S.L., "Electric Power", Khanna Publishers, 1998.
3. Soni,M.L., P.V.Gupta & Bhatnagar , "A course in Electric Power", Dhanpat Rai & Sons, 1999.

REFERENCES:

1. Partab,H., "Art & Science Utilization of Electrical Energy" – Dhanpat Rai & Sons, 1995.
2. Wadhwa,C.L., "Generation, Utilization & Distribution" - Wilsey Eastern Ltd, 2001.
3. Suryanarayana,N.V., "Utilization of Electric Power" - Wilsey Eastern Ltd, 2000.

BEEE10	NEURAL NETWORKS	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BEEE10/E58**

UNIT-I INTRODUCTION TO ARTIFICIAL NEURAL NETWORKS 9-Hours

Neuro – physiology – General Processing Element – ADALINE – LMS learning rule – MADALINE – Perceptron.

UNIT-II BPN AND BAM 9-Hours

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.

UNIT-III SIMULATED ANNEALING AND CPN 9-Hours

Annealing, Boltzmann machine – Learning – Application – Counter Propagation network – Architecture – Training – Application.

UNIT-IV SOM AND ART 9-Hours

Self-organizing map – Learning algorithm – Feature map classifier – Applications – Architecture of Adaptive Resonance theory – ART1 and ART2.

UNIT-V CASE STUDY 9-Hours

1. Implementation of BPN algorithm in a computer language
2. Application of Neural Networks for Pattern recognition, data compression
3. Hop field networks for an n bit A/D converter

Total no. of Hours = 45

TEXT BOOK:

J.A. Freeman and B.M. Skapura, "Neural Networks, Algorithms Applications and Programming Techniques", Addison-Wesley, 1990.

REFERENCES:

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

BEEE12	EMC & EMI	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BEEE12**

UNIT-I EMI ENVIRONMENT 9-Hours

Sources of EMI-Conducted and radiated EMI - Transient in EMI - EMI-EMC definitions and units of parameters - EMI Coupling Principles - 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.

UNIT-II EMI SPECIFICATION / STANDARDS / LIMITS 9-Hours

Units of specification - Civilian standards - Military standards.

UNIT-III EMI MEASUREMENTS 9-Hours

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.

UNIT-IV EMICONTROL TECHINQUES 9-Hours

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

UNIT-V EMI DESIGN OF PCBs 9-Hours

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

Total no. of Hours = 60

TEXT BOOK:

Bernhard Keiser, “Principles of Electromagnetic compatibility”, Artech House, 3rd Ed, 1986.

REFERENCES:

1. Henry W.Ott, “Noise Reduction Techniques in Electronic Systems”, John Wiley and Sons, New York, 1988.
2. V.P.Kodali, “Engineering EMC Principles, Measurements and Technologies”, IEEE Press, 1996.

BEEE14	POWER SYSTEM TRANSIENTS	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BEEE14**

UNIT-I INTRODUCTION AND SURGES 5-Hours

Review of various types of power system transients-effect of transients on power system – relevance of the study and computation of power system transients.

UNIT-II LIGHTNING SURGES 10-Hours

Electrification of thunder clouds-lighting current surges-lightning current parameters and their values-stroke to tower and mid-span-induced lightning surges.

UNIT-III SWITCHING SURGES 10-Hours

Closing and reclosing of lines- load rejection-fault initiation-fault clearing-short line faults-ferro-resonance- isolator switching surges-temporary over voltages- surges on an integrated system-switching – harmonics.

UNIT-IV COMPUTATION OF TRANSIENTS IN CONVERSION EQUIPMENT 10-Hours

Traveling wave method-Beweley's lattice diagram-analysis in time and frequency domain-Eigen value approach- z transform - EMTP software.

UNIT-V INSULATION CO-ORDINATION 10-Hours

Over voltage protective devices-shielding wires - rod gaps-surge diverters - principles of insulation coordination - recent advancements in insulation coordination - design of EHV system.

Total no. of Hours = 45

TEXT BOOKS:

1. Allan Greenwood, "Electrical transients in power systems", Wiley Intersciences, Newyork, 1971.
2. Rakosh das Begamudre , "Extra High Voltage Ac Transmission Engineering", Wiley Eastern Ltd, New Delhi, 1990.

REFERENCES:

1. Klaus Ragaller, "Surges in high voltage networks", Plenum press, Newyork, 1980.
2. Peterson .H.A., "Transients in Power systems", Dover publications, Newyork, 1963.
3. Website: www.microtran.com & www.abb.com

BEEE16	INTELLIGENT CONTROLLERS	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BEEE16/E61**

UNIT-I Introduction 9-Hours

Fuzzy Logic and neural networks in the control of AC drives – Artificial intelligence and expert systems theory in the control of drives and Power electronic converters like UPS.

UNIT-II Vector control of AC drives 9-Hours

A Review –Traditional Phasors – AC motor equation – space phasors and analysis of AC motors – A short review of inverters for the control of AC motors.

UNIT-III Robust control techniques 9-Hours

Introduction to Robust control – Robust servo control – Linear and nonlinear – Adaptive control – MRAC – Self tuning control.

UNIT-IV Robust AC drive control 9-Hours

Introduction – Control methods – Observe for robust control – Speed observer – Speed sensor less operation – Neuro-observer – Fuzzy robust control self tuning Fuzzy controllers - Stability considerations.

UNIT-V Soft computing applied to intelligent control of AC drives 9-Hours

Introduction – Soft computing – Neuro, fuzzy algorithms and their combination in the control and diagnosis of AC drives – PE systems intelligent control – Sensor failure detection using Neuro and fuzzy – Hardware for soft computing.

Total no. of Hours = 45

TEXT BOOKS:

Bimal.K.Sen, "Modern Power Electronics and AC Drives", Pearson publications, 2002.

REFERENCES:

1. Yashiko Dote and RG Hoft, "Intelligent control power Electronic Systems", Oxford University press, 1998.
2. Vedam Subrahmanyam, "Thyristor control of electric drives", TMH, 1988.
3. Vedam Subrahmanyam, "Electric Drives – Concepts and Applications", TMH, 2000.

BEEE18	SOLID STATE RELAYS	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BEEE18/E56**

UNIT-I **9-Hours**

Advantages of Static Relays – Generalized Characteristics and Operational Equations of Relays – Steady State and Transient Performance of Signal Driving Elements – Signal Mixing Techniques and Measuring Techniques – CT's and PT's in Relaying Schemes – Saturation Effects.

UNIT-II **9-Hours**

Static Relay Circuits (Using Analog and Digital IC's) for Over Current, Inverse Time Characteristics, Differential Relay and Directional Relay.

UNIT-III **9-Hours**

Static Relay Circuits for Generator Loss of Field, Under Frequency Distance Relays, Impedance, Reactance, MHO, Reverse Power Relays.

UNIT-IV **9-Hours**

Static Relay Circuits for Carrier Current Protection – Steady State and Transient Behavior of Static Relays – Testing and Maintenance – Tripping Circuits using Thyristor.

UNIT-V **9-Hours**

Microprocessor Based Relays – Hardware and Software for the Measurement of Voltage, Current, Frequency, Phase Angle – Microprocessor Implementation f Over Current Relays – Inverse Time Characteristics – Impedance Relay – Directional Relay – MHO Relay.

Total no. of Hours = 45

TEXT BOOKS:

1. Badriram and Vishwakarma D.N., Power System Protection and Switchgear, Tata McGraw Hill, New Delhi, 1995.
2. Rao T.S.M., Power System Protection – Static Relays, McGraw Hill, 1979.

REFERENCES:

1. Van C.Warrington, "Protection Relays – Their Theory and Practice", Chapman and Hall, 1990.
2. Ravindranath B. and Chander M., "Power System Protection and Switchgear", Wiley Eastern, 1992.
3. Russel C.Mason, "The Art and Science of Protective relays", 1989.

BEEE20	NON-CONVENTIONAL ENERGY SOURCES	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BEEE20/E65**

UNIT-I **9-Hours**

General: primary and commercial energy sources – study of availability, energy consumption pattern and growth rate in India .Non commercial energy sources – Availability, Economics, and efficiency.

UNIT-II **9-Hours**

Solar energy and applications: Solar radiation – principles of solar energy collection – types of collector – characteristics and principles of different types of collector and their efficiencies - Solar energy applications – Water heaters, air heaters, solar cooling, solar drying and power generation – Solar tower concept (solar plant) – solar pump.

UNIT-III **9-Hours**

Wind energy: Energy from the wind – General theory of wind mills – types of wind mills – performance of wind machines – wind power - efficiency.

UNIT-IV **9-Hours**

Tidal energy: Energy from tides and waves – working principles of tidal plants – tidal power generations – geothermal energy – principle of working of geothermal power plants.

UNIT-V **9-Hours**

Bio – energy: Energy from Bio – mass – Biogas plants – various types – Industrial wastes – municipal waste – Burning plants – Energy from the Agricultural wastes – Applications.

Total no. of Hours = 45

REFERENCE BOOKS:

1. S.P.Sukhatme, “Solar Energy- Principles of thermal collection and storage”, Tata McGraw Hill Publishers, Fourth Print, February 1989.
2. G D Rai, “Solar Energy Utilization”, Khanna Publishers, Second revised edition, 1984.
3. Ronald Shaw, “Wave Energy- A Design Challenge”, Ellis Horwood Limited publishers, First edition, 1982.
4. Putnam, “Energy from the wind”, Prentice Hall of India, 2001.

BEEE22	FUZZY LOGIC & ITS APPLICATIONS	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BEEE22/E66**

UNIT-I INTRODUCTION TO FUZZY SETS 5-Hours

Crispness – Vagueness - Fuzziness - Uncertainty -Fuzzy Set Theory.

UNIT-II FUZZY MATHEMATICS 10-Hours

Fuzzy Set - Basic definition-Extension Fuzzy Measures - Measures of Fuzziness-The extension principles and applications.

UNIT-III FUZZY THEORY 10-Hours

Fuzzy Relations - Fuzzy graphs-Fuzzy analysis- Probability Theory-Possibility Theory-Fuzzy Set Theory.

UNIT-IV FUZZY APPLICATIONS 10-Hours

Fuzzy Logic and Approximate Reasoning Expert System and Fuzzy Control-Pattern Recognition.

UNIT-V FUZZY APPLICATIONS IN POWER SYSTEMS 10-Hours

Decision making in power system control through Fuzzy set theory-Use of Fuzzy set Nodels of LP in power systems Scheduling Problems.

Total no. of Hours = 45

TEXT BOOK:

Zimmermann, H.J., "Fuzzy Set Theory and its Applications", 2nd Edition, Kluwer Academic Publishers,1998.

REFERENCES:

1. George Klir &Tina. A. Folger, "Fuzzy Sets, Uncertainity and Information", Prentice Hall of India Private Ltd, 2001.
2. Timothy.J Ross, "Fuzzy Logic with Engineering Applications", Mc Graw Hill, Inc., 1997.

BEEE24	MICROCONTROLLER AND ITS APPLICATIONS	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BEEE24/E53**

UNIT-I **9-Hours**

Intel 8051 Architecture – Hardware – I/O ports – External Memory – Counters and Timer – Serial data I/O – Interrupts, Assembly language, Addressing modes, Instruction Set - Simple programs, 8051 interfacing to LCD, ADC, DAC and Stepper Motors.

UNIT-II **9-Hours**

Motorola 68HC11 Architecture – Input / Output ports – Resets and self-protection – Interrupt Timing – A/D and D/A converters.

UNIT-III **9-Hours**

Intel 8096 CPU Structure – Register file – Assembly Language – Addressing modes – Instruction set – simple programs.

UNIT-IV **9-Hours**

Interrupt structure – Programmable timers – Real time clock latency – Interrupt density and Interval consideration, shared resources and critical regions.

UNIT-V **9-Hours**

SOFTWARE AND EXPANSION METHODS

Queues – Table and Strings – Program organization – State machines – Key switch parsing – Timing consideration – UART ports – I/P O/P Serial ports programmable controllers.

Total no. of Hours = 45

TEXT BOOK:

Kenneth J.Ayala, “The 8051 Microcontroller Architecture, Programming & Applications”, Penram International publishing (India), Second Edition, 1996.

REFERENCES:

1. Muhammed Ali Mazidi, Janice Gillies Pie Mazidi, “The 8051 Microcontroller and Embedded Systems”, Pearson Education Asia, 1995.
2. Peatman J.B, “Design with Microcontrollers”, McGraw Hill Book International Ltd, Singapore, 1989.
3. Intel Manual on 16 – bit “Embedded controllers”, Santa Clara, 1991.

BEEE26	POWER PLANT INSTRUMENTATION	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BEEE26/E59**

UNIT-I OVERVIEW OF POWER GENERATION 9-Hours

Brief survey of methods of power generation-hydro, thermal, nuclear, solar and wind power – importance of instrumentation in power generation – thermal power plants – building blocks – details of boiler processes ÛP & I diagram of boiler –cogeneration.

UNIT-II MEASUREMENTS IN POWER PLANTS 9-Hours

Electrical measurements – current, voltage, power, frequency, power-factor etc., non-electrical parameters – flow of feed water, fuel, air and steam with correction factor for temperature – steam pressure and steam temperature-drum level measurement – radiation detector – smoke density measurement – dust monitor.

UNIT-III ANALYZERS IN POWER PLANTS 9-Hours

Flue gas oxygen analyzer – analysis of impurities in feed water and steam – dissolved oxygen analyzer – chromatography – PH meter-fuel analyzer – pollution monitoring instruments.

UNIT-IV CONTROL LOOPS IN BOILER 9-Hours

Combustion control – air/fuel ratio control – furnace draft control – drum level control – main steam and reheat steam temperature control – super heater control – attemperator – deaerator control – distributed control system in power plants-interlocks in boiler operation.

UNIT-V TURBINE-MONITORING AND CONTROL 9-Hours

Speed, Vibration, shell temperature monitoring and control-steam pressure control – lubricant oil temperature control – cooling system.

Total no. of Hours = 45

TEXT BOOKS:

1. Sam G. Dukelow, “The control of Boilers”, Instrument Society of America, 1991.
2. “Modern Power Station Practice”, Vol.6, Instrumentation, Controls and Testing, Pergamon Press, Oxford, 1971.

REFERENCES:

1. Elonka, S.M.and Kohal A.L. “Standard Boiler Operations”, McGraw Hill, New Delhi, 1994.
2. R.K.Jain, “Mechanical and industrial Measurements”, Khanna Publishers, New Delhi, 1995.

BEEE28	COMPUTER AIDED DESIGN OF ELECTRICAL MACHINES	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BEEE28/E57**

UNIT-I Introduction 6-Hours

Conventional design procedures –Limitations - Need for analysis based design.

UNIT-II Mathematical formulation of Field problems 12-Hours

Development of torques / forces- Electromagnetic Field Equations – Magnetic Vector/Scalar potential –Electrical Vector /Scalar potential – Stored energy in field problems- Inductances-
Lap lace and Poisson's Equations –Energy functional –Principle of energy conversion.

UNIT-III Philosophy of FEM 9-Hours

Mathematical Models – Differential / Integral equations – Finite Difference method –
Finite Element Method – Energy minimization – Variation method – 2D Field problems –
Discretisation – Shape functions – Stiffness matrix – Solution techniques.

UNIT-IV CAD Packages 9-Hours

Elements of a CAD System – Preprocessing – Modeling – Meshing – Material Properties – Boundary Conditions – Setting up solution – Post-processing.

UNIT-V Design Applications 9-Hours

Design of Solenoid Actuator – Induction motor – Switched Reluctance Motor – Synchronous Machines.

Total no. of Hours = 45

TEXT BOOK:

1. S.R.H.Hoole , "Computer – Aided, Analysis and Design of Electromagnetic Devices", Elsevier, New York, Amsterdam, London , 1989.
2. S.J Salon, "Finite Element Analysis of Electrical Machines", Kulwer Academic Publishers, London, 1995.

REFERENCES:

1. Silvester and Ferrani, "Finite Elements of Electrical Engineers", Cambridge University press, 1983.
2. D.A Lowther and P.P Silvester, "Computer Aided Design in Magnetics", Springer Verlag, New York, 1956.
3. C.W.Trowbridge, "An Introduction to Computer aided Electromagnetic Analysis", Vector Field Ltd.
4. User Manuals of MAGNET, MAXWELL& ANAYS, Software Packages.

BEEE30	EHV AC & DC TRANSMISSION ENGINEERING	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BEEE30**

UNIT-I Transmission Engineering 9-Hours

Transmission line trends – Standard transmission voltages – Power handling capacity and line losses Cost of transmission lines and equipment – Mechanical consideration – Transmission Engineering principles.

UNIT-II Line Parameter 9-Hours

Calculation of line and ground parameters - Resistance, capacitance and Inductance calculation – Bundle conductors – modes propagation – Effect of earth.

UNIT-III Power Control 9-Hours

Power frequency and voltage control – voltage control – Over voltages – Power circle diagram – Voltage control using shunt and series compensation – Static VAR compensation – Higher Phase order system – FACTs.

UNIT-IV EHV AC Transmission 9-Hours

Design of EHV lines based in steady state limits and transient over voltages – Design of extra HV cable transmission – XLPE cables – Gas insulated cable – Corona and RIV.

UNIT-V HVDC Transmission 9-Hours

HVDC Transmission principles – Comparison of HVAC and HVDC transmission – Economics – types of Converters – HVDC links – HVDC control – Harmonics – Filters – Multi terminal DC System – HVDC cables and HVDC circuit breakers.

Total no. of Hours = 45

TEXT BOOK:

Padiyar K.R., “HVDC Power Transmission systems”, Wiley Eastern Ltd, 1993.

REFERENCES:

1. Rakosh Das Begamudre, “Extra HVDC Transmission Engineering”, Wiley Eastern Ltd, 1990.
2. Allan Greenwood, “Electrical transients in power Systems”, John Eastern Ltd, New York, 1992.
3. Arrilaga J., “HVDC transmission”, Peter Perengrinus Ltd, London, 1983.

BEEE32	BIOMEDICAL INSTRUMENTATION	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BEEE32/E63**

UNIT-I BASIC PHYSIOLOGY: 9-Hours

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

UNIT-II BASIC TRANSDUCER PRINCIPLES AND ELECTRODES: 9-Hours

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

UNIT-III CARDIOVASCULAR SYSTEM 9-Hours

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.

UNIT-IV X-RAY AND RADIOISOTOPE INSTRUMENTATION: 9-Hours

X-ray imaging radiography – Fluoroscopy – Image intensifiers – Angiography - Medical use of radioisotopes – Beta radiations – Detectors – Radiation therapy.

UNIT-V BIO-TELEMETRY: 9-Hours

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 no. of Hours = 45

TEXT BOOK:

Khandpur, “Handbook on Biomedical Instrumentation”, Tata McGraw Hill Co Ltd., 1989.

REFERENCES:

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.

BEEE34	PRINCIPLES OF ROBOTICS	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BEEE34/E55**

UNIT-I Introduction to Robotics 9-Hours

Automation and Robotics – Robot Anatomy – Classification of Robots by Configuration and Control – Basic Components of robots System - Manipulators, Wrists, End Effectors, Power, Control Units – Robot Sensors, Force Sensors - Introduction to AI – Legged Locomotion.

UNIT-II Robot Motion Analysis and Control 9-Hours

Introduction to Manipulator Kinematics – Homogeneous Transformation and Robot Kinematics – Robot Dynamics – Manipulator Path Controller – Configuration of a Robot Controller – Control of a Robot Joint.

UNIT-III Robot Drive Systems 9-Hours

Introduction to Robot drives – Electric, Hydraulic and Pneumatic – Electrical Actuators – Stepper Motors, Stepper Motor Drives, Linear Stepper Motors, Brushless DC Motors, Direct Drive Actuators – Hydraulic Actuators – Pneumatic drives – Servo Amplifiers.

UNIT-IV Machine Vision for Robotics 9-Hours

Introduction to machine vision – image Acquisition – Illumination Techniques – Imaging Geometry – Some Basic Relationship between Pixels – Analog to Digital Signal conversion –Image Storage – Image Processing and Analysis, Preprocessing, Segmentation, Feature Extractions, Recognition, Interpretation.

UNIT-V Robot programming and Applications 9-Hours

Methods of Robot programming – Lead through Programming Methods – A robot Program as a Path in space – Motion Interpolation – Weight, Signal and Delay Commands – Branching Capabilities – Robot Programming Examples for Pick and Place Application using VAL – Application of Robots in Material Handing, Processing operations, Assembly and Inspections – Future Applications of Robots.

Total no. of Hours = 45

TEXTBOOKS:

1. Richard D.Klaffer, Thomas A. Chimelewski,Michael Negain, “Robotic Engineering –An Integrated Approach”, PHI Pvt. Ltd, 1989.
2. Mikell P.Groover, Michel Wein Roger Nagel and Nicholas G.Ordy, “Industrial Robotics, Technology, Programming and Applications”, McGraw Hill, 1987.

REFERENCES:

1. B.Siciliano, “Modeling and Control of Robot Manipulators”, Tata McGraw-Hill, 1996
2. M.W.Spong and W.Vidyasagar, “Robot Dynamics and Control”, John Wiley and Sons, 1989.
3. J.J.Graig, “Introduction to Robotics, Mechanics and Control”, Addison Wesley Publishers, 1989.

BEEE36	DIGITAL IMAGE PROCESSING	3	0	0	3

Equivalent subject code of the previous years / Part-Time / Other departments: **BEEE36**

UNIT-I CONTINOUS AND DISCRETE IMAGES AND SYSTEMS 9-Hours

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.

UNIT-II IMAGE TRANSFORMS 9-Hours

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

UNIT-III IMAGE ENHANCEMENT 9-Hours

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

UNIT-IV IMAGE RESTORATION 9-Hours

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

UNIT-V IMAGE DATA COMPRESSION AND IMAGE RECONSTRUCTION FROM PROJECTION 9-Hours

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 no. of Hours = 45

TEXT BOOK:

R.Gonzalaz and P.Wintz, “Digital Image Processing”, Addition Wesley 2nd Ed, 1987.

REFERENCES:

1. Anil K. Jain, “Fundamentals of Digital Image Processing”, PHI 1995.
2. M.A.Sid Ahmed, “Image Processing”, McGraw Hill, Inc, 1995.
3. 4. William. K.Pratt, “Digital Image Processing”, Wiley Interscience, 2nd Ed, 1991.