Electronics and Communication Engineering Discipline

SYLLABUS

Effective from Academic Session **1998-99**

Khulna University

Khulna, Khulna-9208, Bangladesh

Summary of **credit hrs** requirements for undergraduate students of Electronics and Communication Engineering (ECE) Discipline:

Years	Terms	Core Courses		Optional Courses	
		Theory	Sessional	Theory	Sessional
Year-I	Term-I	17.00	4.50	0.00	0.00
	Term-II	16.00	3.75	0.00	0.00
Year-II	Term-I	19.00	2.25	0.00	0.00
	Term-II	19.00	2.25	0.00	0.00
Year-III	Term-I	15.00	2.25	2.00	0.00
	Term-II	12.00	3.75	3.00	0.00
Year-IV	Term-I	12.00	4.25	3.00	0.00
	Term-II	8.00	3.50	6.00	1.50
	Total =	118.00	26.50	14.00	1.50
	Total =	144.50		15.50	
	Grand Total	**160.00**			

Summary of **course** requirements for undergraduate students of Electronics and Communication Engineering (ECE) Discipline:

Year-I Term-I

Course	No.	Course Title	Contact Hrs./Week	Credit Hrs.
ECE	1101	Electrical Circuits	3-0	3.00
ECE	1102	Electrical Circuits Sessional	0-3	1.50
CSE	1151	Computer Programming	3-0	3.00
CSE	1152	Computer Programming Sessional	0-3	1.50
Math	1161	Differential & Integral Calculus	3-0	3.00
Phy	1163	Physics	3-0	3.00
Phy	1164	Physics Sessional	0-3/2	0.75
Chem	1165	Chemistry	3-0	3.00
Chem	1166	Chemistry Sessional	0-3/2	0.75
Eng	1171	English	2-0	2.00
Total		6 Theory + 4 Sessional	17-9	21.50

Year-1 Term-II

Course	No.	Course Title	Contact Hrs./Week	Credit Hrs.
ECE	1201	Basic Bipolar & Unipolar Devices & Circuits	4-0	4.00
ECE	1202	Basic Bipolar & Unipolar Devices & Circuits Sessional	0-3	1.50
ECE	1203	Electrical Technology	4-0	4.00
ECE	1204	Electrical Technology Sessional	0-3	1.50
ECE	1205	Discrete Mathematics	3-0	3.00
CSE	1250	Software Sessional	0-3/2	0.75
Math	1261	Differential Equations	3-0	3.00
HSS	1271	Government & Sociology	2-0	2.00
Total		5 Theory + 3 Sessional	16-15/2	19.75

Year-II Term-I

Course	No.	Course Title	Contact Hrs./Week	Credit Hrs.
ECE	2101	Solid State Devices	3-0	3.00
ECE	2103	Electronic Amplifiers, Oscillators & PS Circuits	4-0	4.00
ECE	2104	Electronic Amplifiers, Oscillators & PS Circuits Sessional	0-3/2	0.75
ECE	2105	Switching & Finite Automata Theory	3-0	3.00
ECE	2106	Switching & Finite Automata Theory Sessional	0-3/2	0.75
CSE	2151	Data Structures & Algorithms	3-0	3.00
CSE	2152	Data Structures & Algorithms Sessional	0-3/2	0.75
Math	2161	Coordinate Geometry, Vector Analysis & Statistics	4-0	4.00
Econ	2171	Economics	2-0	2.00
Total		6 Theory + 3 Sessional	19-9/2	21.25

Year-II Term-II

Course	No.	Course Title	Contact Hrs./Week	Credit Hrs.
ECE	2201	Op Amps and IC Technology	3-0	3.00
ECE	2202	Op Amps and IC Technology Sessional	0-3/2	0.75
ECE	2203	Digital Electronics & Pulse Techniques	3-0	3.00
ECE	2204	Digital Electronics & Pulse Techniques Sessional	0-3/2	0.75
ECE	2205	Linear System Analysis	4-0	4.00
ECE	2207	Numerical Methods	3-0	3.00
ECE	2208	Numerical Methods Sessional	0-3/2	0.75
Math	2261	Matrix, Harmonic Analysis & Complex Variable	3-0	3.00
BA	2271	Accounting	3-0	3.00
Total		6 Theory + 3 Sessional	19-9/2	21.25

Year-III Term-I

Course	No.	Course Title	Contact Hrs./Week	Credit Hrs.
ECE	3101	Measurements & Electronic Instrumentation	3-0	3.00
ECE	3102	Measurements & Electronic Instrumentation Sessional/ Project	0-3/2	0.75
ECE	3103	Control Theory	3-0	3.00
ECE	3105	Analog Communication	3-0	3.00
ECE	3106	Analog Communication Sessional	0-3/2	0.75
*Option			2-0	2.00
CSE	3151	Microprocessors	3-0	3.00
CSE	3152	Microprocessors Sessional	0-3/2	0.75
BA	3171	Industrial Management & Law	3-0	3.00
Total		6 Theory + 3 Sessional	17-9/2	19.25

* Option should be selected from the following courses:

***ECE**	3107	Science of Materials	2-0	2.00
***ECE**	3109	Quantum Mechanics	2-0	2.00

Year-III Term-II

Course	No.	Course Title	Contact Hrs./Week	Credit Hrs.
ECE	3200	Electronic Shop Practice	0-3/2	0.75
ECE	3201	Television Engineering	3-0	3.00
ECE	3202	Television Engineering Sessional	0-3/2	0.75
ECE	3203	Digital Communication	3-0	3.00
ECE	3204	Digital Communication Sessional	0-3/2	0.75
ECE	3205	Electromagnetic Fields & Waves	3-0	3.00
* Option			3-0	3.00
ECE	3210	Computer Aided Circuit Design	0-3/2	0.75
CSE	3251	Computer Network	3-0	3.00
CSE	3252	Computer Network Sessional	0-3/2	0.75
Total		5 Theory + 5 Sessional	15-15/2	18.75

* Option should be selected from the following courses:

***ECE**	3207	Stochastic Theory of Communication	3-0	3.00
***CSE**	3253	Computational Geometry	3-0	3.00

Year-IV Term-I

Course	No.	Course Title	Contact Hrs./Week	Credit Hrs.
ECE	4100	Project/Thesis	0-4	2.00
ECE	4101	Industrial Electronics	3-0	3.00
ECE	4102	Industrial Electronics Sessional/Project/Field Trip	0-3/2	0.75
ECE	4103	VLSI Technology	3-0	3.00
ECE	4105	Microwave Engineering	3-0	3.00
ECE	4106	Microwave Engineering Sessional/Project/Field Trip	0-3/2	0.75
ECE	4107	Telecommunication Engineering	3-0	3.00
ECE	4108	Telecommunication Engineering Sessional/Field Trip	0-3/2	0.75
*Option			3-0	3.00
Total		5 Theory + 4 Sessional	15-17/2	19.25

* Option should be selected from the following courses:

***ECE**	4109	Digital Signal Processing	3-0	3.00
***ECE**	4111	Digital Image Processing	3-0	3.00
***ECE**	4113	Information Security and Control	3-0	3.00

Year-IV Term-II

Course	No.	Course Title	Contact Hrs./Week	Credit Hrs.
ECE	4200	Project/Thesis	0-4	2.00
ECE	4202	Industrial Training	3 weeks	Non-cr.
ECE	4204	Seminar	0-3/2	0.75
*Option I			3-0	3.00
**Option I Sessional			0-3/2	0.75
ECE	4207	Radar & Satellite Communication	3-0	3.00
ECE	4209	Opto-electronic Devices & Optical Communication	3-0	3.00
ECE	4210	Opto-electronic Devices & Optical Communication Sessional/Project/Field Trip	0-3/2	0.75
ECE	4211	Mobile Communication Engineering	2-0	2.00
*Option II			3-0	3.00
**Option II Sessional			0-3/2	0.75
Total		5 Theory + 6 Sessional	14-10+3$_{weeks}$	19.00

*Option I, *Option II, **Option I Sessional & **Option II Sessional should be selected from the following courses:

ECE	4205	Bio-Medical Engineering	3-0	3.00
ECE	4206	Bio-Medical Engineering Sessional	0-3/2	0.75
*ECE	4213	Antennas	3-0	3.00
**ECE	4214	Antennas Sessional	0-3/2	0.75
*ECE	4215	Simulation & Modeling	3-0	3.00
**ECE	4216	Simulation & Modeling	0-3/2	0.75
*ECE	4217	Artificial Intelligence	3-0	3.00
**ECE	4218	Artificial Intelligence Sessional	0-3/2	0.75

Details of **course** requirements for undergraduate students of Electronics and Communication Engineering (ECE) Discipline:

Year-I Term-I

ECE 1101
Electrical Circuits

3 hrs per week 3.00 credits

Section A

Introduction; The Circuit laws: Kirchoff's voltage law, Kirchoff's current law, Some useful consequences of Kirchoff's laws, Applications of KVL and KCL to more complicated circuits, Delta-Wye conversion techniques; Circuit theorems and analysis methods: Branch current method, Loop current method, Nodal analysis, Source transformation, Maximum power transfer theorem, Thevenin's theorem, Norton's theorem; Magnetism: Introduction; Ampere's law and its application, reluctance, Characteristics of ferromagnetic materials, The magnetic circuit.

Section B

Instantaneous current, voltage and power; Effective current and voltage-average power, Phasor algebra (as applied to a-c circuit analysis); Sinusoidal single-phase circuit analysis

Recommended References

1. R.P. Ward, Introduction to Electrical Engineering, 3/e, Prentice Hall, 1985
2. R.M. Kerchner & G.F. Corcoran, Alternating-Current circuits, 4/e, Toppan, Tokyo, 1997
3. M. C. Kelley & B. Nichols, Introductory Linear Electrical Circuits and Electronics, 1/e, John Wiley & Sons, 1988

ECE 1102
Electrical Circuits Sessional

3 hrs per week 1.50 credits

Sessionals on verification of KVL & KCL; Verification of maximum power transfer theorem; Verification of superposition theorem; Verification of Thevenin's theorem; Verification of Norton's theorem; Study of series R-L-C circuit; Study of parallel R-L-C circuit; Determination of Q & f_r of a series R-L-C circuit; Determination of Q & f_r of a parallel R-L-C circuit; Study of a tank (oscillatory/tuning) circuit

Recommended References

1. R.P. Ward, Introduction to Electrical Engineering, 3/e, Prentice Hall,1985
2. R.M. Kerchner & G.F. Corcoran, Alternating-Current circuits, 4/e, Toppan, Tokyo, 1997

CSE 1151
Computer Programming
3 Hrs. per week 3.00 credits

Section A

Elements of computer structures and languages; Number systems and codes; Principles of programming; Overview of C; Constants, variables and data types; Operators and expression; Managing input and output operators; Decision making and branching; Decision making and looping; Arrays.

Section B

Handling of character strings; User-defined functions; Structures and unions; Pointers; File management in C; Dynamic memory allocation and linked lists; The preprocessor; Developing a C program, Writing programs using C++.

Recommended References

1. Kernighan and Ritchie, The C Programming Language, 2/e, Prentice-Hall, 1997
2. Balagurusamy, Programming in ANSI C, 2/e, Tata McGraw- Hill, 1999

CSE 1152
Computer Programming Sessional
3/2 Hrs. per week 0.75 credits

Sessionals on to write programs using IF, IF ELSE, GO TO, WHILE, DO, FOR statements; Arrays; Character strings; User-defined functions; Structures and unions; Pointers; File management; Linked lists; File inclusion; To learn and practice how to design a program; To learn and practice how to code a program; To learn and practice how to define programming errors; To learn and practice how to test and debug a program.

Recommended References

1. Kernighan and Ritchie, The C Programming Language, 2/e, Prentice-Hall, 1997
2. Balagurusamy, Programming in ANSI C, 2/e, Tata McGraw- Hill, 1999

Math 1161
Differential & Integral Calculus
3 hrs. per week 3.00 credits

Section A

Differential Calculus: Limit, Continuity and differentiability; Differentiation of explicit and implicit function and parametric equations, Significance of derivatives, Differentials, Successive differentiation of various types of functions. Leibnitz's theorem, Rolle's theorem, Mean value theorems, Taylor's theorem in finite and infinite forms, Maclaurin's theorem in finite and infinite forms, Langrange's form of remainders, Cauchy's form of remainder, Expansion of functions by differentiation and integretion, Partial differentiation, Euler's theorem. Tangent, Normal, Subtangent and subnormal in Cartesian and polar coordinates, Determination of maximum and minimum values of functions and points of inflection, Applications, Evaluation of indeterminate forms by L'Hospitals rule, Curvature, Circle of curvature, center of curvature and chord of curvature, Evolute and involute, Asymptotes, Envelopes, Curve tracing.

Section B

Integral Calculus: Definitions of integrations, Integration by method of substitution. Integration by parts, Standard integrals, Integration by the method of successive reduction. Definite integrals, its properties and use in summing series; Wallis's formulae, Improper Integrals, Beta function and Gamma function; Area under a plane curve in Cartesian and Polar co-ordinates, Area of the region enclosed by two curves in Cartesian and Polar co-ordinates, Trapezoidal rule, Simpson's rule. Arc lengths of curves in Cartesian and Polar co-ordinates, parametric and pedal equations, Intrinsic equation, Volumes of solids of revolution, Volume of hollow solids of revolution by shell method, Area of surface of revolution, Jacobians, Multiple integrals with application.

Recommended References

1. M.R. Spiegel, Advanced Calculus, I/e, McGraw-Hill, 1974
2. Thomas & Finney, Calculus & Analytic Geometry, 6/e, Norosa pnblishing House, India, 1996
3. JR.F. Ayres, Schaum's outline of Theory and problems of Calculus(Differential & Integral), 2/e, McGraw-Hill, 1974
4. Das & Mukharjee, Differential Calculus, 43/e, Dhur & Sons, India, 1997
5. Das & Mukharjee, Integral Calculus, 43/e, Dhur & Sons, India, 1997

Phy 1163
Physics

3 hrs per week 3.00 credits

Section A

Heat and Thermodynamics: Kinetic Theory of gases; Deduction of gas laws, Principle of equi-partition of energy, Equation of state- Andrew's experiment, Vander Waals equations, Critical constants, Transmission of heat- Conduction, Convection and Radiation Laws of thermodynamics; First Law of Thermodynamics, Internal Energy, Specific heats of gases, Work done by expanding gas, Elasticities of a perfect gas, Second Law of Thermodynamics, Carnot's cycle, Efficiency of Heat engines, Absolute scale of temperature, Entropy and its physical concept, Maxwell's thermodynamic relations.
Optics: Combination of lenses; Equivalent lense and equivalent focal length; Theories of light; Hygen's principle and construction. Interference of light; Young's double slit experiment, Biprism, Newton's ring, Interferometer, Interference by multiple reflection. Refraction of light: Fresnel and Fraunhofer diffraction, Diffraction by single slit, Diffraction of double slit, Diffraction gratings.

Section B

Oscillation: Simple Harmonic motion, Combination of S.H.M. and Lissajous pattern, Damped Oscillations, Forced Oscillations, Resonance, The Doppler effect, Acoustics, Revibration, Noise Insulation and reduction, Compound Absorption, Sound distribution, Viscosity: Critical Velocity, Poiseulli's equation, Hydrodynamics: Equation of continuity, Bernoulli's equation, surface tension, surface effects, Free surface energy, contact angle, Theory of relativity, Photoelectric effect, Compton effect, De-Broglie's wave, Uncertainty principle.

Recommended References

1. G. Ahmed, Outlines of Physics I, 1/e, Hafiz book centre, Dhaka, 1995
2. A. Beiser, Concepts of Modern Physics, 4/e, McGraw-Hill, 1988

Phy 1164
Physics Sessional
3/2 hrs per week 0.75 credits

Sessionals on to determine the value of g by means of a compound pendulum; To determine the surface tension of water by capillary tube method; To determine the co-efficient of viscosity of a liquid by its flow through a capillary tube; To determine the specific heat of a liquid by the method of cooling; To determine the thermal conductivity of a bad conductor by Lees and Chorlton's method; To verify the laws of transverse vibration of a stretched string by sonometer; To determine the focal length and hence the power of a convex lens by displacement method with the help of an optical bench; To determine the focal length and hence the power of a concave lens by using an auxiliary convex lens; To determine the refractive index of a liquid by Newton's rings; To determine e/m for electron by Thomson's method.

Recommended References

1. G. Ahmed & M. Shahabuddin, Practical Physics, 3/e, Hafiz book centre, Dhaka, 1992

Chem 1165
Chemistry
3 hrs. per week 3.00 credits

Section A

Atomic structure, quantum numbers, electronic configuration, periodic table; Properties and uses of noble gases; Different tupes of chemical bonds and their properties; Molecular structures of compounds; Selective organic reactions.

Section B

Different types of solutions and their compositions; phase value, phase diagram of monocomponent system; Properties of dilute solutions; Thermochemistry, chemical kinetics, chemical equilibrium; Ionization of water and P^H concept; Electrical properties of solution.

Recommended References

1. S. Glasstone, A Text Book of Physical Chemistry, 2/e, Macmillan, 1974
2. K.K. Sharma & L.K. Sharma, A Text Book of Physical Chemistry, 2/e, Vikas Publishing House, New Delhi, 1980
3. F.A. Cotton & G. Wilkinson, Advanced Inorganic Chemistry, 3/e, Wiley Eastern, 1979l
4. S.Z. Haider, Advanced Inorganic Chemistry, 1/e, Students' Publications, Dhaka, 1975

Chem 1166
Chemistry Sessional
3/2 hrs per week 0.75 credits

Sessionals on volumetric analysis: acid-base titration, oxidation-reduction titration, determination of Fe, Cu, and Ca volumetrically.

Recommended References

1. S. Glasstone, A Text Book of Physical Chemistry, 2/e, Macmillan, 1974
2. K.K. Sharma & L.K. Sharma, A Text Book of Physical Chemistry, 2/e, Vikas Publishing House, New Delhi, 1980

3. F.A. Cotton & G. Wilkinson, Advanced Inorganic Chemistry, 3/e, Wiley Eastern, 1979l
4. S.Z. Haider, Advanced Inorganic Chemistry, 1/e, Students' Publications, Dhaka, 1975

Eng 1171
English
2 hrs per week 2.00 credits

Section A

English phonetics: the places and manners of articulation of the English sounds; English grammar: Parts of speech, Tense from of verbs and subject verb agreement, Sentence (Joining sentences), Modal Auxiliaries (usage and application), Conditional sentences, Affixes, Appropriate prepositions, finite and non-finite verb, Forming and questions**.**

Section B

Vocabulary; Synonyms and Antonyms; Comprehension; Composition of current affairs; Precis writing; Report writing; Research paper writing; Commercial correspondence and tenders; Short stories written by some well known classic writers.

Recommended References

1. B. Rogers, TOEFL Success, 30/e, Peterson's, 2000
2. Michael, Pyle & Mary Ellen Munog, Cliffs TOFEL Guide, 2000
3. Thomson and Martinet, A Practical English Grammar with Exercise Books, OUP, India, 1986

Year-1 Term-II

ECE 1201
Basic Bipolar & Unipolar Devices & Circuits
4 hrs per week 4.00 credits

Section A

Introduction to metal, semiconductor & insulator, types of semiconductor: p-type and n-type; p-n junction diode & its characteristics, p-n junction diode as rectifiers: half wave and full wave; BJT & its characteristics, biasing and thermal stabilization; BJT at low frequencies: hybrid h model, h-parameters, analysis of a transistor amplifier circuit using h-parameters.

Section B

BJT at high frequencies: hybrid pi-model; low and high frequency response of RC coupled amplifiers; Field effect transistor (FET): the junction field effect transistor (JFET), JFET operations and characteristics, pinch off voltage and the behavior of pinch of region, the parameter of JFET small signal model and the JFET model for low and high frequencies; MOSFET : Threshold voltage, power supply requirements, depletion MOSFETs, p-channel MOSFET, n-Channel MOSFET, low frequency CS and CD FET amplifier, biasing the FETs, FET as a VVR.

Recommended References

1. J. Millman & C.C. Halkias, Integrated Electronics: Analog & Digital Circuits & Systems, 6/e, McGraw-Hill, 1994
2. J. Millman & C.C. Halkias, Electronic Devices and Circuits, 8/e, McGraw-Hill, 1995

ECE 1202
Basic Bipolar & Unipolar Devices & Circuits Sessional
3 hrs. per week 1.50 credits

Sessionals on p-n junction diode characteristics, p-n junction diode as rectifiers, BJT characteristics, BJT biasing, Low and high frequency response of RC coupled amplifiers, JFET characteristics, MOSFET characteristics, FET biasing, FET as a VVR.

Recommended References

1. J. Millman & C.C. Halkias, Integrated Electronics: Analog & Digital Circuits & Systems, 6/e, McGraw-Hill, 1994
2. J. Millman & C.C. Halkias, Electronic Devices and Circuits, 8/e, McGraw-Hill, 1995

ECE 1203
Electrical Technology
4 hrs. per week 4.00 credits

Section A

Coupled circuits; Polyphase circuit analysis and power measurement; Transient analysis of simple circuits; Electric wave filters; Transformer

Section B

D.C. generator and D. C. motor: operation and characteristics; Induction motor: Types, Operations, Equivalent circuit, Characteristics; Introduction to alternators and synchronous motors; Fractional horsepower motors (Stepper Motor).

Recommended References

1. Kerchner and Corcoran, Alternating Current circuits, 4/e, Toppan, Tokyo, 1997
2. B.L. Theraja & A.K. Theraja, A Text Book of Electrical Technology, 22/e, Nirja construction & Development, 1989

ECE 1204
Electrical Technology Sessional
3 hrs. per week 1.50 credits

Sessionals on study of balanced 3-phase; Power measurement of 3-phase system; Tests of Transformer; Characteristics of d.c. Generator and d.c. Motor; Starting of Induction Motor; Parallel operation of Alternators; Study of Stepper Motor

Recommended References

1. Kerchner and Corcoran, Alternating Current circuits, 4/e, Toppan, Tokyo, 1997
2. B.L. Theraja & A.K. Theraja, A Text Book of Electrical Technology, 22/e, Nirja construction & Development, 1989

ECE 1205

Discrete Mathematics
3 hrs. per week 3.00 credits

Section A

Mathematical logic: Propositional calculus & predicate calculus; Set theory; Relations; Functions.

Section B

Graph theory: Graphs, Paths & Trees; Algebraic Structures: Binary operations, Semigroups, Groups & subgroups, Rings & Fields; Combinatorial analysis; Posets & Lattices.

Recommended References

1. S. Lipschutz , Schaum's outline of Theory and Problems of Discrete Mathematics, 1/e, McGraw-Hill, 1976
2. O. Nicodemi , Discrete Mathematics, 3/e, CBS publishers & distributors, India, 1989

CSE 1250
Software Sessional
3/2 hrs per week 0.75 credits

Students will develop programs/projects with proper documentation in C/C^{++} languages as assigned by teachers and will run on microcomputers.

Recommended References

1. Kernighan and Ritchie, The C Programming Language, 2/e, Prentice-Hall, 1997
2. Balagurusamy, Programming in ANSI C, 2/e, Tata McGraw- Hill, 1999

Math 1261
Differential Equations
3 hrs. per week 3.00 credits

Section A

Ordinary Differential Equations: Degree and order of ordinary differential equations, Formation of differential equations. Solutions of first order differential equations by various methods. Solutions of general linear equations of second and higher orders with constant coefficients. Solution of homogeneous linear equations. Solution of differential equations of the higher order when the dependent of independent variables are absent.

Section B

Solution of differential equation by the method based on the factorization of the operators. Frobenius method. Bessel's and Legendre's differential equations. Partial Differential Equations: Partial differential equations. wave equations. Particular solutions with boundary and initial conditions.

Recommended References

1. JR. F. Ayres, Schaum's outline of Theory and problems of Differential Equations, I/e, McGraw-Hill, 1997
2. H.T.H. Piaggio, Differential Equations, 1/e, CBS publishers & distributors, India, 1985

HSS 1271

Government & Sociology
2 hrs per week 2.00 credits

Section A

Introduction: Political science-definition and scope, relation with other social science; Theories of origin of state, functions of state, welfare state, socialism & capitalism; Citizenship-rights and duties of citizen; Law, liberty and equality; Organs of govt.-legislature, executive & judiciary; Classification of govt.-democracy, dictatorship, parliamentary-presidential, federal and unitary; UNO, powers & functions of security council & general assembly; Political party, public opinion & electorate; Bangladesh constitution- Jatio Sangshad, Bureaucracy.

Section B

Nature of Sociology: definition, scope, relation with other social sciences; Basic concepts: society, community, association, institution, group, culture and civilization; Socialization process- agencies of socialization; Social structure- rural and urban social structure; The family- origin, kinds and functions; Social change- factors of social change, cultural hag theory; Social Problems- population problem, Crime- Juvenile Delinquency, Beggary, unemployment problem- corruption; Industrialization- important of industrialization in Bangladesh, hindrances of industrialization; Bureaucracy- Characteristics- merits and demerits.

Recommended References

1. A.C. Kapur, Principles of Political Science, 11/e, S. Chand & Co, (pvt). Ltd., New Delhi, 1973
2. A.W. Bhuiya, Rashtio Sangatan, 2/e, Azizia Book, Dhaka, 1998
3. B.R. Nath, Rajnaitik Jhatto O Sangatan, 4/e, Book Society, Dhaka, 1997
4. D.C. Bhattacharyya, Sociology, 6/e, Vijoya Publishing House, Calcutta, 1996
5. M.H. Rahman, Samaj Biggan Parichiti, 4/e, Hasan Book, Dhaka, 1994

Year-II Term-I

ECE 2101
Solid State Devices
3 Hrs. per week 3.00 credits

Section A:

Crystal properties and growth of semi conductors, Energy bands and charge carriers in semi conductors, Excess carrier in semi conductors, Junctions: Forward and reverse-biased junctions, Metal-Semiconductor junctions, p-n junction diode.

Section B:

Bipolar junction transistors: Amplification and Switching, Fundamentals of BJT operation, BJT fabrication, Minority carrier distributions and Terminal Currents, Generalized biasing, Switching, Other important Effects, Frequency Limitations of Transistors, Heterojunction Bipolar Transistors, Field effect transistors, Metal semiconductor FET, Metal- Insulator- semiconductor FET.

Recommended References

1. B.G. Streetman, Solid State Electronic Devices, 4/e, Prentice Hall, India, 1999
2. S.M. Sze, Physics of Semiconductor Devices, 3/e, Wiley, New York, 1981

ECE 2103
Electronic Amplifiers, Oscillators & PS circuits
4 Hrs. per Week 4.00 credits

Section A:

Feedback amplifiers: classification, feedback concept, effect of feedback on transfer gain, loop gain, amplifier characteristics, types of feedback, negative feedback amplifiers and their applications. Sinusoidal Oscillators: Conditions of self-oscillation, phase shift resonant circuit; Colpitts & Hartley, Wien bridge and crystal oscillators.

Section B

Unturned power amplifiers: class A, class B, push-pull, Darlington pair, Tuned voltage (R.F. & I.F.) and power (class B, class C) amplifiers, Regulated power supplies, Regulated IC based power supplies, Switch-mode power supplies.

Recommended References:

1. Millman & Halkias, Integrated Electronics, 11th Reprint, Tata McGraw-Hill, India,1991
2. Boylestad, Electronic Circuits and Devices, 6/e, Prentice Hall, India,1997

ECE 2104

Electronic Amplifiers, Oscillators & PS circuits Sessional
3/2 Hrs. per week 0.75 credits

Sessionals on study of voltage shunt/series and current shunt/series feedback amplifiers; Study of phase shift/ Colpits/Hartley/ Wien bridge/Crystal oscillators; Study of push-pull amplifiers/Darlington pair circuits; Study of series/shunt/IC regulated circuits; Study of switch-mode power supplies.

Recommended References

1. Boylestad, Electronic Circuits and Devices, 6/e, Prentice Hall, India,1997
2. V.K. Mehtha, Principle of Electronics,6/e, S. Chand & Company, India, 1998

ECE 2105
Switching & Finite Automata Theory
3 Hrs. per Week 3.00 credits

Section A

Boolean algebra and logic gates; Minimization of Boolean functions: Canonical forms, SOP/POS techniques, algebraic method, K-map technique, Q-M method, Don't care conditions, Mineterms/Maxterms; Combinational logic design: adder/subtractor, code conversion, encoder/decoder, multiplexer/demultiplexer; Sequential logic: Flip-flops, registers, counters; Threshold Logic; Reliable design and fault diagnosis.

Section B

Introduction to synchronous sequential circuits and iterative networks; Capabilities, minimization, and transformation of sequential machines; Asynchronous sequential circuits; Structure of sequential machines; State-identification and fault-detection experiments; Memory, definiteness, information losslessness of finite automata; Linear sequential machines; Finite-state recognizers.

Recommended References

1. Z. Kohavi, Switching and Finite Automata Theory, 2/e, Tata McGraw-Hill, New Delhi, 1996
2. Floyd, Digital Fundamentals, 4/e, C. E. Merril Publication, 1996

ECE 2106
Switching & Finite Automata Theory Sessional
3/2 Hrs. in every alternate Week 0.75 credits

Sessionals on study on Logic gates; Study on reliable design and fault diagnosis; Study on threshold Logic; Study on F/F, Study on synchronous sequential circuits and iterative networks; Study on sequential machine state; Study on asynchronous sequential circuits; Study on finite state recognizer.

Recommended References

1. Z. Kohavi, Switching and Finite Automata Theory, 2/e, Tata McGraw-Hill, New Delhi, 1996
2. Floyd, Digital Fundamentals, 4/e, C. E. Merril Publication, 1996

CSE 2151
Data Structures & Algorithms
3 Hrs per Week 3.00 credits

Section A

Concepts and examples of elementary data objects, elementary data structures, arrays, stacks, queues, lists, Trees, Graphs, Sorting and searching

Section B

Techniques for analysis of algorithms, methods for design of efficient algorithms; divide and conquer, greedy method, dynamics programming.

Recommended References

1. L.Banachowski,A. Kreczman & W.Rytter,Analysis of Algorithms and Data Structures, 1/e, Addison-Wesley, 1991
2. A.V. Aho, J.E. Hopcroft & J.D. Ullman, Data Structures and Algorithms, 1/e, Addison-Wesley, London, 1983

CSE 2152
Data Structures & Algorithms Sessional
3/2 Hrs per Week 0.75 credits

Sessionals on study of arrays, stacks, queues, lists, Trees, Graphs, Sorting and searching; Study of divide and conquer, greedy method, dynamics programming.

Recommended References

1. L.Banachowski,A. Kreczman & W.Rytter,Analysis of Algorithms and Data Structures, 1/e, Addison-Wesley, 1991
2. A.V. Aho, J.E. Hopcroft & J.D. Ullman, Data Structures and Algorithms, 1/e, Addison-Wesley, London, 1983

Math 2161
Coordinate Geometry, Vector Analysis & Statistics
4 Hrs. per Week 4.00 credits

Section A

Co-ordinate Geometry: Co-ordinate geometry of two dimensions: change of axes, transformation of co-ordinates, simplification of equations of curves; Co-ordinate geometry of three dimensions: system of co-ordinates, distance of two points, section formula, projection, direction cosines, equations of planes and lines.

Section B

Vector Analysis: Definitions of line, surface and volume integrals; Gradient of a scalar function; Divergence and curl of a vector function; Physical significance of gradient, divergence and curl; Various formulae; Integral forms of gradient, divergence and curl; Divergence theorem; Stoke's theorem, Green's theorem and Gauss's theorem.

Statistics: Elementary probability theory and discontinuous probability distribution (Binomial and Poisson); Continuous probability distributions (Normal and Exponential); Characteristics of distributions; Elementary sampling theory; Estimation; Hypothesis testing and regression analysis.

Recommended References

1. S. Narayan, Analytical Solid Geometry, 15/e, S. Chand & Company, New Delhi, 1998
2. M.R. Spiegel, Schaum's Outline of Theory and Problems of Vector Analysis, I/e, McGraw-Hill, 1982
3. S.P. Gupta, Advanced Practical Statistics, 8/e, S. Chand & Company, New Delhi, 1997

Econ 2171
Economics
2 Hrs. per Week 2.00 credits

Section A

Economics and engineering; Micro-economics: the theory of supply, demand and their elasticities; Nature of an economic theory, applicability of economic theories to the problem of developing countries; Consumer's equilibrium- indifference curve technique; Producer's equilibrium- isoquan; Marginal analysis, optimization market.

Section B

Production, production function, type of productivity; Rational region of production of an engineering firm; The short run and the long run, fixed cost and variable cost internal and external economics and dis-economics; Macro-economics: savings, investment, national income analysis; Inflation monetary policy, fiscal policy and trade policy with reference to Bangladesh planning in Bangladesh.

Recommended References

1. Roger, A. Amold, Economics, 2/e, West Publishing, 1989
2. Hyman, Economics, 2/e, McGraw-Hill, 1988.

Year-II Term-II

ECE 2201
Op Amp & IC Technology
3 Hrs. per Week 3.00 credits

Section A

Introduction of Operational Amplifier (Op Amp): Characteristics of an Ideal Op-Amp, Op-Amp Parameters, Inverting and Non-Inverting Op Amp; Practical Op Amp Circuits: General Description of

Various Stages Used in Op Amp, Type 741 Op Amp and Its Analysis; Basic Op-Amp Circuits: Adder/Summing/Averaging Amplifier (Inverting & Non-Inverting), Phase Shifter, Scale Changer, Voltage Follower, Differential Amplifiers, Integrator and Differentiator; Linear Op-Amp Circuits: DC/AC Voltage Sources Amplifiers, Voltage to Current Converter with Floating Load and Grounded Load, Current to Voltage Converter and Its Application as Photodetector, DC/AC Voltmeters, Current Meters, Instrumentation and Bridge Amplifiers, Non Linear Op-Amp Circuits: Precision Half-Wave Rectifiers, Precision Full-Wave Rectifiers, Logarithmic and Anti-Logarithmic Amplifiers, Logarithmic Multiplier, Electronic Analog Computation; Op-Amp Protection Circuits; DC Performance of Op-Amps: Bias, Offset and Drift; AC Performance of Op-Amps: Bandwidth, Slew Rate, Noise and Frequency Compensation.

Section B

Active Filters: Introduction, Basic Low-Pass, High-Pass, Band-Pass, Band-Reject & All Pass Filters, Low-Pass and High-Pass Butterworth, Chebyshev & Caur Filters; Switched-Capacitor Filters; Integrated Circuit (IC) Technology: The Steps of Fabrications, Basic Monolithic ICs, Epitaxial Growth, Masking and Etching, Diffusion of Impurities, Monolithic BJTs, Monolithic Diodes, IC Resistors, IC Capacitors and Inductors, Design Rules for Monolithic Circuit Layout, Introduction to Large Scale and Medium Scale Integration, Metal Semiconductor Contact.

Recommended References

1. Coughlin & Driscoll, Operational Amplifiers and Linear Integrated Circuits, 4/e, Prentice Hall, New Delhi,1994
2. Millman & Halkias, Integrated Electronics, 11th Reprint, Tata McGraw-Hill, India,1991

ECE 2202
Op Amp & IC Technology Sessional
3/2 Hrs. per Week 0.75 credits

Sessionals on introduction of Op Amp, Inverting/Non-Inverting Op Amp, Type 741 Op Amp, Adder/Summing/Averaging Amplifier (Inverting/Non-Inverting), Voltage Follower, Integrator and Differentiator, Diode Tester Circuit, DC/AC Voltmeters, Instrumentation and Bridge Amplifiers, Precision Half-Wave Rectifiers, Precision Full-Wave Rectifiers, Logarithmic and Anti-Logarithmic Amplifiers, Logarithmic Multiplier, Electronic Analog Computation, AC Performance of Op-Amps: Bandwidth, Slew Rate, Noise and Frequency Compensation; Low-Pass and High-Pass Butterworth, Chebyshev Filters; Introduction to IC Technology.

Recommended References

1. Coughlin & Driscoll, Operational Amplifiers and Linear Integrated Circuits, 4/e, Prentice Hall, New Delhi,1994
2. K. R. Botkar, Integrated Circuits, 8/e, Khanna Publishers, Delhi, 1993

ECE 2203
Digital Electronics & Pulse Techniques
3 Hrs. per Week 3.00 credits

Section A

Digital Logic Families: RTL, DCTL, IIL, DTL, HTL, TTL, ECL, PMOS, NMOS and CMOS logic etc. with operation details, propagation delay, noise immunity, fan-out, power dissipation, 7400 TTL Series; A/D & D/A converters with applications; Read Only Memory, Read and Write Memory, Charge Coupled Device Memory; Programmable Logic Device (PLD): Programmable Logic Array (PLA).

Section B:

Linear wave shaping: diode wave shaping techniques, clipping and clamping circuits; Timing Circuits: Op Amp Comparator, Regenerative Comparator (Schmitt Trigger), Square-Wave Generator, Triangular Wave Generator, Astable Multivibrator, Monostable Multivibrator, 555 Timer, Astable Multivibrator using 555 Timer, Monostable Multivibrator using 555 Timer; Pulse Transformers and Delay Lines; Voltage Time-Base Generators; Current Time-Base Generators; Blocking-oscillator Circuits.

Recommended References

1. Millman & Taub, Pulse, Digital and Switching Waveforms, I/e, McGraw-Hill, Singapore, 1986
2. Millman & Halkias, Integrated Electronics, 11th Reprint, Tata McGraw-Hill, India, 1991
3. R.P. Jain, Modern Digital Electronics, 16th reprint, Tata McGraw-Hill, New Delhi, 1995

ECE 2204
Digital Electronics & Pulse Techniques Sessional
3/2 Hrs. per week 0.75 credits

Sessionals on study on RTL/DTL/TTL gates; Study on A/D & D/A converters; Study on clipping/clamping circuits; Study on Square-Wave/Triangular Wave Generators; Study on Astable/Monostable Multivibrator using 555 Timer.

Recommended References

2. Millman & Taub, Pulse, Digital and Switching Waveforms, I/e, McGraw-Hill, Singapore, 1986
2. Millman & Halkias, Integrated Electronics, 11th Reprint, Tata McGraw-Hill, India, 1991
3. R.P. Jain, Modern Digital Electronics, 16th reprint, Tata McGraw-Hill, New Delhi, 1995

ECE 2205
Linear System Analysis
4 hrs per week 4.00 credits

Section A

Characteristics of a linear system-methods of transient and steady state solutions of differential and integro-differential equations, Network theorems, Analogous systems, Analysis by Fourier methods, Laplace transformation.

Section B

Application of Laplace transformation to linear circuits, Impulse function, convolution integral and its application, superposition integral; Z-Transformation and its application; Introduction to topological concepts in electrical and magnetic circuit networks

Recommended References

1. D.K. Cheng, Analysis of Linear Systems, I/e, Narosa Publishing House, New Delhi, 1986

ECE 2207
Numerical Methods
3 Hrs. per Week 3.00 credits

Section A

Computational methods for solving problems in linear algebra, Root finding algorithm, Nonlinear equations, approximations, iterations, methods of least squares, Differential equations.

Section B

Interpolations, Integration, Simultaneous Linear Equations

Recommended References

1. K. Atkinson, Elementary Numerical Analysis, 2/e, Wiley, Singapore, 1994
2. M.K.Jain, Iyengar & R.K.Jain, Numerical Methods for Scientific and Engineering Computation, 3/e,New Age, 1997

ECE 2208
Numerical Methods Sessional
3/2 Hrs. per week 0.75 credits

Sessionals on computational methods for solving problems in linear algebra; Root finding algorithms; Nonlinear equations; approximations; iterations; methods of least squares; Differential equations; Interpolations; Integration; Simultaneous Linear Equations.

Recommended References

1. K. Atkinson, Elementary Numerical Analysis, 2/e, Wiley, Singapore, 1994
2. M.K.Jain, Iyengar & R.K.Jain, Numerical Methods for Scientific and Engineering Computation, 3/e, New Age, 1997

Math 2261
Matrix, Harmonic Analysis & Complex Variable
3 hrs per week 3.00 credits

Section A

Matrix: Definition of Matrix, equality of two matrices, Addition, Subtraction and Multiplication of Matrices. Transpose of matrices and inverse of matrix and Rank of matrices.
Harmonic: Solution of Laplace equation, Cylindrical harmonics, spheriacal harmonics.

Section B

Complex Variable: Complex number system, General functions of a complex variable; Limits and continuity of a function of complex variable and related theorems; Complex differentiation and the Cauchy-Riemann equations. Infinite series; Convergence and uniform convergence; Line integral of a complex function; Cauchy integral formula; Liouville's theorem; Taylor's and Laurent's theorem. Singular points; Residue, Cauchy's residue theorem.

Recommended References

1. Prasad, Matrices and Linear Algebra, 1/e, 1998
2. M.R. Spiegel, Complex Variable, Metric/e, McGraw-Hill, 1981

BA 2271
Accounting
3 Hrs. per Week 3.00 credits

Section A

Accounting and society; Principles of accounting; Financial statements-general accounting reports; Cost in general-objectives and classifications; Overhead costs-allocation and apportionment.

Section B

Product costing-cost sheet under job costing; Operating costing and process costing system; Marginal cost analysis-cost-volume-profit relationship; Relevant costs and special decial decisions; Accounting for planning and control-capital budgeting; Master budgets, flexible budgets and variance analysis.

Recommended References

1. Fess & Warren, Accounting Principles, 15/e, South-Western, Ohio, 1987
2. B. Banerjee, Cost Accounting, 10/e, World Press, Calcutta, 1994
3. M.M. Khan, Advanced Accounting, 7/e, Ideal Library, Dhaka, 1989

Year–III Term-I

ECE 3101
Measurements & Electronic Instrumentation
3 hrs per week 3.00 credits

Section A

Measurement of resistance, inductance and capacitance, Measurement of conductivity of bulk materials, Cable faults and locating cable faults, Magnetic Measurement, Ballistic galvanometers, Flux meters, Illumination Measurement, High voltage measurements, Applications of operational amplifiers in instrumentation, Transducers & Sensors, measurement of strain, pressure, temperature and flow.

Section B

Measuring instruments, Classification, Ammeters, Voltmeters and Multimeters, Extension of instruments ranges, Current and voltage transformers, measurement of power and energy, wattcmeters, watt-hour meters and maximum demand indicators, Measurement of speed, frequency and phase difference, electronic measuring instruments, Oscilloscope, Digital meters, DMM, VTVM, Q meters, Statistical methods in measurements.

Recommended References

1. Sawhney, Electrical and Electronic Measurement and Instrumentation, 11/e, Dhanpat Roy, Delhi, 1996
2. Cooper & Helfrick, Electronics instrumentation and Measurement techniques, 3/e, Prentice Hall, 1995.

ECE 3102
Measurements & Electronic Instrumentation Sessional/Project
3/2 hrs per week 0.75 credits

Sessionals on study of the circuit of a multimeter by physical inspection and measurement of different parameter by it, Determination of unknown resistance by Carey-Foster bridge, Use of Instrument transformers for measurements, Measurement of salinity of ocean water by Megaohm bridge, Creation of Lissajous patterns in an oscilloscope for measurement.

Recommended References

1. Sawhney, Electrical and Electronic Measurement and Instrumentation, 11/e, Dhanpat Roy, Delhi, 1996
2. Cooper & Helfrick, Electronics instrumentation and Measurement techniques, 3/e, Prentice Hall, 1995.

ECE 3103
Control Theory
3 hrs per week 3.00 credits

Section A

Introduction: Open loop and closed loop systems, equations of physical systems, models of linear systems, block diagram, transfer functions, signal flow graph; System concepts: Sources of errors, system response, steady-state error, sensitivity factors, system types, error coefficients; Transient response: Typical test signals and transient response of second order systems; Root Locus: Construction of root and phase angle loci, effects of pole and zero locations, transient response evaluation; Frequency: Correlation of frequency and time responses, logarithmic plots, polar plots, constant M and $\propto$ circles, Nichol's chart

Section B

Stability Analysis: Routh-Hurwitz criteria, Nyquist's Stability criterion and phase margin, relative stability, Compensation techniques: Phase lag, phase lead, phase lag-lead networks, design of compensation by Bode and Root locus techniques; Introduction to State Space analysis: State space representation of systems, Solving the time invariant state equations, transfermating linear time varying system, state space representation of discrete time systems, solving discrete time state equations

Recommended References

1. D'azzo & Houpis, Feed back control Systems Analysis and Synthesis, 2/e, McGraw Hill, 1996.
2. B. C. Kuo, Automatic Control Theory,7/e, Prentice Hall of India(p) Ltd., New Delhi,1996.
3. Franklin, Powell & E-Naeini, Feedback Control of Dynamic Systems, 3/e, Addison Wesley, 1995.

ECE 3105
Analog Communication
3 hrs per week 3.00 credits

Section A

Modulation: Need for modulation, amplitude modulation, modulators and demodulators, DSB/SC, SSB and VSB signals – their spectra and circuitry for generation and demodulation, the PLL equation and its linear approximation under noise free condition, Costas scheme for DSB detection; Angle modulation: Basic definition of frequency and phase modulation, spectra of narrow band and wide band FM signals with single tone modulation, multi-tone FM signals, methods of generation and demodulation of FM signals and the circuits used, block diagram of FM receiver.

Section B

Receivers: Straight receivers, Superhetrodyne receivers, Choice of I.F., Image rejection, Adjacent channel selectivity, Double Superhetrodyne, Aerial coupling circuits, Frequency changers, Ganging and tracking, AGC, AFC, tuning indicators, Communication receivers, Transmitters: Allocation of frequencies for various services, General requirements and specifications for transmitters, High power

transmitters, parasitic suppression, Transmitters for various services and various frequency ranges, a block schematic study, Aerial coupling circuits.
Noise in analog modulation systems: system model and parameters, SNR calculation for synchronous detection of DSB, SSB and VSB and envelope detection of AM, Noise performance of AM systems.
Output calculations in angle modulated systems, Threshold effects, and Threshold extension in FM using PLL and FMFB techniques.

Recommended References

1. Roddy & Coolen, Electronic Communications, 4/e, Prentice-Hall, 1995.
2. Kennedy & Davis, Electronic Communication Systems, 4/e, McGraw-Hill, 1999.

ECE 3106
Analog Communication Sessional
3/2 hrs per week 0.75 credits

Sessionals on observation of amplitude modulated wave and it's demodulated wave, Frequency modulated wave and its demodulated wave.

Recommended References

1. Roddy & Coolen, Electronic Communications, 4/e, Prentice-Hall, 1995.
2. Kennedy & Davis, Electronic Communication Systems, 4/e, McGraw-Hill, 1999.

CSE 3151
Microprocessors
3 hrs per week 3.00 credits

Section A

Introduction to different types of microprocessors, Architecture, Addressing Modes, Instruction Format, Instruction Sets, Interrupt structures, Memory interfacing, I/O operation, I/O interfacing, DMA.

Section B

Microprocessor based system design: Hardware design, Building, Debugging, Testing and Linking program modules, Programming EPROM. Multiprocessor configurations: coprocessor configurations, Numeric data processor, I/O processors, Advanced Microprogramming: Bit-Slice Microprocessor, Parallelism in Microprocessor.

Recommended References

1. Hall, Microprocessors and Interfacing: Hardware and Software, 3/e, Mc GRaw Hill Ltd., India,1995.
2. Gaonkar, Microprocessors and System Design
3. Barry b. Brey, The Intel Microprocessors, 4/e, PHL Publication, India, 1996.

CSE 3152
Microprocessors Sessional
3/2 hrs per week 0.75 credits

Sessionals on assembly Language program, LED (Light Emitting Diode) Matrix Character display, LED Matrix character shift and change, DC Motor Control

Recommended References

1. Hall, Microprocessors and Interfacing: Hardware and Software, 3/e, McGRaw-Hill,1995.
2. Gaonkar, Microprocessor, Architecture, Programming, and Applications, 25/r, Wiley Eastern, 1993.
3. Barry b. Brey, The Intel Microprocessors, 4/e, PHL Publication, India, 1996.

BA 3171
Industrial Management and Law
3 hrs per week 3.00 credits

Section A

Industrial Management, Administration and Management, Scientific management, Organization, Management and organization, organization structure, organization chart, Authority and responsibility, Span of control, Selection and recruitment of employees, Sources of recruitment, Advantages and disadvantages of the sources, Selection processes, Employer training and its types, promotion, Wage system and incentive, Methods of wages, payment and types of incentives systems, layout of physical facilities, Plant layout, Types of layout, Material handling, Maintenance, Maintenance policy, Production control in intermittent and continuous manufacturing industry, functions of production control, Transportation and storage, Inventory management, types of inventory, need and methods of control, Factors affecting inventory building-up, Economic lot size and reorder point.

Section B

Law, Commercial law, Law of contract, Elements of a valid contract, Termination of a contract, Sale of goods acts, Goods, Classification of goods according to this act, Sale and agreement to sell, Essential elements of sale of goods act, condition and warranty, Implied conditions of a sale of goods act, sale by a non-owner, Sale and hire purchase, Negotiable instrument Act, Bill of exchange, Promissory note, cheque, Industrial laws in Bangladesh, factories Act, Rules regarding health and hygiene, welfare, safety, Working hours of workers, Industrial Relation Ordinance, Workmen's compensation act.
Recommended References

1. H. Koontz and H. Weihrich, Management, 9/e, McGraw Hill International edition, New York, 1988
2. Terry & Frankin, Principle of Management,
3. Stevenson W. J., Management Science

*** Option should be selected from the following courses:**

***ECE 3107**
Science of Materials
2 hrs per week 2.00 credits

Section A

Dielectric properties of insulators in static fields; Behavior of dielectrics in alternating fields, Magnetic properties of materials

Section B

The conductivity of metals; The mechanism of Conduction in Semiconductors

Recommended References

1. Dekker, Electrical Engineering Materials, 19/e, Prentice-Hall, 1997

***ECE 3109**
Quantum Mechanics
2 hrs per week 2.00 credits

Section A

Black body radiation, Einstein Photon Theory, Compton effect, Principles of uncertainty, De Broglie wave and matter-wave duality, Equation of continuity and boundary conditions of wave functions, Schrodinger wave equation, normalization of wave function, Probability current density, Finite potential step and one-dimensional square well potential, Energy eigen values and energy eigen function.

Section B

Box normalization and closure property, Linear harmonic oscillator, Spherically symmetric potential and three dimensional square well potential, Scattering in three dimension, scattering by spherical symmetric potential and Coulomb's scattering, perturbation theory, Stationary perturbation theory, Matrix formulation of quantum mechanics, matrix algebra, transformation theory and equation of motion in matrix form.

Recommended References

1. Powell & Crosemann, Quantum Mechanics,4/e, Narosa Publishing House,1993.
2. Gupta & Sharma, Quantum Mechanics, 13/e, J.P. Nath and Co., 1995.
3. Ghatak and Loknath, Quantum Mechanics, 3/e, Mac Millian, 1984.
4. Bagde, Singh & Singh, Quantum Mechanics, 2/e, S. Chand & Company, 1999

Year-III Term-II

ECE 3200
Electronic Shop Practice
3/2 hrs per week 0.75 credits

Radio receivers: Study and circuit tracing, fault finding by signal injection and other means, alignment, TV camera, B/W TV, Color TV, VCP and VCR.

Recommended References

1. Grob, Basic TV and Video System, Latest Edition, McGraw Hill Book Company Ltd., New York.
2. Gulati, Monochrome and Color Television, 26/e, New Age International (p) Ltd., New Delhi, 1998.

ECE 3201
Television Engineering
3 hrs per week 3.00 credits

Section A

Monochrome and Color television Transmission systems, Introduction to TV Engg, Scanning and synchronizing, Color TV principles, Television receiver and transmitter, basic operation of TV camera, the luminance and color difference signals, HDTV (High Definition Television), Picture Resolution.

Section B

Monochrome and Color Television Reception system, NTSC, PAL and SECAM encoders, the PAL decoder principles, the picture tubes and types of drives used to reproduce the color, VSB (vestigial Side Band) Transmission.

Recommended References

1. Grob, Basic TV and Video System, Latest Edition, McGraw Hill Book Company Ltd., New York.
2. Gulati, Monochrome and Color Television, 26/e, New Age International (p) Ltd., New Delhi, 1998.

ECE 3202
Television Engineering Sessional
3/2 hrs per week 0.75 credits

Sessionals on study of the reception system of TV signal by T&T wireless station to supply the relay station of BTV at Khulna; Visit to the reception system of T&T wireless station at Khulna; Study of the transmission system of the relay station of BTV at Khulna; Visit to the relay station of BTV at Khulna; Study of the TV reception set, measuring voltages at different points of the circuit and observing waveshapes by oscilloscope.

Recommended References

1. Grob, Basic TV and Video System, Latest Edition, McGraw Hill Book Company Ltd., New York.
2. Gulati, Monochrome and Color Television, 26/e, New Age International (p) Ltd., New Delhi, 1998.

ECE 3203
Digital Communication
3 hrs per week 3.00 credits

Section A

Analog Pulse Modulation: Sampling theorem, Aliasing, natural sampling and flat top sampling using finite width pulses.
Pulse Amplitude Modulation: Cross talk in PAM due to frequency limitation of channel. Synchronization of PAM. TDM (Time Division Multiplexing).
PTM: Method of generation and demodulation of pulse duration modulated and pulse position modulated signals. Cross talk in PTM systems.
Base Band Data Transmission: Base band binary PAM systems, Principles of correlative coding-duo-binary, modified duo-binary and generalized forms. Base band M-array PAM, Eye pattern.
ASK, PSK, FSK, Signals-Detection techniques, receiver implementation and probability of error, DPSK and QPSK.

Section B

Digital Modulation: Sampling, quantizing and encoding, Companding, PCM signal Multiplexing, Synchronization, Quantization noise, Transmission noise and probability of error, Over all signal to noise ratio for PCM systems, Threshold effect, channel capacity.
Differential PCM, Delta Modulation (DM), Quantization noise slope over/load, SNR Calculations, Comparison of PCM, DPCM and DM, Adaptive digital waveform coding schemes, Digital multiplexiers.

Recommended References

1. Simons Haykin, Communication systems, 3/e, John Wiley Sons, New York, 1996.
2. Taub and Schilling., Principles of Communication Systems, 2/e, McGraw Hill, 1993.
3. Schwartz, Information Transmission, Modulation and Noise, 4/e, McGraw Hill International edition.

ECE 3204
Digital Communication Sessional / Field Trip/Project
3/2 hrs. per week 0.75 credits

Sessionals on observation of Pulse code modulated waveform, Pulse position modulated waveform, Pulse width modulated waveform, Delta modulated waveform and their demodulation respectively.

Recommended References

4. Simons Haykin, Communication systems, 3/e, John Wiley Sons, New York, 1996.
5. Taub and Schilling., Principles of Communication Systems, 2/e, McGraw Hill, 1993.
6. Schwartz, Information Transmission, Modulation and Noise, 4/e, McGraw Hill International edition.

ECE 3205
Electromagnetic Fields and Waves
3 hrs per week 3.00 credits

Section A

Electrostatics: Coulomb's law, Force, Electric field intensity, Electrical flux density. Gauss theorem with application, Electrostatic potential, Boundary conditions, Method of images, Laplace's and Poisson's equations, Energy of an electrostatic system, Conductor and dielectrics.
Magnetostatics: Concept of magnetic field, Ampere's law, Biot-Savart law, Vector magnetic potential, Energy of magnetostatic system, Mechanical forces and torque in electric and magnetic fields, Curvilinear co-ordinates. Rectangular, Cylindrical and spherical co-ordinates, Solutions to static field problems. Graphical field mapping with applications, Solution to Laplace's equations. Rectangular, Cylindrical and spherical harmonics with applications.

Section B

Maxwell's equations: Their derivations, Continuity of charges, Concept of displacement current: Boundary conditions for time-varying systems, Potentials used with varying charges and currents. Retarded potentials. Maxwell's equations in different co-ordinate systems. Relation between circuit theory and field theory: Circuit concepts and the derivation from the field equations. High frequency circuit concepts, Circuit radiation resistance. Skin effect and circuit impedance. Concept of good and perfect conductors and dielectrics. Current distribution in various types of conductors, Depth of penetration, Internal impedance, Power loss, Calculation of inductance and capacitance.
Propagation and reflection of electromagnetic waves in unbounded media: Plane wave propagation, Polarization, Power flow and Poynting's theorem. Transmission line analogy, Reflection from conducting and conducting dielectric boundary. Display lines ion in dielectrics, Liquids and solids, Plane wave propagation through the ionosphere. Introduction to radiation.

Recommended References

1. William H. Hayt. Jr., Engineering Electromagnetics, 5/e, Tata McGraw Hill, 1992.
2.S. Rammo, Fields and Waves in Communication Engineering,2/e,John Willey, New York,1984.

ECE 3210
Computer Aided Circuit Design
3/2 hrs per week 0.75 credits

Simulations of various circuits such as RL, RC, RLC, Half wave rectifier circuit, Full wave rectifier circuit, Transistor characteristics and FET.

Recommended References

1. M. A. Rashid, Computer Aided Circuit Design, 2/e,

CSE 3251
Computer Network
3 hrs. per week 1.50 credits

Section A

Introduction to Data Communication: Data transfer modes, Parallel I/O, Synchronous communication, Asynchronous communication, Asynchronous communication speed matching.
The telephone system, multiplexiers, Concentrators and front-end processors, Circuit switching, Packet switching, Computer to terminal handling. Evolution of data networks, Network architecture, The ISO reference model, Examples of networks, Applications of networks.

Section B

Capacity assignment for terminal networks and distributed networks, Concentration and buffering for finite and infinite buffers, Dynamic buffers and blocked storage.
Point to point network: Virtual circuits and diagrams, Routing algorithms and congestion, Examples and network layers, Local area network, Satellite and packet networks: Conventional channel allocation methods, Pure ALOHA, S-ALOHA, Finite population ALOHA, Controlled ALOHA, R-ALOHA, Design issues for packet Radio Networks.

Recommended References

1.S. Tanenbaum, Computer Networks, 3/e, Prentice-Hall, 1987.
2.M. Schwartz, Computer Communications, 2/e, Mc-Graw Hill Ltd.,
3.Davis and Barber, Communication Networks for Computers, 2/e, John Wiley, 1973.

CSE 3252
Computer Network Sessional
3/2 hrs per week 0.75 credits

Sessionals on the telephone system, multiplexiers, Concentrators and front-end processors, Circuit switching, Packet switching, Computer to terminal handling, Network architecture, The ISO reference model, Local area network, Satellite and packet networks, Packet Radio Networks

Recommended References

1.S. Tanenbaum, Computer Networks, 3/e, Prentice-Hall, 1987.
2.M. Schwartz, Computer Communications, 2/e, Mc-Graw Hill Ltd.,
3.Davis and Barber, Communication Networks for Computers, 2/e, John Wiley, 1973.

***Option should be selected from the following courses:**

***ECE 3207**
Stochastic Theory of Communication
3 hrs per week 3.00 credits

Section A

Probability distribution and expectations, Conditional probability and conditional expectation, Discrete time Markov chain, Continuous time Markov chain, Birth-death process in queuing problems.

Section B

Introduction to queuing theory, Network of queues, Queuing models: M/M/1, M/M/K, M/G/1, M/G/K, G/M/1 and G/M/K queuing models, Application of queuing models in communication engineering.

Recommended References

1. Ross, Introduction to Probability Models, 5/e, Academic Press, 1993.
2. Cooper, Introduction to Queuing Theory, 2/e, Macmillan, 1984.
3. Medhi, Stochastic Processes, 2/e, New Age International, 1999.

***CSE 3253**
Computational Geometry
3 hrs per week 3.00 credits

Section A

Introduction: Historical perspective, algorithm background, geometric preliminaries, models of Computation, Geometric searching, point location problem and range searching problems, Divide & conquer, amortization, multi-dimensional search, space sweep, duality and randomization, Convex hulls.

Section B

Proximity, Closest pair problem, Intersections, Voronoi and Delaunay diagrams, arrangements of lines and points, Geometry of rectangles, hidden surface removal, polygon triangulation, art gallery theorems, shortest paths, and lower-bounds.

Recommended References

1. Shamos, Computational Geometry
2. Robert Sedgewick, Algorithms
3. Knuth, The Art of Computer Programming, Vol 2 Seminumerical Algorithms

Year-IV Term-I

ECE 4100
Project / Thesis
4 hrs per week 2.00 credits

Study of problems in the field of Electronics and Communication engineering
N. B. The Project and thesis topic selected in this course is to be continued in the **ECE 4200** course, but students must pass individually in both courses.

ECE 4101
Industrial Electronics
3 hrs per week 3.00 credits

Section A

Introduction to solid-state devices and thyristors: Schottky rectifier, Zener diode, Diode and transistor packages, SCR and TRIAC. Introduction to triggering devices: DIAC, UJT, UJT relaxation oscillator, phase control circuit, programmable UJT (PUT). PUT relaxation oscillator, Schottky diode, Silicon unilateral switch (SUS), Silicon Bilateral Switch (SBS), Asymmetrical AC trigger devices, Motor control, DC motor braking and plugging circuits-transistor dynamic breaking circuits, Typical motor plugging circuits, Emergency stop plugging circuit. Speed control of PM/shunt motors: electronic speed control using armature voltage control method. Solid state motor speed controllers: single transistor speed control, Op-amp and Darlington pair amplifier speed control. OP AMP and MOSFET power amplifier control for PM/shunt motors. SCR speed control circuits for PM/shunt motors, simple SCR circuits, SCR plus UJT circuit, Variation of a pulse width modulation (PWM) speed control circuit.

Section B

Speed control of series/universal motors: series/universal motor control circuit using SCR (half wave control), TRIAC and DIAC (Full wave control), TRIAC control with hysteresis compensation, DC motor phase control: balanced bridge (reversing) drive for PM or shunt motors, Phase control circuit for series DC motor. DC-DC chopper control: basic Jones chopper circuit. Stepper motors: stepper motor drive circuit using transistors. Speed control of AC motors: variable frequency converter block diagram, simplified single phase cycloconverter, Single phase inverter, three phase six step inverter, Voltage multipliers, Magnetic amplifiers, Resistance welder controls, Induction heating, Di-electric heating.

Recommended References

1. P. C. Sen, Power Electronics, Mc-Graw Hill Book, 1995.
2. H. Rashid, Power Electronics, 3/e, Prentice-Hall, 1996.

ECE 4102
Industrial Electronics Sessional / Project/ Field Trip
3/2 hrs per week 0.75 credits

Laboratory works based on study of voltage regulator, DC motor speed control by electromechanical devices and solid state devices, AC motor speed control, Study of electronic timer.

Recommended References

1. P. C. Sen, Power Electronics, Mc-Graw Hill, 1995.
2. H. Rashid, Power Electronics, 3/e, Prentice-Hall, 1996.

ECE 4103
VLSI Technology
3 hrs per week 3.00 credits

Section A

Introduction to microelectronics and MOS technology, Basic electrical properties and circuit design processes of MOS and BiCMOS circuits, Scaling of MOS circuits, Subsystem designs processes and layout.

Section B

Computational elements: Design of an ALU subsystem, Adder, Multipliers, Memory, Registers, and aspects of system timing, Practical aspects of design tools and testability, CMOS design: Behavioral description, Structural description, Physical description and design verification, Introduction to GaAs technology: Ultra-fast VLSI circuits and systems.

Recommended References

1. Douglas A. Pucknell & K. Eshraghian, Basic VLSI Design, 3/e, Prentice-Hall, 1997.
2. S. M. Sze, VLSI Technology, 2/e, McGraw-Hill, 1988.
3. C. Mead & L. Conway, An Introduction to VLSI System, 2/e, Addison-Wesley, 1980.

ECE 4105
Microwave Engineering
3 hrs per week 3.00 credits

Section A

H.F. transmission line equation and solution, Reflection and transmission coefficient, Standing wave and standing wave ratio, Smith chart, Impedance matching techniques and applications, Wave guides and components: Rectangular and circular wave guides, microwave cavities and hybrid circuits, directional couplers, circulators and isolators, Introduction to Read, IMPATT, TRAPATT, BARITT Diodes.

Section B

Microwave tubes, Klystron amplifier, Multicavity Klystron amplifier, Reflex Klystron, Magnetron, Traveling Wave Tube (TWT) amplifier, Backward Wave Oscillator (BWO), Antennas and radiation, Hertzian dipole, Radiation patterns, Introduction to antenna arrays and array design.

Recommended References

1. R. E. Collins, Microwave Engineering, 3/e, McGraw-Hill, 1995.
2. S. Y. Liao, Microwave devices & Circuits, 3/e, Prentice-Hall, 1995.
3. David M. Pozar, Microwave Engineering, 2/e, John Wiley & Sons, 1999.
4. J. D. Kraus, Antennas, 2/e, McGraw-Hill, 1998.

ECE 4106
Microwave Engineering Sessional / Project/ Field Trip
3/2 hrs per week 0.75 credits

Laboratory works based on wave-guide components, Klystron Amplifier, Circulars and Isolators, Directional Couplers etc.

Recommended References

1. R. E. Collins, Microwave Engineering, 3/e, McGraw-Hill, 1995.
2. S. Y. Liao, Microwave devices & Circuits, 3/e, Prentice-Hall, 1995.
3. David M. Pozar, Microwave Engineering, 2/e, John Wiley & Sons, 1999.
4. J. D. Kraus, Antennas, 2/e, McGraw-Hill, 1998.

ECE 4107
Telecommunication Engineering
3 Hrs. per Week 3.00 credits

Section A

Elements of a communication systems; Rotary dialing telephone; Pulse and multi-frequency dialing; Design parameters of a switching system; Cross bar switching; Stored program control; Enhanced services; Two-stage and three-stage networks, n-stage networks; Time division switching.

Section B

Modern transmission systems; Signaling techniques; Network traffic load and parameters; Grade of service and blocking probability; Modeling switching systems; Incoming traffic and service time characterization; Blocking model and loss estimates; Delay systems; Integrated services digital network (ISDN); Electronic mail; Videotext. Facsimile; Teletex; Database access; ISDN architecture and protocol; Broadband ISDN; Introduction to Internet

Recommended References

1. T. Viswanathan, Telecommunication switching systems and network, Prentice-Hall, 1998.
2. James Martin, Telecommunications and the computer, 3/e, Prentice-Hall, 1992.
3. William Stallings, Data and Computer communications, 5/e, Prentice-Hall, 1998.

ECE 4108
Telecommunication Engineering Sessional/ Field Trip
3/2 hrs per week 0.75 credit

Laboratory work based on introduction to various components of rotary dialing telephone, observation of waveform of DTMF, function of a digital exchange telephone network.

Recommended References

1. T. Viswanathan, Telecommunication switching systems and network, Prentice-Hall, 1998.
2. James Martin, Telecommunications and the computer, 3/e, Prentice-Hall, 1992.
3. William Stallings, Data and Computer communications, 5/e, Prentice-Hall, 1998.

***Option should be selected from the following courses:**

***ECE 4109**
Digital Signal Processing
3 hrs per week 3.00 credits

Section A

Introduction to discrete time signals and systems; Sampling of continuous time signals; Z-transform; Discrete Fourier transform; Two-dimensional discrete Fourier transform. Flow graph and matrix representation of digital filters. Digital filters design technique. Computer aided design of different types of filter.

Section B

Computation of discrete Fourier transform, Discrete Hilbert transforms, discrete random signal. Response of linear system to random signals, Effect of finite register length in digital signal processing; Homomorphic signal processing and application, Power spectrum estimation and its examples

Recommended References

1. A. V. Oppenheim and R. W. Schafer, Digital Signal Processing, Prentice-Hall, 1997.
2. A. V. Oppenheim & R. W. Schafer, Discrete-Time Signal Processing, Prentice-Hall, 1997.

3. J. R. Johnson, Introduction to Digital Signal Processing, Prentice-Hall, 1997.

***ECE 4111**
Digital image Processing
3 hrs per week 3.00 credits

Section A

Introduction, Digital Image fundamentals, Image transfers, Image enhancement, Image Restoration, image compression

Section B

Image segmentation, Representation and description, Recognition and Interpretation.

Recommended References

1. Castleman, Digital Image Processing, 1/e, Simon & Schuster Book Company, New York, 1993.
2. Hussain, Digital Image Processing, 1/e, Simon & Schuster Book Company, New York, 1993.

***ECE 4113**
Information Security and Control
3 hrs per week 3.00 credits

Section A

Introduction to Information Systems Security, Information system security management, Risk analysis and management, Physical and logical security, Database and telecommunications security, Systems Security and controls

Section B

Computer abuse, Internet and electronic commerce, Special security considerations and aspects, Legal and ethical issues, Managerial issues, Case studies.

Recommended References

1. Rosen & Hubbard, Information Processing, 2/e, Simon & Schuster Book Company, New York, 1993.
2. Napier, Information Processing, 1/e, Simon & Schuster Book Company, New York, 1993.

Year-IV Term-II

ECE 4200
Project / Thesis
4 hrs per week 2.00 credits

Continuation of project and thesis topic taken in **ECE 4100**

ECE 4202
Industrial Training
3 weeks (Non credit)

Students will take 3 weeks industrial training in an "Electronics and Communication Engineering" related industry or establishment. Student will be evaluated on the basis of a report submitted by them

after the completion of the training, oral examination and the report from the concerned industry or establishment. This training is to be organized during the inter-session break.

ECE 4204
Seminar
3/2 hrs per week 0.75 credits

Student will work in-groups or individually to prepare review papers on topics assigned by teacher and will present before audience.

ECE 4207
Radar and Satellite Communication
3 hrs per week 3.00 credits

Section A

Introduction, Simple form of Radar equation, Radar block diagram, Applications of Radar, Prediction of range performance, Minimum detectable signal, Receiver noise, Probability density function, S/N ratio, Integration of Radar pulses, Radar cross sections of target, Cross section fluctuations, Transmitter power, PRF and range ambiguities, Equation of Radar considering other relevant effects, CW and frequency-modulated Radar, MTI and pulse Doppler Radar, Tracking Radar, HF Over-the-Horizon Radar, Air-Surveillance Radar.

Section B

Satellite communication, Orbits, Orbits, Station Keeping, Satellite altitude, Transmission path, Path loss, noise consideration, Satellite systems, Saturation flux density, Effective isotropic radiated power, Multiple access method.

Recommended References

1. Merril & Skolnik, Introduction to Radar Systems, 2/e, McGraw-Hill, 1998.
2. Roddy & Coolen, Electronic Communication, 4/e, Prentice-Hall, 1995
3. Pratt & Bostian, Satellite Communications, John Wiley & Sons, 1988.

ECE 4209
Opto-electronic Devices and Optical Communication
3 hrs per week 3.00 credits

Section A

Block diagram of an optical communication system, Optical Fibers: Structures and wave guide fundamentals, Basic optical laws and definition, Optical fiber modes and configuration, Mode theory for circular waveguide, Graded index fiber, An overview of fiber materials and fabrication methods, Attenuation, Signal distortion, LEDs, External and internal efficiency, Laser diode.

Section B

Photo detectors: Physical principles of photo diodes, PIN photo detectors, Avalanche photo diodes, Photo detector noise, Optical fiber cables, Splices and connectors, Couplers, Introduction to unguided optical communication systems, optical ether.

Recommended References

1. G. Keiser, Optical Fiber Communication, 2/e, McGraw-Hill, 1995.

2. John Gowar, Optical Communication Systems, 2/e, Prentice-Hall, 1996.
3. S. Desmond Smith, Opto-electronics devices, Prentice Hall, 1995.

ECE 4210
Opto-electronic Devices and Optical Communication Sessional/ Project/ Field Trip
3/2 hrs per week 0.75 credits

Laboratory work based on introduction to various photoelectric devices and fiber optics, photo detectors and their applications.

Recommended References

1. G. Keiser, Optical Fiber Communication, 2/e, McGraw-Hill, 1995.
2. John Gowar, Optical Communication Systems, 2/e, Prentice-Hall, 1996.
3. S. Desmond Smith, Opto-electronics devices, Prentice Hall, 1995.

ECE 4211
Mobile Communication Engineering
2 hrs per week 2.00 credits

Section A

Accessing: FDMA, TDMA, CDMA, Cordless telephone: CTO, CT1, CT2, DECT, Cellular mobile communication, Cellular network architecture, Radio network planning, C-network, D-network, GSM, Personal communication network (PCN), DCS L800, E1.

Section B

Paging systems, Beam communication (Tracking systems), Mobile data transmission, Modacom, IRIDIUM, NMARSAT, GPS, and EMC-E.

Recommended References

1. H. Lobensommer, The Technology of the Modern Mobile Communications, 1/e, Galgotia, 1997.
2. W. C. Y. Lee, Mobile Communication, 1/e, McGraw-Hill, 1982.

***Option I, *Option II, **Option I Sessional & **Option II Sessional should be selected from the following courses:**

ECE 4205
Bio-Medical Engineering
3 hrs per week 3.00 credits

Section A

Bio-medical Instrumentation, Electrocardiography (ECG), X-Ray machines and homography, Ultrasonic Imaging System, Organ Implantation, Laser applied to bio-medical field, Electrography, Hazards and safety measures in bio-medical application.

Section B

Bio-medical telemetry, Blood flow meter, Pulmonary function measurements, Cardiac measurement, Blood gas analysis, Blood cell counters, medical Thermography, Instruments for surgery, Pacemakers, Computer applications in medical field.

Recommended References

1. R. S. Khandjur, Hand Book of bio-medical instrumentation, 3/e, TMH Book Company, New Delhi, 2000.

ECE 4206
Bio-Medical Engineering Sessional/Project/Field Trip
3/2 hrs per week 0.75 credits

Laboratory works based on study of bio-medical instruments, characteristics of X-Ray machines, Application of Ultrasonic imaging instrument, Blood gas analysis, Application of Surgical Instruments.

Recommended References

1. R. S. Khandjur, Hand Book of Bio-medical instrumentation, 3/e, TMH Book Company, New Delhi, 2000.

***ECE 4213**
Antennas
3 hrs per week 3.00 credits

Section A

Retarded potentials, Radiation from a current element, Monopoles and dipoles, Radiation resistance, Gain and directivity, Field patterns, Effective length and aperture, Half-wave dipole, Radiation, Field patterns, Self and Mutual impedance of antennas, Methods of feeding dipoles and Monopoles, Arrays of two point sources, Linear arrays of point sources, Beam width, Broad side and end five arrays, Pattern multiplication, Effect of earth on radiation pattern of antennas, Binomial array.

Section B

Folded dipoles, Parasitic elements and Yagi antenna, Electricity long antennas, V-antenna, Traveling wave antennas, Rhombic antenna, Loop antennas, Slot antennas, Horn antennas, Reflector antennas, Parabolic reflections, Log periodic antennas.

Recommended References

1. J. D. Kraus, Antennas, 2/e, McGraw-Hill, 1998.
2. Jordan, Electromagnetic waves and Radiating Systems, 3/e, Prentice-Hall, 1995.
3. R. E. Collin, Antennas and Radio Wave Propagation, 2/e, McGraw-Hill, 1995.

****ECE 4214**
Antennas Sessional
3/2 Hrs. per week 0.75 credits

Laboratory works based on observation of radiation pattern of various antennas.

Recommended References

1. J. D. Kraus, Antennas, 2/e, McGraw-Hill, 1998.
2. Jordan, Electromagnetic waves and Radiating Systems, 3/e, Prentice-Hall, 1995.
3. R. E. Collin, Antennas and Radio Wave Propagation, 2/e, McGraw-Hill, 1995.

***ECE 4215**
Simulation & Modeling
3 hrs per week 3.00 credits

Section A

Simulation Methods, Model building, random number generator, Statistical analysis of results, Validation and verification techniques, Digital simulation of continuous systems.

Section B

Simulation and analytical methods for analysis of computer systems and practical problems in business and practice, Introduction to the development of simulation packages

Recommended References

1. Law & Keltan, Simulation, Modeling and Analysis, I/e, McGraw-Hill, 1995.

****ECE 4216**
Simulation & Modeling Sessional
3/2 hrs per week 0.75 credits

Students will complete some problems with proper documentation assigned by the teacher.

Recommended References

1. Law & Keltan, Simulation, Modeling and Analysis, I/e, McGraw-Hill, 1995.

***ECE 4217**
Artificial Intelligence
3 hrs per week 3.00 credits

Section A

Introduction: Definition of AI, Historical Development of AI, Applications of AI, AI Techniques, Propositional logic, First-Order logic, Resolution principle, State-Space representation, Problem-reduction representation, Production system structure, Recognition-action cycle, Interference directions, Black board systems, PS Implementation, frame representation: Basic structure, Inheritance properties, Slot extension.

Section B

Search: Blind and non-blind searches, Depth-first search, Breath-first search, Heuristic search, Best first search, Optimal search, A search implementation complexity, Expert systems, Natural Language Processing: Syntactic Semantics, Top-Down passing, Bottom-up pursing, Features of AI programming Language, Major AI programming Languages (LISP, PROLOG).

Recommended References

1. E. Ritch, K. Knight, Artificial Intelligence, 2/e, McGraw-Hill, 1995.
2. Winston, Artificial Intelligence, 3/e, Addison Wesley Longman, 1999.

****ECE 4218**
Artificial Intelligence Sessional
3/2 hrs per week 0.75 credits

Students will complete at least two projects with proper documentation as assigned by the teacher.

Recommended References

1. E. Ritch, K. Knight, Artificial Intelligence, 2/e, Tata McGraw-Hill, 1995.
2. Winston, Artificial Intelligence, 3/e, Addison Wesley Longman, 1999.