DIRECTOR
Institute of Engineering and Technology
JK Lakshmipat University
JAIPUR (Rajasthan)

Approved for implementation

27.12.13

Vice Chancellor

JK Lakshmipat University

Laliya Ka Vas, P.O. Mahapura, Ajmer Road, Jaipur 302 026

Ph.: +91-141-7107500/504

INSTITUTE OF ENGINEERING AND TECHNOLOGY

B. Tech (2014-18)

4 Years Degree Programme

(Branch: Electronics & Communication Engineering)

Semester – I - VIII

Curriculum, Detailed Syllabus

&

Scheme of Examination

Academic Council Meeting (23.12.2013)

JK Lakshmipat University, Jaipur
Institute of Engineering and Technology
Department of Electronics & Communication Engineering
Course Structure for the Batch 2014-18

Semester	Courses								(L T P) Credits Hrs/ Week
I	English Communication Skills	Engineering Mathematics - I	Engineering Chemistry	Electrical & Electronics Engineering	Workshop Practice	Engineering Drawing			(13 3 9) 20.5
	LA101 (2 1 0) 3	MA101 (3 1 0) 4	CH101 (3 1 2) 5	EE101 (3 0 2) 4	ME141 (0 0 3) 1.5	CE102 (2 0 2) 3			25
II	Professional Communication Skills	Engineering Mathematics - II	Engineering Physics	Environmental Studies	Engineering Mechanics	Computer Programming			(15 4 6) 22
	LA201 (1 1 2) 3	MA201 (3 1 0) 4	PH101 (3 1 2) 5	ID201 (2 0 0) 2	ME201 (3 1 0) 4	CSE201 (3 0 2) 4			25
III	Electronic Devices & Circuits	Electromagnetic Field Theory	Network Analysis & Synthesis	Object Oriented Programming	Engineering Mathematics – III	Principles of Management for Engineers			(17 4 8) 25
	ECE301 (3 1 2) 5	ECE303 (3 1 0) 4	EE301 (3 1 2) 5	CSE302 (3 0 4) 5	MA301 (3 1 0) 4	HS302 (2 0 0) 2			29
IV	Analog Electronics	Digital Electronics	Measurements & Instrumentation	Engineering Materials and Processes	Numerical & Statistical Methods	Microwave Engineering-I			(18 2 10) 25
	ECE401 (3 1 4) 6	ECE402 (3 1 2) 5	ECE406 (3 0 2) 4	ECE405 (3 0 0) 3	MA402 (3 0 2) 4	ECE407 (3 0 0) 3			30
V	**Practice School - I (PS 501) - 4 to 6 Weeks Duration - 4 Credits**								
	Linear Integrated Circuits	Analog Communication	Computer Networks	Optimization Techniques	Engineering Signals & Systems	Linear Control Systems			(18 3 8) 25 + 4
	ECE501 (3 0 2) 4	ECE502 (3 0 2) 4	CSE503 (3 0 2) 4	MA502 (3 1 0) 4	ECE505 (3 1 0) 4	EE501 (3 1 2) 5			29
VI	Microwave Engineering-II	Digital Communication	Digital Signal Processing	Electronic Circuit Design	Microprocessors & Interfacing	Elective – I			(17 2 12) 25
	ECE601 (3 0 2) 4	ECE602 (3 0 2) 4	ECE603 (3 1 2) 5	ECE604 (2 0 2) 3	ECE622 (3 0 2) 4	(3 1 2) 5			31
VII	Antenna & Wave Propagation	Wireless Communication	Optical Fiber Communication	Elective – II	Elective – III	Seminar	Principles of Economics		(18 0 6) 21
	ECE701 (3 0 2) 4	ECE 702 (3 0 0) 3	ECE 703 (3 0 0) 3	(3 0 0) 3	(3 0 0) 3	SEM701 (0 0 4) 2	HS701 (3 0 0) 3		24
VIII	**Practice School - II (PS 801) – (16 Weeks Duration) - 16 Credits**								16

List of Elective Courses

Elective I	Industrial Instrumentation & Control ECE624		Virtual Instrumentation ECE625		Industrial Electronics EE603			
Elective II	Digital Image Processing (CSE728)	Biomedical Engineering (ECE722)	VLSI Design (ECE728)	Information Theory & Coding (ECE729)				
Elective III	IC Technology (ECE725)	Verilog Hardware Description Language (ECE726)		RADAR & Satellite Communication (ECE727)				

Total Credits: 183.5

06/01/14

JK Lakshmipat University

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

4 Year B. Tech Programme

(Branch: Electronics & Communication Engineering)

Batch 2014-18

SEMESTER-ONE

Detailed Syllabus

&

Scheme of Examination

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
LA 101	English Communication Skills	2	1	0	3

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

- Definition and Characteristic Features of Effective Communication
- Barriers to Communication: Types, Ways to Overcome
- Vocabulary Extension: Roots, Prefixes and Suffixes
- Vocabulary Extension: Synonyms, Antonyms, Homophones, One Word Substitution
- Vocabulary Extension: Learning words through Situations
- Basics of English Grammar
- Applied English Grammar and Standard English Usage
- Standard English Usage, Listening Skills
- Phonetics and Spoken English: Sounds of English, Word Accent and Weak Forms in English, Intonation
- Introducing students to the rules of Word Accent and Weak Forms in English
- Reading Comprehension: Problems, Types of Reading Skills, Strategies
- Paragraph Writing: Definition, Structure of a Paragraph, Construction of a Paragraph, Unity and Coherence
- Art of Condensation: Steps Required, Strategies

Text Book(s)

1. Sanjay Kumar and Pushp Lata, *Communication Skills,* New Delhi: OUP, 2011

Reference Book(s)

2. Meenakshi Raman and Sangeeta Sharma, *Technical Communication: Principles and Practice*, Second Edition, New Delhi: OUP, 2011.
3. Krishna Mohan and Meenakshi Raman, *Effective English Communication*, New Delhi: Tata-McGraw Hill, 2000.
4. Krishna Mohan and N.P.Singh, *Speaking English Effectively*, New Delhi: Macmillan,1994.
5. V. Sasikumar and P.V. Dhamija, *Spoken English: A Self-Learning Guide to Conversation Practice*, Tata-McGraw Hill, 2007.
6. Norman Lewis, Word Power Made Easy, Delhi: GoyalSaab Publishers and Distributors, 1994.
7. A.J.Thomson and A.V.Martinet, A Practical English Grammar, 4th Edition, New Delhi: OUP, 1999.
8. Asha Kaul, Business Communication, Second Edition, New Delhi: PHI, 2010.
9. Edgar Thorpe and Showick Thorpe, Objective English, 2nd Edition, New Delhi: Pearson Education, 2008.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MA 101	Engineering Mathematics – I	3	1	0	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

Unit 1: Calculus of several variables

Functions of two or more variables, Partial Derivatives, Total derivative, chain Rule, Euler's Theorem, Jacobian and transformation, Applications to errors, Optimization using derivatives - Maxima-Minima of functions of two variables, Lagrange's method.

Unit 2: Curve Sketching

Asymptotes, Double and Triple Points, Cartesian, parametric and polar curve sketching

Unit 3: Vector function and its derivatives

Vector functions, their derivatives and integration, Arc length and unit tangent vector, Curvature and unit normal vector, Torsion and unit Bi-normal vector, Directional derivative and gradient vectors, Tangent plane, Divergence and curl of a vector field

Unit 4: Integral Calculus

Definite Integral - Integral calculus, Line integral, Arc length, Solids of revolution: Surface and volume, Multiple Integrals - Double integral: Area, change of order of integration, changing to polar coordinates, Triple integral, Volume integral, Improper Integrals - Gamma and Beta functions

Unit 5: Vector Integration

Line integral, flux, work done, circulation, Path independence, potential function and conservative fields, Green's theorem in the plane, Stoke's theorem, Divergence theorem,
Sequence and Series: Sequence, Series, Orthogonal function, Fourier Series

Text books and Reference books

1. B. S. Grewal, *Higher Engineering Mathematics*, 41st Ed., Khanna Publishers, Delhi, 2011.
2. G.B. Thomas, Jr., *Thomas' calculus*, 11th edition (Indian), Pearson education, Delhi, 2008
3. Dennis G. Zill and Warren S. Wright, *Advanced Engineering Mathematics*, Fourth Edition (Student Edition), Jones & Barlett, Viba, New Delhi, 2011
4. Rober Wrede, Spiegel M. R., *Schaum's outline of advanced calculus*, 3rd edition, Tata Mc-GrawHill, NewYork, 2011
5. Peter V. O'Neil, *Advanced Engineering Mathematics*, Seventh Indian Reprint, Cengage Learning, New Delhi, 2011.
6. Kreyszig, E., *Advanced Engineering Mathematics*, John Willey, Delhi (2011).
7. Potter M.C., Goldberg J.L., Edward F.A., *Advanced Engineering Mathematics*, 3rd Edition, Oxford University Press, 2005.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
CH 101	Engineering Chemistry	3	1	2	5

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

UNIT-I Water Chemistry

Introduction, common Impurities in water, Hardness of water, Determination of hardness by Clark's test and complexometric (EDTA) method. Removal of hardness by Lime Soda, Zeolite and Ion exchange process.

Boiler feed water: troubles their causes, disadvantages and prevention, Scale & Sludge Carry over (Priming and Foaming), Boiler Corrosion and Caustic embrittlement.

UNIT-II Polymers

Introduction to Polymer, Classification of polymers. Methods of Polymerization, Plastics: Thermosets and Thermoplastic. Preparation, properties and uses of Vinyl resins, Bakelite, Polyesters and Nylons. Rubbers: Natural rubber, vulcanization, synthetic rubbers e.g. Buna-S, Buna-N, Butyl, Thiokol and Neoprene rubbers.

UNIT-III Corrosion &Lubricants

Definition and its significance, Theories of corrosion: Dry corrosion theory, Wet (Electrochemical) theory, Passivity, Types of electrochemical corrosion. Factors influencing rate of corrosion.

Introduction, classification and uses of lubricants. Types of lubrication. Viscosity & viscosity index, Flash point Fire point, cloud and pour point, steam emulsification number, precipitation number and neutralization number.

UNIT-IV Solid State Chemistry

Solid State, Types of solids, Space Lattice and Unit cell, Types of unit cell, Cubic System – Number of atoms per unit cell, Atomic Radius, Density Calculation of unit cell. Bragg's Law X-ray studies of Crystals.

Graphite – Structure, Properties and applications.

Liquid Crystal: Liquid Crystalline state, Classification of liquid crystal and their applications.

UNIT-V Engineering Materials

Cement: Definition, Composition basic constituents and their significance, manufacturing of Portland cement by Rotary Klin technology. Setting and hardening of cement and role of gypsum.

Nanotechnology and Nano materials: Fullerenes and Carbon Nano tubes - Introduction, Structural properties, preparation and their applications.

Syllabus (Practical)

1. To determine the hardness of water by complex metric method using EDTA.
2. To determine the strength of NaOH and Na2CO3 in given alkali mixture.
3. To determine the strength of copper sulphate with the help of Hypo solution.
4. Measurement of conductivity of given sample by conductivity meter.
5. Measurement of pH of given sample by pH meter.

6. Determination of Barium as barium sulphate gravimetrically.
7. Measurement of Fluoride in water sample.
8. Determination of Na/K/Ca by Flame photometer in a given sample.
9. To determine the amount of free chlorine in given sample.
10. To determine the viscosity of a given sample of lubricant oil at various temperature.
11. To determine flash and fire point of a given lubricant using Pensky-Martin's apparatus.
12. Measurement of Nitrate and Oxygen in water sample.
13. To determine cloud and pour point of a given sample of lubricating oil using Cloud and Pour point apparatus.

Text Book

1. Engineering Chemistry by Jain & Jain (Dhanpat Rai publication)

Reference Book(s)

1. Engineering Chemistry by B Sivasankar, (Mc-Graw Hill publication).
2. Engineering Chemistry by O.G. Palanna, (Mc-Graw Hill publication).
3. Engineering Chemistry (Wiely India publication).
4. Introduction to Nanotechnology by Poole Owens (Wiley)
5. Nanotechnology by Shah&Shah (Wiley)
6. *Chemistry* in *Engineering* & Technology by J. C. Kuriacose and J. *Rajaram*,, Vol. 1&2
7. The Physics and Chemistry of Solids by Elliott (Wiley)
8. Engineering Chemistry (Wiely India publication).
9. Polymer Chemistry by Stevens (Oxford)
10. Polymer Science and Technology by Ghosh (Tata Mc-Graw Hill publication)
11. Polymer Science and Technology by Fried (PHI publication)
12. Text book of Polymer Science by Billmeyer (Wiely)

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE101	Electrical & Electronics Engineering	3	0	2	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

UNIT I

INTRODUCTION: basic physical laws, circuit elements, Source Transformation, KVL, KCL, Wye (Y) – Delta (Δ) and Delta (Δ) – Wye (Y) transformations.

UNIT II

THEOREM: Norton, Thevenin, Superposition, Max power transfer Theorem

UNIT II

AC NETWORKS: Fundamental aspects of single phase ac supply, Sinusoidal Steady State, Real/Reactive Power, Phasor, Three phase circuits, Start-delta, Two watt-meter Method, simple circuits, RMS Average value, Transients in R-L, R-C, R-L-C.

UNIT IV

TRANSFORMER & MACHINE: Basics of transformer Faraday and Lenz law, Mutual Inductance, construction, Working Principles of Transformers, AC/DC machines.

UNIT IV

INTRODUCTION TO SEMICONDUCTORS: Defining Insulator, Semiconductor, Conductors. Band gap energy and band formation, elementary idea about semiconductor behavior, conductivity, types of semiconductor, p-type and n-type, working principle, characteristics and applications of Diode and Transistor, Transistor CE, CB, CC configuration.

Syllabus (Practical)

ELECTRICAL LAB

1. Single line diagram of a power system and a distribution sub-station and basic functional study of main components used in power systems.
2. Make house wiring including earthling for 1-phase energy meter, MCB, ceiling fan, tube light, three pin socket and a lamp operated from two different positions. Basic functional study of components used in house wiring
3. Study the construction and basic working of ceiling fan, single phase induction motor and three phase squirrel cage induction motor. Connect ceiling fan along with regulator and single phase induction motor through auto-transformer to run and vary speed.

4. (a) Basic functional study and connection of moving coil & moving iron ammeters and Voltmeters, dynamometer, wattmeter and energy meter.

   (b) Run a 3-phase squirrel cage induction motor at no load and measure its voltage, current, power and power factor. Reverse the direction of rotation.

5. Study the construction, circuit, working and application of the following lamps:

   (i) Fluorescent lamp, (ii) Sodium vapour lamp, (iii) Mercury vapour lamp, (iv) Halogen lamp and (v) Neon lamp

6. (a) Study the construction and connection of single phase transformer and auto-transformer. Measure input and output voltage and fin turn ratio.

   (b) Study the construction of a core type three phase transformer. Perform star and delta Connection on a 3-phase transformer and find relation between line and phase voltage.

ELECTRONICS LAB

7. Identification, testing and applications of resistors, inductors, capacitors, PN-diode, Zener diode,LED, LCD, BJT, FET, UJT, SCR, Photo diode and Photo transistor.
8. (a) Functional study of CRO, analog & digital multi-meters and function / signal generator.

   (b) Study the single phase half wave and bridge rectifier and effects of filters on waveform.

9. Study the BJT amplifier in common emitter configuration. Measure voltage gain, plot gain frequency response and calculate its bandwidth.
10. (a) Study the construction and basic working of SCR.

    (b) Study the single phase half wave and bridge controlled rectifier and observe the effect of firing angle on waveform.

Text Book(s)

1. S.N.Singh "Basic Electrical Engineering", Prentice-Hall of India Pvt. Ltd, 2011.
2. J. Millman and C. Halkias, Integrated Electronics, McGraw Hill,2th Edition, 6th Indian Reprint, 2011.
3. B. L. Theraja, "Electrical Technology", Vol.1, S. Chand Publication, New Delhi
4. V. K. Mehta, "Basic Electrical Engineering", S. Chand and Company Ltd., New Delhi

Reference Book(s)

1. T.K.Nagsarkar,M.S. Sukhija,"Basic Electrical Engineering", Oxford University press, 2nd edition, 2011.
2. A.S. Sedra and K.C. Smith, Microelectronic Circuits, Saunder's College Publishing, 1991.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ME 141	Workshop Practice	0	0	3	1.5

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks
-	-	-	-	-	-	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Practical)

- Basics of manufacturing, types of production systems, ethics, safety in workshop.
- Metrology, quality, Least Count of a measuring Instrument, measurement with Vernier Caliper or Micrometer.
- Machining – Demonstration of Turning, Step Turning, Facing, etc.
- Casting – Demonstration of sand casting process
- Forging – Demonstration of forging operations
- Sheet metal working applications.
- Hands on practice of Sheet metal working operations using hand tools- Preparation of Funnel.
- Gas Welding, Demonstration of Gas Welding
- Hands on practice of Joining of metal parts by Arc Welding- Preparation of a Lap Joint model.
- Mechanical joining processes, Arc Welding
- Hands on practice of Joining of metal parts by Arc Welding- Preparation of a Butt Joint model.
- Introduction to wood working, Wood working Tools, Types of wood, Types of joints.
- Hands on practice of Wood working operations using hand tools- preparation of Lap Tee Joint, Mechanical joining processes, Soldering, Brazing.
- Machining – Demonstration of Shaping operations
- Hands on practice of Fitting operations using hand tools- Prepare a job in fitting shop.

Text Books:

1. H S Bawa, "Workshop Practice", TMH, New Delhi, 2nd Edition, 2011
2. B S Nagendra Parashar and R K Mittal, "Elements of Manufacturing Process", Prentice Hall of India, New Delhi, 2010 print
3. B S Raghuwanshi, "A Course in Workshop Technology", Dhanpat Rai & Co., New Delhi, Volume I & II, 2011 reprint,
4. Serope Kalpakjian and Steven R. Schmid, "Manufactuirng Engineering and Technology," Pearson Education (Low Cost Indian Edition), New Delhi, 4th Edition, 2005

Reference Books:

1. K. Venkata Reddy, "Workshop Practice Manual", BS Publications, Hyderabad,6th Edition, 2011 print
2. P. kannaiah and K. L. Narayana, "Engineering Practices Laboratory", SciTech Publications, Chennai, 2006

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
CE 102	Engineering Drawing	2	0	2	3

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

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**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

Unit I

Lines, Lettering & Dimension (Sketch Book)

Scales: Representative factor, plain scales, diagonal scales, scale of chords.

Conic sections: Construction of ellipse, parabola, & hyperbola by different methods; Engineering Curves: Cycloid, Epi-cycloid, Hypo-cycloid, Involutes, Archimedean and logarithmic spirals.

Unit II

Projection: Types of projection, orthographic projection, first and third angle projection, (Sketch Book)

Projection of points and straight lines: Line inclined to one plane, inclined with both the plane, methods for determining True Length, true Inclinations, and Traces of straight lines.

Unit III

Projection of planes and solids: Projection of Planes like circle and polygons in different positions; Projection of right and regular polyhedrons like prisms, pyramids and solids of revolutions like cylinder, cones in different positions.

Unit IV

Section of Solids: Section of right solids (like Prism, Pyramid, Cylinder and Cone) by normal and inclined planes in different positions; Intersection of cylinders.

Development of Surfaces: Parallel line and radial-line method for right, regular solids.

Unit V

Isometric Projections: Isometric scale, Isometric axes, Isometric Projection of solids from orthographic drawing.

Computer Aided Drafting (CAD): Introduction, benefit, software's basic commands of drafting entities like line, circle, polygon, polyhedron, cylinders; transformations and editing commands like move, rotate, mirror, array; Draw Toolbar, Object & Modify toolbar; solution of projection problems on CAD.

Syllabus (Practical)

Sketching and drawing of geometries and projections on Sketch Book & on AutoCAD based on above syllabus

Text Books:

1. Kulkarni D M, Rastogi A P, Sarkar A K, Engineering Graphics with AutoCAD, PHI Learning Pvt. Ltd., New Delhi, India, Fourth Printing (Revised Edition), 2012.
2. Bhatt N D, Engineering Drawing, Charotar Book Stall, Anand, India.

Reference Books:

1. Jolhe D A, Engineering Drawing with an introduction to AutoCAD, TMH, New Delhi, India.
2. Gill P S, Engineering Drawing (Geometrical Drawing), S K Kataria & Sons, Delhi, India
3. Jeyopoovan T.; Engineering drawing & Graphics Using AutoCAD; Vikas publishers.
4. Engineering Drawing, Basant Agarwal & CM Agarwal, Tata McGraw Hill.
5. Shah MB and Rana BC; Engg.drawing; Pearson Education
6. Luzadder WJ and Duff JM; Fundamental of Engg Drawing; PHI
7. Dhananjay A Jolhe; Engg. Drawing an Introduction; Tata McGraw Hill.
8. Visvesvaraya Tech. University; A Premier on Computer Aided Engg drawing; VTU Belgaum
9. Venugopal K.; Engineering Graphics; New Age

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

4 Year B. Tech Programme

(Branch: Electronics & Communication Engineering)

Batch 2014-18

SEMESTER-TWO

Detailed Syllabus

&

Scheme of Examination

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
LA 201	Professional Communication Skills	1	1	2	3

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

- Professional Communication: Definition, Types, Process, Features
- Importance of Non-Verbal Communication: Eye contact, Facial Expressions, Gestures, Posture, Proxemics, etc.
- Importance of Paralinguistic Features: Voice, Volume, Pitch, Intonation, Pauses, Rate, Vocalized Pauses and Vocal Cues.
- Group Discussion: Purpose, Difference between GD and Debate, Personality Traits to be Evaluated, dynamics of Group Behaviour, Opening and Ending a GD
- Job Interviews: Process, Stages, Desirable Qualities, Steps to Preparation, Body Language, Confidence, Frequently Asked Questions
- Presentation Skills: Combating Nervousness and Stage Fright, Beginning and Ending of a Presentation, Dynamics of Team Presentations, Using Slides and Audio-Visual Aids
- Business Letters and Resume: Structure, Style, Types
- Business Reports: Types, Features, Structure, Style
- E-mail Writing, Other Business Writings
- Editing and Proofreading

Syllabus (Practical)

1. Sounds of English: Vowel and Consonant Sounds, Word Stress, Intonation - Listening and Practice
2. Reading Comprehension: Reading Passages and Answering Questions
3. Vocabulary Extension: :Learning Words through Situations and Modules
4. Presentation Skills: Learning through Video Presentations
5. Group Discussion: Learning through Recorded Group Discussions
6. Job Interviews: Learning through Recorded Job Interviews

Text Book(s)

1. Sanjay Kumar and Pushp Lata, *Communication Skills*, New Delhi: OUP, 2011

Reference Book(s)

1. Meenakshi Raman and Sangeeta Sharma, *Technical Communication: Principles and Practice*, Second Edition, New Delhi: OUP, 2011.
2. Krishna Mohan and Meenakshi Raman, *Effective English Communication*, New Delhi: Tata-McGraw Hill, 2000.

3. Krishna Mohan and N.P.Singh, *Speaking English Effectively,* New Delhi: Macmillan,1994.
4. V. Sasikumar and P.V. Dhamija, *Spoken English: A Self-Learning Guide to Conversation Practice*, Tata-McGraw Hill, 2007.
5. Norman Lewis, *Word Power Made Easy,* Delhi: GoyalSaab Publishers and Distributors, 1994.
6. A.J.Thomson and A.V.Martinet, *A Practical English Grammar,* 4th Edition, New Delhi: OUP, 1999.
7. Asha Kaul, *Business Communication,* Second Edition, New Delhi: PHI, 2010.
8. Edgar Thorpe and Showick Thorpe, *Objective English*, 2nd Edition, New Delhi: Pearson Education, 2008.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MA 201	Engineering Mathematics – II	3	1	0	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

Unit 1: Ordinary Differential equation

Differential equation of first order, Differential equation of higher order with constant coefficients, Differential equation of second order with variable coefficients, Solution in series.

Unit 2: Partial differential equation

Partial Differential Equations of First Order, Variable separable technique for solving PDE, Boundary value problems: Heat equation, wave equation, Laplace equation

Unit 3: Matrix Algebra

Matrices, Rank of a Matrix, System of Linear Algebraic Equations, Linear Independence and Dependence, Eigen Values and Eigen Vectors, Diagonalization, Cayley Hamilton Theorem

Unit 4: Linear Algebra

Unit Vector Space, Subspaces, Bases and Dimensions, Coordinates, Row Equivalence and Computations concerning Subspaces, Linear Transformations, The Algebra of Linear Transformations, Representation by matrices

Unit 5: Linear Programming Problems

Introduction to LP Problems, LP formulations, Graphical Methods, Convex Sets, Simplex Methods

Text books and Reference books

1. B. S. Grewal, *Higher Engineering Mathematics*, 41st Ed., Khanna Publishers, Delhi, 2011.
2. Dennis G. Zill and Warren S. Wright, *Advanced Engineering Mathematics*, Fourth Edition (Student Edition), Jones & Barlett, Viba, New Delhi, 2011.
3. B.V.Ramana, *Higher Engineering Mathematics*, Tata Mc-graw Hill.
4. Peter V. O'Neil, *Advanced Engineering Mathematics*, Seventh Indian Reprint, Cengage Learning, New Delhi, 2011.
5. Kreyszig, E., *Advanced Engineering Mathematics*, John Willey, Delhi (2011).
6. Potter M.C., Goldberg J.L., Edward F.A., *Advanced Engineering Mathematics*, 3rd Edition, Oxford University Press, 2005.
7. G.B. Thomas, *Jr., Thomas' Calculus*, 11th edition (Indian), Pearson education, Delhi, 2008.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
PH 101	Engineering Physics	3	1	2	5

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Course Syllabi (Theory):

- **Coherence, Interference and Optical Technology**
  - Introduction to optics, Spatial Coherence, Temporal coherence, Coherence length, Coherence time and 'Q'factor for light
  - Formation of Newton's rings, Measurement of wavelength of light, Diameter of Newton's rings
  - Elementary idea of anti-reflection coating and interference filters
- **Diffraction**
  - Single slit diffraction, position of maxima / minima and width of central maximum, intensity variation.
  - Construction and theory. Formation of spectra by plane transmission grating, Determination of wavelength of light using plane transmission grating.
- **Polarization**
  - Plane, circular and elliptically polarized light on the basis of electric (light) vector, Malus law.
  - Quarter and half wave plates, construction, working and use of these in production and detection of plane, circular and elliptically polarized light.
  - Introduction and law of optical rotation, specific rotation and its measurement using the half-shade and bi-quartz device.
- **Quantum Mechanics**
  - Heisenberg's Uncertainty Principle, Wave and Particle Duality of Radiation, De-Broglie's Concept of Matter waves, Quantum Nature of Light
  - Concept of Compton Effect
  - Concept of Wave Function, Physical interpretation of wave function and its properties
  - Schrödinger's Wave Equation: Time dependent and time independent cases

- **Application of Schrodinger Equations and Band Theory of Solids**
    - Particle in one-dimensional box
    - Particle in three-dimensional boxes, Degeneracy.
    - Barrier penetration and tunnel effect, Tunneling probability
    - Sommerfeld Free Electron Gas Model of Solids.
    - Distinction between Insulators, Semiconductors and Conductors, Intrinsic and Extrinsic Semiconductors.

- **Laser and Fibre Optics**
    - Theory of Laser Action, Einstein's Coefficients, Threshold Conditions for Laser Action.
    - Theory, Design, and Applications of He-Ne Laser.
    - Theory of Semiconductor Lasers.
    - Optical Fibre, Numerical Aperture, and Maximum Angle of Acceptance.

- **Special Theory of Relativity**
    - Postulates of Special Theory of Relativity, Lorentz Transformations
    - Relativity of Length, and Time, Mass-Energy Relation, Relativistic Energy and Momentum.

- **Nuclear Radiation Detectors**
    - Characteristics of Gas Filled Detectors, Constructions, Working, and Properties of Ionization Chamber.
    - Proportional Counter, G.M. Counter, Paralysis Time, Quenching.
    - Scintillation Counter.

Course Syllabi (Practical):

1. To determine the wave length of sodium light by Newton's Ring
2. To determine the specific rotation of Glucose (Sugar) solution using a Polarimeter
3. To measure the Numerical Aperture of an Optical Fibre.
4. To determine coherent length and coherent time of laser using He-Ne Laser
5. To determine the height of object with the help of a Sextant.
6. To determine the dispersive power of material of a Prism for Violet Red and Yellow colours of Mercury light with the help of a spectrometer.
7. To determine the wave length of prominent lines of mercury by plane diffraction Grating with the help of spectrometer.
8. To study the Charge & Discharge of a condenser and hence determine time constant (Both current and voltage graphs are to be plotted).
9. To determine the high resistance by method of leakage, using a Ballistic Galvanometer.
10. To study characteristics of G.M. Counting System.
11. To determine the specific resistance of the material of a wire by Carey Fosters Bridge.
12. To convert a Galvanometer in to an ammeter of range 1.5/3 amp and calibrate it.

13. To convert a Galvanometer in to a Volt of range 1.5/3 volt and calibrate it.

Text Books:

1. G.D. Ladiwala and S. S. Sharma, "Engineering Physics-I" New Age International Publication, New Delhi, I edn. 2010.
2. T2. G.D. Ladiwala and S. S. Sharma, "Engineering Physics-II" New Age International Publication, New Delhi, I edn. 2010.
3. T3: Lab Manuals for Physics

Reference Books:

1. Arther Beiser, "Concept of Modern Physics" Tata McGrawHill, New Delhi, 5th edn. 1997.
2. R2 Ajoy Ghatak, "Optics", Tata McGraw Hill, 4th edn
3. R3 Eyvind H Wichman, "Quantum Physics" Tata McGraw Hill, Volume 4
4. R4 Neeraj Mehta, "Applied Physics for Engineers", PHI, I edn. 2011
5. R5: Dattu R Joshi, "Engineering Physics", Tata McGraw Hill Education Pvt. Ltd. New Delhi, I edn. 2010.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ID 201	Environmental Studies	2	0	0	2

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Course Syllabi (Theory):

- Understanding environment, The global crisis, Basic Concepts
- Forest and Grassland ecosystems, Desert Ecosystems, Aquatic Ecosystems
- Introduction to Biodiversity, Biodiversity Conservation
- Water Resources, Energy Resources, Forest Resources
- Land, Food, and Mineral Resources
- Air and Noise Pollution, Water, Soil, and Marine Pollution
- Solid Waste Management and Disaster Management
- Population Growth, Environment and Human Health, Sustainable Development
- Global Warming, Acid Rain, and Ozone Depletion
- Different types of laws and regulations

Text Books:

1. Rajagopalan, R., "Environmental Studies: From Crisis to Cure", Oxford University Press, New Delhi, 2e, 2011

Reference Books:

1. Ranjit Daniels & J. Krishnaswamy "Environmental Studies", Wiley India
2. Davis & Cornwell "Environmental Engineering", Mc Graw Hill

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ME 201	Engineering Mechanics	3	1	0	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

- Fundamentals of engineering mechanics, Laws of Motion, Equilibrium, Conditions for equilibrium, Equations of equilibrium.
- **Statics of Particles and Rigid Bodies:** System of forces, Resultant force, Resolution of force, Moment and Couples.
- **Trusses:** Truss analysis, analysis of frames and machines.
- **Friction:** Types of Friction, Laws of friction, Angle of friction, Angle of repose, Applications of Friction.
- **Lifting Machines:** Mechanical advantage, Velocity Ratio, Efficiency of machine, Ideal machine, Ideal effort and ideal load, Reversibility of machine, Law of machine, Lifting machines; System of Pulleys, Simple wheel and axle, Wheel and differential axle, Weston's differential pulley block, Worm and worm wheel.
- **Properties of Plane Surfaces:** Centroids & Centre of Mass, area of moments, principle moments of inertia, Second moment of mass.
- **Virtual work:** Principle of Virtual Work, Active forces and active force diagram.
- **Kinematics of Particles and Rigid Bodies:** Velocity, Acceleration, Types of Motion, Equations of Motion, Rectangular components of velocity and acceleration, Angular velocity and Angular acceleration, Radial and transverse velocities and accelerations, Projectiles motion on plane and Inclined Plane, Relative Motion.
- **Kinetics of Particles and Rigid Bodies**: Equation of motion in rectangular coordinate, radial and transverse components, Equation of motion in plane for a rigid body.
- **Work, Energy and Power:** Work of a force, weight, spring force and couple, Power, Efficiency, Energy, Kinetic energy of rigid body, Principle of work and energy, Conservative and Non-conservative Force, Conservation of energy.
- **Impulse and Momentum:** Linear and angular momentum, Linear and angular impulse, Principle of momentum for a particle and rigid body, Principle of linear impulse and momentum for a particle and rigid body, Principle of angular momentum and Impulse, Conservation of angular momentum, Angular momentum of rigid body.

Text Books:

1. Meriam and Kraige, **"Engineering Mechanics-STATICS"**, John Wiley & Sons, Fifth Edition, 2010
2. Meriam and Kraige, **"Engineering Mechanics-DYNAMICS"**, John Wiley & Sons, Fifth Edition, 2010

Reference Books:

1. Engineering Mechanics, Basudeb Bhattacharyya, Oxford University Press
2. Vector Mechanics for Engineers, Beer and Johnston, Tata McGraw-Hill., Ninth Edition, 2009.
3. Engineering Mechanics, Hibbeler, Pearson Education, Sixth Edition, 2010
4. Engineering Mechanics, Andrew Pytel & Kiusalas, Cengage Learning, Third Edition, 2010.
5. Engineering Mechanics, Timoshenko and Young, Tata McGraw-Hill, Fourth Edition, 2006.
6. Engineering Mechanics- Statics and Dynamics, Shames, Pearson Education.
7. Engineering Mechanics, Boresi and Schmidt, CL-Engineering, First Edition, 2008.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
CSE201	Computer Programming	3	0	2	4

Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks **
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Course Syllabi (Theory):

- Introduction: Stored Program Architecture of Computers, Evolution of Processors (In terms of word length & Speed only), Storage Device- Primary Memory and Secondary Storage, Working Principle of Primary Storage devices- RAM, ROM, PROM, EPROM, EEPROM, Random, Direct, Sequential access methods. Language Translators – Concept of High-Level, Assembly and Low Level programming languages. Working of Assembler, Interpreter and compiler. Representing Algorithms through flow chart, pseudo code, step by step etc.
- Number System: Data Representation, Concept of radix and representation of numbers in radix r with special cases of r=2, 8, 10 and 16 with conversion from radix r1 to radix r2. R's and (r-1)'s complement. Representation of Integer in sign-magnitude, signed 1's and 2's complement, Floating point representation. Concept of bias and normalization. Representation of alphabets, Binary Codes: Binary arithmetic, Addition and subtraction of Integers and floating point Numbers.
- Programming in C: Structure of C Program, Concept of Preprocessor, Macro Substitution, Intermediate code, Object Code, Executable Code. Compilation Process, Basic Data types, Importance of braces ({ }) in C Program, enumerated data type, Identifiers, Scope of Variable, Storage Class, Constants, Expressions in C, Type Casting, Control Statements, printf( ), scanf ( ), reading single character, Command Line arguments.
- Functions in C, Passing Parameters (By value & Reference), using returned data, Passing arrays, structures, array of structures, pointer to structures etc., passing characters and strings, The void pointer.
- Arrays in C, Pointers, Using pointers to represent arrays, Dynamic Memory allocation, structures, using typedef,
- Pointers: What is a Pointer? - How do you Define a Pointer? - Pointer Indexing - Pointer
- Arithmetic - Function data return with a Pointer - A pointer to a Function, Arrays of Structures & pointers,
- File Handling (Opening in different modes & closing of file, fscanf & fprintf only).

Course Syllabi (Practical):

1. Simple OS Commands, compiling program, compiler options, linking libraries.
2. Simple input output program integer, real character and string. (Formatted & Unformatted)
3. Conditional statement programs (if, if-else-if, switch-case)
4. Looping Program. (for, while, do-while)
5. Program based on array (one, two and three dimensions)
6. Program using Function (with and without recursion)
7. Simple programs using pointers.
8. File handling. Program using Structure and Union

Text Books:

1. Reema Thareja "*Computer Fundamentals and Programming in C*" Oxford Education, first.2012
2. Balagurusamy, "*Programming in ANSI C*" Tata Mcgraw Hill, sixth, 2012.

Reference Books:

1. Yashwant Kanetkar, "Let us C" BPB publication, fifth, 2012

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

4 Year B. Tech Programme

(Branch: Electronics & Communication Engineering)

Batch 2014-18

SEMESTER-THREE

Detailed Syllabus

&

Scheme of Examination

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE 301	Electronic Devices & Circuits	3	1	2	5

Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

- **Semiconductor Physics:** Mobility and conductivity, charge densities in a semiconductor, Fermi Dirac distribution, carrier concentrations and Fermi levels in semiconductor, Generation and recombination of charges, diffusion and continuity equation, Mass action Law, Hall effect.
- **Junction Diode:** PN Junction diodes, Diode as a circuit element, load line concept, clipping and clamping circuits, Voltage multipliers. Zener diode, characteristics and its applications.
- **Bipolar Junction Transistor:** Transistor characteristics, Current components, Current gains: alpha and beta. Operating point. Hybrid model, h-parameter equivalent circuits. CE, CB and CC configuration. DC and AC analysis of CE, CC and CB amplifiers. Ebers-Moll model. Biasing & stabilization techniques. Thermal runaway, Thermal stability.
- **Field Effect Transistor** JFET, MOSFET, Equivalent circuits and biasing of JFET's & MOSFET's. Low frequency CS and CD JFET amplifiers. FET as a voltage variable resistor. Biasing, Small signal model analysis.
- **Small Signal Amplifiers at Low Frequency:** Analysis of BJT and FET, DC and RC coupled amplifiers. Frequency response, mid-band gain, gains at low and high frequency. Analysis of DC and differential amplifiers. Miller's Theorem. Cascading Transistor amplifiers, Darlington pair. Emitter follower, source follower.

Syllabus (Practical)

1. Plot V-I characteristic of P-N junction diode & calculate cut-in voltage, reverse saturation current and static & dynamic resistances.
2. Plot V-I characteristic of Zener diode and study of Zener diode as voltage regulator. Observe the effect of load changes and determine load limits of the voltage regulator.
3. Study of application of diode as clipper & clamper circuit.
4. Plot input and output characteristics of BJT in CB, CC and CE configurations.
5. Plot frequency response curve for single stage amplifier and to determine gain bandwidth product.
6. Plot drain current-drain voltage and drain current-gate bias characteristics of field effect transistor and measure of I_{DSS} & V_P.

7. Plot gain-frequency characteristic of two stages RC coupled amplifier & calculate its bandwidth and compare it with theoretical value.

Text Books:

1. Microelectronics Circuits (Theory and Applications), Adel S. Sedra and Kenneth C. Smith, Adapted by Arun N. Chandorkar, 5th Ed. Oxford International Student Edition.
2. Electronic Device and Circuits, J.B. Gupta, Katson Educational Series.
3. Electronic Devices and Circuits, S. Salivahanan, N. Suresh Kumar and A Vallavaraj, Tata Mc-Graw Hill 2rd Edition

Reference Books:

1. Millman's Electronic Devices and Circuits, Jocob Millman, Christos C Halkias & Satyabrata Jit, Tata Mc-Graw Hill 3rd Edition.
2. Electronic Devices and Circuit Theory, Robert L. Boylestad and Louis Nashelsky, Pearson 10th Edition.
3. Electronic Devices and Circuits, David A. Bell, Oxford 5th Edition.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE 303	Electromagnetic Field Theory	3	1	0	4

Evaluation Scheme (Theory)					
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks*
20	20	40	10	10	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Course Syllabi (Theory):

- **Introduction:** Scalar and Vector fields, Physical meaning of gradient, divergence and curl, co-ordinate systems, review of electrostatic and magnetostatic fields.
- **Time varying fields and Maxwell's equations:** Faraday's law, current continuity equation, displacement current, Maxwell's equations, electromagnetic boundary conditions.
- **Electromagnetic waves:** Wave equations and their solutions for free space conditions, electromagnetic potentials, uniform plane waves, wave equations for a conducting medium, losses, skin depth, sinusoidal time variations, wave propagation in dielectrics and conductors, polarization, reflection and refraction, Poynting vector and the flow of power.
- **Electromagnetic radiation:** Radiation from a current element in free space, Quarter and half wave antenna, Electromagnetic interference and electromagnetic compatibility

Text Book:

1. Principles of Electromagnetics, N. O. Sadiku ; Oxford Univ. Press, 4th Ed

Reference Books:

1. Engineering Electromagnetics, Hayt and Buck;TMH,7th Ed
2. Fundamentals of applied electromagnetics, F.T. Ulaby;PHI,5th Ed
3. Introduction to electrodynamics,D.J. Griffiths;PHI.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE301	Network Analysis & Synthesis	3	1	2	5

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

UNIT-I

NETWORK CONCEPTS: RLC parameter, Independent and dependent sources, Voltage/current relationship for individual element, source transformation techniques, KCL, KVL for network having both Independent and dependent sources.

NETWORK ANALYSIS TECHNIQUES AND THEOREMS: Superposition, Thevenin and Norton Theorem, Maximum power transfer Reciprocity theorem, Tellengen Theorem, Series and parallel resonant circuits and Q-factor, Mutual inductance ,Dot Convention and duality and concept of dual network, magnetically couples circuit analysis.

UNIT-II

GRAPH THEORY AND ITS APPLICATIONS: Fundamental concepts, definitions of a graph and various related terms, paths and circuit connections, trees of a graph, cut sets and tie sets, non-separable planner and dual graphs, matrices of oriented graphs, properties and inter relationships of incidence, tie and cut set matrices, complete circuit analysis using tie set and cutest matrices

UNIT-III

AC AND DC TRANSIENTS ANALYSIS: Laplace transform fundamentals, properties and theorems, unit step function, other unit function, the impulse, ramp and doublet, Laplace transform for shift and singular, functions, initial and final value theorems, Formulation and solution of network equilibrium equations on loop and node basis, Introduction to Laplace Transform, Laplace transform of some basic functions, Laplace transform of periodic functions, Inverse Laplace transform, Time Constant, Complete response of RL, RC, and RLC circuits to step, sinusoidal, exponential, ramp, impulses and the combinations of excitations.

UNIT-IV

NETWORK FUNCTIONS: Concepts of Complex Frequency, Transform Impedance, Network functions of one and two port network, concepts of poles and zeros, properties of driving point and transfer functions, time response stability from pole zero plot.

TWO PORT NETWORK: Voltage & current ratio of two port network, Admittance, impedance, hybrid and transmission parameter of two port networks, Conversion of one parameter to another parameter, Series, parallel and cascade connection of two port networks, Condition of reciprocity & symmetry, Iterative and Image Impedance.

UNIT-V

NETWORK SYNTHESIS: Network reliability, Hurwitz Polynomials, Positive real functions, Properties of RC, RL & LC networks, Foster and Cauer forms of RC, RL & LC networks.

Syllabus (Practical)

1. Study and verification of Thevenin's Theorem.
2. Study and verification of Norton Theorem.
3. Study and verification of Superposition theorem.
4. Study and verification of Maximum power transfer Theorem.
5. Transient analysis of RL/RC circuits.
6. Transient analysis of RLC circuits.
7. Study of Two Port Network.
8. Study of Two Port Ladder Network.
9. Study and verification of T and π Networks.
10. Study of Inter Connection of Two Port Network

Text Book(s)

1. K.M.Soni, "Circuit & Systems" S.K.Kataria & Son, Eight Edition, 2008.
2. Van Valkenburg M.E., "Network Analysis", Prentice Hall, India, 3rd Edition, 2002.
3. A. Chakarbrati, "Circuit Theory", Dhanapat Rai and Co.

Reference Book(s)

1. T.K.Nagsarkar,M.S. Sukhija,"Basic Electrical Engineering", Oxford University press, 2nd edition, 2011.
2. Roy Choudhary, "Network Theory", TMH, 3rd Edition, 2004
3. Edminister Joseph A., "Electrical Circuits, Schaum's Outline Series", Tata McGraw Hill, 2nd edition,1983.
4. Hayt W.H., Kemmerly J. E., Durbin S. M., "Engineering Circuit Analysis", Tata Mcgraw Hill, 6th edition, 2006

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
CSE302	Object Oriented Programming	3	0	4	5

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Course Syllabi (Theory):

Identifiers and constants (Literals), Keywords, Data Types, The Operators, New Casting Operators, Typeid and throw, The Conditional structures and Looping Constructs

Difference between Struct and class in C++, The difference between Union and Class, Static Data members of a class, Pointer to objects and pointer to members of class, the local classes,

Assigning Objects

Introduction to Functions, The Inline function, Default Arguments to the function, Functions with object as parameters, Call by reference and return by reference, Prototyping and Overloading, Friend functions, Const and Volatile functions, Static functions, Private and Public functions

Introduction to constructors, The explicit constructors, Parameterized constructors, Multiple constructors, Constructors with default arguments, Dynamic Initialization, Constructor with dynamic allocation, copy constructors, The member initialization list, destructors

Overloading Operators, The need, Defining derived class using single base class, Derivation using public, private and protected access modifiers

The implementation of Inheritance in the C++ object model, The multiple-inheritance, Abstract classes, Composite objects (container objects), Compile Time and Runtime Polymorphism

Introduction, Need for Exception handling, Components of exception handling mechanism

Course Syllabi (Practical):

Programs using C++ which covers following concepts:

- Declaration and Usage of Classes and Objects
- Constructors and Destructors.
- Overloaded Functions and Overloaded Operators.
- Inheritance
- Exception handling mechanism.

Text Books:

1. Object Oriented Programming with C++ , Balagurusamy, Third Edition, Tata McGraw Hill

Reference Books:

1. Programming with ANSI C++ by Bhushan Trivedi, Oxford University Press

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MA 301	Engineering Mathematics – III	3	1	0	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Course Syllabi (Theory):

Unit 1: Integral Transforms

Laplace transform and its properties, Fourier Transform.

Unit 2: Applications of Transform Calculus

Integral transform method for solving differential equations, Systems of Linear Differential Equations

Unit 3: Special Functions

Legendre and Bessel functions, series representations and recurrence relations

Unit 4: Calculus of variations

Extremal function, Euler Equation, Isoperimetric problems

Unit 5: Complex Analysis

Functions of complex variables and its derivatives, Integration in complex planes, Series, Singularities and Residues, Evaluation of Real Integrals, Conformal mappings, Schwarz-Christoffel Transformations

Text books and Reference books

8. Dennis G. Zill and Warren S. Wright, *Advanced Engineering Mathematics*, Fourth Edition (Student Edition), Jones & Barlett, Viba, New Delhi, 2011
9. Peter V. O'Neil, *Advanced Engineering Mathematics*, Seventh Indian Reprint, Cengage Learning, New Delhi, 2011.
10. Erwin Kreyszig, *Advanced Engineering Mathematics*, Wiley 9th Edition.
11. B. S. Grewal, *Higher Engineering Mathematics*, 41st Ed., Khanna Publishers, Delhi, 2011.
12. H. K. Dass, *Advanced Engineering Mathematics*, 12th editions with corrections, S. Chand and Company, Meerut, 2004
13. B. V. Ramana, *Higher Engineering Mathematics*, Tata Mcgraw Hill.
14. Potter M.C., Goldberg J.L., Edward F.A., *Advanced Engineering Mathematics*, 3rd Edition, Oxford University Press, 2005

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
HS302	Principles of Management for Engineers	2	0	0	2

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Course Syllabi (Theory):

- **Concepts of management:** Functions and Responsibilities of managers, Principles of management and visiting various, Schools of management Thoughts in developing, Excellent managers
- **Planning:** Nature and purpose of planning, Planning process and principles, Types of planning, Advantages and disadvantages of planning, Concept of objectives and types of objectives, Case analysis
- **Organizing:** Nature and purpose of organizing, Process of organizing, Span of management and determination of span of management, Principles of organizing, Departmentalization, delegation and, Decentralization. Case analysis
- **Directing and leading:** Requirements of Effective directions, Giving orders, motivation, Nature of leadership, leadership and management, Recapitulation and case discussion
- **Controlling:** concept and process, Need for controlling and types of control methods, Essentials of effective control, Benefits and problems in control systems. Case analysis
- Social responsibilities of business: Meaning, Social responsibility of business towards different groups, Social performance of business in India, Social audit, Business ethics and corporate governance

Text Books:

1. Tripathy, P.C. and Reddy, P. N. "Principles of Management". . McGraw Hill, New Delhi.4th ed. 2008.

Reference Books:

1. Koontz, Herold and Weihrich, Heinz. "Management". McGraw Hill, New York. 9th ed. 1988.
2. Stoner, James A. F. and Freeman, R Edward. "Management". Prentice Hall of India, New Delhi. 6th e, 1989.
3. Bateman, T. S. and Snell, S. A. "Management: Leading and Collaborating in a Competitive World", McGraw Hill Irwin. 8th edition,2009.
4. Draft, R. L. "Principles of Management". Cengage learning.2009
5. Schermerhron, J. R. "Introduction to Management", 10th edition, Wiley India. 2009

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

4 Year B. Tech Programme

(Branch: Electronics & Communication Engineering)

Batch 2014-18

SEMESTER-FOUR

Detailed Syllabus

&

Scheme of Examination

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE 401	Analog Electronics	3	1	4	6

Mid Term Test – I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Course Syllabi (Theory):

- **Feedback Amplifiers:** Feedback concept and some properties of negative feedback, Four basic feedback topologies, Analysis of voltage-series, voltage-shunt, current-series and current-shunt feedback amplifier, Determining the loop gain, Stability criterion.
- **Signal Generators and Waveform-Shaping Circuits:** Basic Principles of Sinusoidal Oscillators, Criterion for oscillation, RC Oscillator Circuits (Wien Bridge & RC Phase Shift), LC-Tuned Oscillator (Hartley & Colpitts), Crystal Oscillator, Sine Wave, Sawtooth Wave, Triangular Wave, Square Wave Generator, Astable, Monostable and Bistable Multivibrators.
- **High Frequency Amplifiers:** Hybrid, Pi model, conductance and capacitances of hybrid, Pi model, high frequency analysis of CE amplifier, gain-bandwidth product. Emitter follower at high frequencies.
- **Output Stage and Power Amplifiers:** Classification of output stage, Class A output stage, class B output stage and class AB output stage, class C amplifiers, Push-pull amplifiers with and without transformers. Complementary symmetry amplifiers and Quasi-Complimentary symmetry amplifiers.

Syllabus (Practical)

1. Plot gain-frequency characteristics of BJT amplifier with and without negative feedback in the emitter circuit and determine bandwidths, gain bandwidth products and gains at 1 KHz with and without negative feedback.
2. Study of series and shunt voltage regulators and measurement of line and load regulation and ripple factor.
3. Study of push pull amplifier, Measure variation of output power & distortion with load.
4. Study Wein bridge oscillator and observe the effect of variation in R & C on oscillator frequency.
5. Study transistor phase shift oscillator and observe the effect of variation in R & C on oscillator frequency and compare with theoretical value.
6. Study the following oscillators and observe the effect of variation of C on oscillator frequency: (a) Hartley (b) Colpitts
7. Study of a Digital Storage CRO and store a transient on it.

8. To plot the characteristics of MOSFET and CMOS.
9. Design Fabrication and Testing of k-derived filters (LP/HP).

Text Books:

1. Op-Amps and Linear Integrated Circuits, Ramakant A. Gayakwad, PHI Learning, 4th Edition.
2. Microelectronics Circuits (Theory and Applications), Adel S. Sedra and Kenneth C. Smith, Adapted by Arun N. Chandorkar, 5th Ed. Oxford International Student Edition.
3. Analog Electronics, L.K. Maheshwari and M.M.S Anand, PHI Learning, 6th Edition.

Reference Books:

1. Millman's Electronic Devices and Circuits, Jocob Millman, Christos C Halkias & Satyabrata Jit, Tata Mc-Graw Hill 3rd Edition.
2. Electronic Devices and Circuit Theory, Robert L. Boylestad and Louis Nashelsky, Pearson 10th Edition.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE 402	Digital Electronics	3	1	2	5

Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Course Syllabi (Theory):

- Digital system and binary numbers: Signed binary numbers, binary codes, cyclic codes, error detecting and correcting codes, hamming codes.
- Gate-level minimization: The K-map method up to five variable, don't care conditions, POS simplification, NAND and NOR implementation, Quine Mc-Clusky method (Tabular method)
- Combinational Logic: Combinational circuits, analysis procedure, design procedure, binary adder-subtractor, decimal adder, binary multiplier, magnitude comparator, decoders, encoders, multiplexers ,demultiplexers
- Synchronous Sequential logic: Sequential circuits, storage elements: latches, flip flops, analysis of clocked sequential circuits, state reduction and assignments, design procedure.
- Registers and counters: Shift registers, ripple counter, synchronous counter, other counters.
- Memory and programmable logic: RAM, ROM, PLA, PAL. Design at the register transfer level: ASMs, design example, design with multiplexers. Asynchronous sequential logic: Analysis procedure, circuit with latches, design procedure, reduction of state and flow table, race Free State assignment, hazards.

Course Syllabi (Practical):

1. Study of logic gates.
2. Design and implementation of adders and subtractors using logic gates.
3. Design and implementation of code converters using logic gates.
4. Design and implementation of 4-bit binary adder/subtractor and BCD adder using IC 7483.
5. Design and implementation of 2-bit magnitude comparator using logic gates, 8-bit magnitude comparator using IC 7485.
6. Design and implementation of 16-bit odd/even parity checker/generator using IC 74180.
7. Design and implementation of multiplexer and demultiplexer using logic gates and study of IC 74150 and IC 74154.
8. Design and implementation of encoder and decoder using logic gates and study of IC 7445 and IC 74147.

9. Construction and verification of 4-bit ripple counter and Mod-10/Mod-12 ripple counter.

10. Design and implementation of 3bit synchronous up/down counter.

11. Implementation of SISO, SIPO, PISO and PIPO shift registers using flip-flops

Text Books:

1. M. Morris Mano and M. D. Ciletti, "Digital Design", 4th Edition, Pearson Education

2. Pedroni - Digital Electronics & Design, Elsevier

Reference Books:

1. F. Vahid: Digital Design: Wiley Student Edition, 2006

2. J. F. Wakerly, Digital Design Principles and Practices, Fourth Edition, Prentice-Hall, 2005.

3. R. L. Tokheim, Digital electronics, Principles and applications, 6th Edition, Tata McGraw Hill Edition.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE 406	Measurements & Instrumentation	3	0	2	4

Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Course Syllabi (Theory):

- **Introduction of Measurements and Theory of Error:** Significance of measurements, different methods of measurements, Instruments used in measurements, Elements of a Generalized Measurement System. Characteristics of instruments, Errors analysis, Types of Error, Significant figures.
- **Introduction of DC and AC Bridges:** Wheatstone Bridge, Kelvin Double Bridge, Maxwell's Bridge, and Hay's Bridge. Sources of errors in Bridges and their elimination by shielding and grounding.
- **Digital Instruments:** Advantages of digital over analogue processing. Techniques of converting Digital to Analogue (D/A) and Analogue to Digital (A/D). Digital Voltmeter.
- **Transducers:** Definition, Classification, Selection Criteria, Principle, Resistive Transducer (Strain Gauge, Thermistor and RTD), Capacitive, Piezoelectric, Thermocouple and Inductive, LVDT transducer, Application of above transducers.
- **Display Devices and Recorders:** Classification of display devices and systems. Cathode Ray Tube, LED, LCD and Recorders.

Course Syllabi (Practical):

- To study Anderson Bridge
- To Study Wien Bridge Oscillator trainer
- To study Maxwell's Capacitance & Inductance Bridge
- To study Solar Energy Trainer with built in Voltmeter & Ammeter.
- To study Ultrasonic transducer Trainer
- Displacement measurement using LVDT
- Temperature measurement using RTD, Thermistors, Thermocouple, Thermometers, Calibration.
- To study Bench top LCR meter
- Force measurement using Strain Gauges and Load Cells
- Measurement of earth resistance by fall of potential method
- To study the working of Spectrum analyzer and determine the bandwidth of different signals.

Text Books:

1. Cooper & Helfrick, "Modern Electronic Instrumentation and Measurement Techniques", PHI.

2. A.K.Sawhney, "A Course in Electrical and Electronics Measurements and Instrumentation", Dhanpat Rai & Sons

Reference Books:

1. H. S. Kalsi, "Electronic Instrumentation", TMH.
2. Thomas and Clark, "Handbook of Electronic Instruments and Measurement Techniques", PHI

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE 405	Engineering Materials and Processes	3	0	0	3

Evaluation Scheme (Theory)					
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks
20	20	40	10	10	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Course Syllabi (Theory):

- DIELECTRIC MATERIALS: Polarization phenomenon, spontaneous polarization, dielectric constant and loss, piezo and ferro electricity.
- MAGNETIC MATERIALS: Dia, para & ferromagnetism, ferro-ferrimagnetism; soft and hard magnetic materials and their applications.
- SEMI CONDUCTOR MATERIALS: Crystal growth, zone refining, Degenerate and non-degenerate semiconductors, Direct and indirect band gap semiconductors. Electronic properties of silicon, Germanium, Compound Semiconductor, Gallium Arsenide, gallium phosphide & Silicon carbide.
- CONDUCTIVE & SUPERCONDUCTIVE MATERIALS: Electrical properties of conductive and resistive materials. Important characteristics and electronic applications of specific conductor & resistance materials. Superconducting phenomenon, Type I and Type II superconductors and their applications.
- PASSIVE COMPONENETS & PCB FABRICATION: Brief study of fabrication methods of fixed and variable type of resistors; capacitors, Inductors, solenoid and toroid, air core, iron core and Ferro core conductors. Printed Circuit Boards – Types, Manufacturing of copper clad laminates, PCB Manufacturing process, Manufacturing of single and double sided PCBs. Surface mount devices – advantages & limitations.

Text Books:

1. Charles A. Harper, "Electronic Materials and Processes Handbook", Third Edition, McGraw-Hill

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE 407	Microwave Engineering-I	3	0	0	3

Evaluation Scheme (Theory)					
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks
20	20	40	10	10	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations /Mock Interviews/others

Course Syllabi (Theory):

- RF and microwave spectrum, historical background, application of RF and microwave, Behaviour of circuits at Conventional and microwave frequencies.
- Transmission structures and Resonators: Transmission Line equation, Characteristic impedance, losses in transmission line, reflection coefficient, standing wave ratio, Smith Chart, Impedance matching, Rectangular Waveguides – TE/TM mode analysis, Characteristic Equation and Cut-off Frequencies, Circular Waveguides- Nature of Fields, Characteristic Equation, Dominant and Degenerate Modes. Cavity Resonators– Introduction, Transmission cavity, Rectangular and Cylindrical Cavities, Dominant Modes and Resonant Frequencies, Q factor and Coupling Coefficients.
- Microwave Generators: Transit-time effect, Limitations of conventional tubes, Two-cavity and multi-cavity Klystrons, Reflex Klystron, TWT, Magnetrons.
- Microwave semiconductor devices: operation - characteristics and application of BJTs and FETs - Principles of tunnel diodes Transferred Electron Devices -Gunn diode- Avalanche Transit time devices- IMPATT and TRAPATT devices, MASER.
- Monolithic Microwave Integrated Circuits: Materials and fabrication techniques.

Text Books:

1. Microwave Engineering by David M. Pozar, WILEY India
2. Microwave Devices and Circuits by S.Y. Liao, Pearson

Reference Books:

1. Microwave Engineering by Annaparna & Sisir Das, McGraw Hill
2. Foundations for Microwave Engineering by Robert E. Collin, Wiley India.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MA 402	Numerical and Statistical Methods	3	0	2	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

- **Modeling, Computers, and Error Analysis**: Mathematical Modeling and solution using Programming and Software, Computer Arithmetic and Errors: Approximations and Round-Off Errors, Truncation Errors and the Taylor Series
- **Transcendental and polynomial equation**: Solution of non-linear Equations: Bisection Method, *Regula-falsi* Method, Secant Method, Newton Raphson Method
- **Linear Algebraic Equations**: LU Decomposition Method, Gauss Elimination Method, Gauss Jordan Elimination Method, Iterative methods for solving system of linear equations.
- **Interpolation and approximation**: Netwon Formula for forward and backward interpolation, Sterling Central difference interpolation, Lagrangian Interpolation
- **Numerical Differentiation and Integration**: Numerical Differentiation and Integration, Newton-Cotes Integration Formulae.
- **Ordinary Differential Equations**: Picard Method, Euler Method, Modified Euler Method, Runge-Kutta 4^{th} order Method, Milne Predictor-Corrector Method
- **Random Variables and probability distributions**: Introduction to probability, Discrete and continuous random variables, Probability Distributions: Binomial, Possion, Exponential, Normal distributions, Mathematical expectation, Chebyshev's inequality, Discrete and continuous probability distributions
- **Sampling distributions**: Sampling, Types of sampling, sampling errors, sampling distribution of means, variance and proportions for normal population, The Central Limit Theorem, Chi-Square, t and F distributions
- **Estimation**: Estimators, Point and interval estimation, confidence intervals for parameters in one sample and two sample problems of normal populations, confidence intervals for proportions
- **Testing of Hypotheses**: Null and alternative hypotheses, the critical and acceptance regions, two types of error, Parametric Tests, Chi-square goodness of fit test, Contingency tables.
- **Correlation and regression**: Types of Relationships, Scatter Diagrams, Regression Line, Coefficients of Determination and Correlation

Syllabus (Practical)

Numerical Methods using MATLAB and Statistical Analysis using SPSS in Computer Labs that includes:

1. Numerical solution of algebraic and transcendental equations.
2. Numerical solution of system of linear equations.
3. Interpolation.
4. Numerical differentiation.
5. Numerical integration.
6. Numerical solution of differential equations.
7. Data Analysis using Correlation and Regression

8. Test of Hypothesis

Text books and Reference books

1. K. E. Atkinson, *Introduction to Numerical Analysis*, John Wiley and Sons.
2. M.K. Jain, S. R. K. Iyengar, R. K. Jain, *Numerical Methods For Scientific And Engineering Computation*, New age International publishers, New Delhi.
3. Steven C Chapra, Raymond P Canale, *Applied Numerical Methods with MATLAB for Engineers and Scientists*, 3rd Editions, Tata Mc Graw Hill, New Delhi, 2012.
4. Srimanta Pal, *Numerical Methods: Principles, Analyses and Algorithms*, Oxford University Press, New Delhi.
5. Cheney and Kincaid, *Numerical Methods and Applications*, Cengage Publications, New Delhi.
6. Cleve B. Moler, *Numerical Computing with MATLAB*, Prentice Hall of India, New Delhi .
7. Rishard A. Johnson, *Miller and Freund's probability and Statistics for Engineers*, PHI, 8th Ed.
8. Ravichandran J., *Probaility and statistics for Engineers*, Wiley India, New Delhi.
9. Douglas C. Montgomery and George C. Runger, *Applied Statistics and Probability for Engineers*, John Wiley & Sons, Inc., 3rd Edition (2004).
10. Prem S. Mann, *Introductory Statistics*, Wiley publication, 7th edition.

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

4 Year B. Tech Programme

(Branch: Electronics & Communication Engineering)

Batch 2014-18

SEMESTER-FIVE

Detailed Syllabus

&

Scheme of Examination

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE501	Linear Integrated Circuits	3	0	2	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test – I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Course Syllabi (Theory):

- Operational Amplifiers: Op-amp Basics, Properties of Ideal Op-Amp, Inverting, Non-inverting, Summing, Difference amplifier, Voltage Follower, Current-to-Voltage Converter, and Characteristics of Practical Op-Amp, Effect of Non-ideal behavior on Op-Amp performance, Differentiator, Integrator, Exponential and logarithmic amplifier, Analog Multiplier, Precision Half wave and Full wave rectifiers, Clipper and Clamper, Peak Detector, Comparator and its applications, Schmitt Trigger.
- Active Filters: Low pass, high pass, band pass and band reject filters, all-pass filter, Switched capacitor filter, Butterworth filter design, Chebyshev Filter design.
- Phase Locked Loops:Operating Principles of PLL, Linear Model of PLL, Lock range, Capture range, Applications of PLL as FM detector, FSK demodulator, AM detector, frequency translator, phase shifter, tracking filter, signal synchronizer and frequency synthesizer, Building blocks of PLL, LM565 PLL.
- Analog to Digital and Digital to Analog Convertors: Analog switches, High speed sample and hold circuits and sample and hold ICs, Types of D/A converter, Current driven DAC, Switches for DAC, A/D converter-Flash, Single slope, Dual slope, Successive approximation, Delta Sigma Modulation, Voltage to Time converters.
- Special Function IC's: Four quadrant multiplier & its applications, Basic blocks of linear IC voltage regulators, Three terminal voltage regulators, Positive and negative voltage regulators, Frequency to Voltage converters, Voltage to Frequency converters, Tuned amplifiers, power amplifiers, Isolation Amplifiers, Video amplifiers, Fiber optic ICs and Opto-couplers.

Course Syllabi (Practical):

1. To study Op-Amp 741 characteristics and its various parameters from data sheet.
2. To study Op-amp based inverting and non-inverting amplifiers, voltage comparator and zero crossing detectors.
3. To study Op-Amp as scalar, summer and voltage follower.
4. To study Op-Amp as differentiator and integrator.
5. To design 1st order low pass and high pass active filters using Op-Amp 741.
6. To design Band Pass and Band reject Active filters using Op-Amp 741.
7. To design Oscillators using Op-Amp (i) RC phase shift (ii) Wien bridge at 1 kHz.
8. To design (i) Astable (ii) Monostable Multivibrators using IC-555 timer
9. To design Triangular & square wave generator using 555 timer.

10. To study operation of IC NE/SE 566 Voltage Controlled Oscillator and determine output frequency for various voltage levels.
11. To study Op-Amp based V to I and I to V converters.
12. To study a PLL circuit and determine the free running frequency.
13. To study Op-Amp based sample and hold circuit.
14. To design Schmitt trigger using op-amp.

Text Books:

1. Op-Amps and Linear Integrated Circuits, Ramakant A. Gayakwad, PHI Learning, 4th Edition.
2. Op-amp & Linear ICs, David A. Bell, Prentice Hall of India, 2nd Edition, 1997.

Reference Books:

1. Analysis and Design of Analog Integrated Circuits, Gray and Meyer, Wiley International, 1995.
2. Design with operational amplifiers and analog integrated circuits, Sergio Franco, McGraw-Hill, 1997.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE 502	Analog Communication	3	0	2	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Course Syllabi (Theory):

- **RANDOM PROCESS:** Random variables: Several random variables. Statistical averages: Function of Random variables, moments, Mean, Correlation and Covariance function: Principles of autocorrelation function, cross – correlation functions. Central limit theorem, Properties of Gaussian process.
- **AMPLITUDE MODULATION:** Introduction, AM: Time-Domain description, Frequency – Domain description. Generation of AM wave: square law modulator, switching modulator. Detection of AM waves: square law detector, envelop detector. Double side band suppressed carrier modulation (DSBSC): Time-Domain description, Frequency-Domain representation, Generation of DSBSC waves: balanced modulator, ring modulator. Coherent detection of DSBSC modulated waves. Costas loop.
- **SINGLE SIDE-BAND MODULATION (SSB):** Quadrature carrier multiplexing, Hilbert transform, properties of Hilbert transform, Pre-envelope, Canonical representation of band pass signals, Single side-band modulation, Frequency-Domain description of SSB wave, Time-Domain description. Phase discrimination method for generating an SSB modulated wave, Time-Domain description. Phase discrimination method for generating an SSB modulated wave. Demodulation of SSB waves.
- **VESTIGIAL SIDE-BAND MODULATION (VSB):** Frequency – Domain description, Generation of VSB modulated wave, Time - Domain description, Envelop detection of VSB wave plus carrier, Comparison of amplitude modulation techniques, Frequency translation, Frequency division multiplexing, Application: Radio broadcasting, AM radio.
- **ANGLE MODULATION (FM)-I:** Basic definitions, FM, narrow band FM, wide band FM, transmission bandwidth of FM waves, generation of FM waves: indirect FM and direct FM.
- **ANGLE MODULATION (FM)-II:** Demodulation of FM waves, FM stereo multiplexing, Phase-locked loop, Nonlinear model of the phase – locked loop, Linear model of the phase – locked loop, Nonlinear effects in FM systems.
- **NOISE:** Introduction, shot noise, thermal noise, white noise, Noise equivalent bandwidth, Narrow bandwidth, Noise Figure, Equivalent noise temperature, cascade connection of two-port networks.
- **NOISE IN CONTINUOUS WAVE MODULATION SYSTEMS:** Introduction, Receiver model, Noise in DSB-SC receivers, Noise in SSB receivers, Noise in AM receivers, Threshold effect, Noise in FM receivers, FM threshold effect, Pre-emphasis and De-emphasis in FM.

Course Syllabi (Practical):

1. Amplitude modulation and demodulation
2. DSB-SC Modulator & Detector
3. SSB-Sc Modulator & Detector (Phase Shift Method)
4. Frequency modulation and demodulation.
5. Study of spectrum analyzer and analysis of AM and FM Signals
6. Pre-emphasis & de-emphasis.
7. Time Division Multiplexing & De multiplexing
8. Frequency Division Multiplexing & De multiplexing
9. Verification of Sampling Theorem
10. Pulse Amplitude Modulation & Demodulation
11. Pulse Width Modulation & Demodulation
12. Pulse Position Modulation & Demodulation
13. Frequency Synthesizer.
14. AGC Characteristics.

Text Books:

1. Communication Systems, Simon Haykins, 3rd Edition, John Willey, 1996.
2. Modern digital and analog Communication systems B. P. Lathi, 3rd ed 2005 Oxford University press.

Reference Books:

1. An Introduction to Analog and Digital Communication, Simon Haykins, John Wiley, 2003.
2. Communication Systems, Harold P.E, Stern Samy and A Mahmond, Pearson Ed. 2004.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
CSE503	Computer Networks	3	0	2	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Course Syllabi (Theory):

- Introduction Concepts: Goals and Applications of Networks, Network structure and architecture, The OSI reference model, services, Network Topology Design - Delay Analysis, Back Bone Design, Local Access Network Design, Physical Layer Transmission Media, Switching methods, ISDN, Terminal Handling.
- Medium Access sub layer: Medium Access sub layer - Channel Allocations, LAN protocols - ALOHA protocols - Overview of IEEE standards - FDDI. Data Link Layer - Elementary Data Link Protocols, Sliding Window protocols, Error Handling.
- Network Layer: Network Layer - Point - to Pont Networks, routing, Congestion control Internetworking - TCP / IP, IP packet, IP address, IPv6.
- Transport Layer: Transport Layer - Design issues, connection management, session Layer- Design issues, remote procedure call. Presentation Layer-Design issues, Data compression techniques, cryptography - TCP - Window Management.
- Application Layer: Application Layer: File Transfer, Access and Management, Electronic mail, Virtual Terminals, Other application. Example Networks - Internet and Public Networks.

Course Syllabi (Practical):

1. Packet transmission – packetization of data, simple point-to-point communication.

2. MAC Layer – Observe and measure the performance of various MAC Layer protocols by changing the network load, distance between the nodes wherever applicable and compare them:

- BUS Topology:
  - ALOHA: Exposure to multiple access to a shared medium, throughput vs offered load
  - CSMA: Throughput vs offered load for various node distances in the form of bit delays
  - CSMA/CD: Throughput vs offered load, packet delay vs throughput at various loads
  - Token-Passing BUS: Demand assignment when compared to random access protocols, packet delay vs throughput – comparison with CSMA/CD
  - CSMA/CA: DCF mode operation – Throughput vs offered load – comparison with CSMA/CD performance
- RING Topology:

- Token Ring: Throuhgput vs average packet delay at various loads and timeout values, performance comparison with CSMA/CD

3. DLL: Observe and measure the performance of various DLL protocols by changing the network load, various timeout period, introducing bit errors and compare them

- Stop-and-Wait: Throughput vs BER for different packet lengths and timeout values
- Sliding Window – Go-Back-N: Pipelining concept – throughput vs BER for different packet lengths and timeout values – comparison with Stop-and-Wait
- Sliding Window – Selective-Repeat: Pipelining with selective re-transmissions concept – throughput vs BER for different packet lengths and timeout values – comparison with Go-Back-N

4. Network Layer: Study of Routing Protocols

- Distance Vector routing: Hop-by-hop routing, routing table updation, count-to-infinity problem exposure
- Link State routing: Routing table updation, effect of shortest path algorithm, comparison with DV routing

5. Application Layer:

- File transfer using sockets: TCP connection establishment, session management

6. Serial/Parallel port networking: Simple network connectivity using serial and parallel ports in a PC, setup TCP/IP communication through PPP.

7. Data security in computer networks:

- Data protection: RC4 symmetric stream cipher-key generation, encryption-decryption steps
- Network threat: Sniffing of raw data and encrypted data in a LAN

8. STAR Topology (Optional):

- ALOHA, CSMA, CSMA/CD, Stop & Wait and Sliding Window GBN protocols performance in STAR topology
- Switching in LAN: Switching at Layer 2, self-learning using Baran's backward learning algorithm

Text Books:

1. Forouzen, "Data Communication and Networking", TMH

2. A.S. Tanenbaum, Computer Networks, Pearson Education

3. W. Stallings, Data and Computer Communication, Macmillan Press

4. Anuranjan Misra, "Computer Networks", Acme Learning

5. G. Shanmugarathinam, "Essential of TCP/ IP", Firewall Media

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE505	Engineering Signals & Systems	3	1	0	4

Evaluation Scheme (Theory)					
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks
20	20	40	10	10	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Mock Interviews/others

Course Syllabi (Theory):

- **Introduction:** Continuous time and discrete time systems, Properties of systems. Linear time invariant systems - continuous time and discrete time. Properties of LTI systems and their block diagrams. Convolution, Discrete time systems described by difference equations.
- **Fourier Series Representation Of Signals:** Fourier series representation of continuous periodic signal & its properties, Fourier series representation of Discrete periodic signal & its properties, Continuous time filters & Discrete time filters described by Diff. equation.
- **Fourier Transform:** The continuous time Fourier transform for periodic and aperiodic signals, Properties of CTFT. Discrete time Fourier transform for periodic and aperiodic signals. Properties of DTFT. The convolution and modulation property.
- **Laplace and Z-Transform:** Laplace transform, Properties of Laplace Transform, Application of Laplace transform to system analysis. Introduction and the region of convergence of the Z-transform. The Inverse Z-transform. Properties of Z transform.
- **Sampling:** Mathematical theory of sampling. Sampling theorem. Ideal & Real sampling. Interpolation technique for the reconstruction of a signal from its samples. Aliasing. Sampling in freq.domain. Sampling of discrete time signals..

Text Books:

1. Signals and Systems by Tarum Kumar Rawat, Oxford.

Reference Books:

1. Signals And Systems by Oppenhiem Willsky- Nawabi, PHI
2. Linear Systems and Signals by B.P.Lathi, Oxford

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE 501	Linear Control Systems	3	1	2	5

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Syllabus (Theory)

UNIT I

INTRODUCTION TO CONTROL SYSTEM: Open loop and closed loop systems, examples, components of control systems, types of control systems, concept of feedback, positive and negative feedback.

MATHEMATICAL MODELING OF PHYSICAL SYSTEMS: Modeling of physical systems such as mechanical, electrical, thermal and chemical systems, analogous systems, concept of transfer function, poles, zeros, order and type of the system, computation of overall transfer function, block diagram reduction techniques, signal flow graphs.

UNIT II

TIME RESPONSE ANALYSIS: Standard test signals, transient and steady state response of first and second order systems, time response specifications, types of systems, steady state error and error constants. Basic control action and automatic controllers, Effect of PI, PD and PID controllers on system performance.

UNIT III

STABILITY ANALYSIS OF CONTROL SYSTEMS: Notations of stability, Necessary conditions for stability, Routh-Hurwitz stability criterion, Relative stability, Basic properties of root locus, rules to construct root locus, stability analysis using root locus.

UNIT IV

FREQUENCY DOMAIN ANALYSIS: Introduction to frequency response, frequency domain specifications, stability analysis using Bode plots, stability analysis using Polar and Nyquist plots.

UNIT V

INTRODUCTION TO STATE SPACE: Concept of state, state variables, state space modeling, conversion of state space equations to transfer function, solution of state equation, controllability and observability.

DESIGN AND COMPENSATION: Design consideration of control system, lead, lag, lead-lag compensation, Design of compensating network using bode plots and root locus.

Syllabus (Practical)

1. Introduction to MATLAB Computing Control Software.
2. For a given 2^{nd} order system plot step response and obtain time response specification.
3. Defining Systems in TF, ZPK form.
   (a) Plot step response of a given TF and system in state-space. Take different values of damping ratio and w_n natural undamped frequency (b) Plot ramp response.
4. To design 1st order R-C circuits and observes its response with the following inputs and traces the curve.
   - Step
   - Ramp
   - Impulse
5. To design 2^{nd} order electrical network and study its trarient response for step input and following cases.
   - Under damped system
   - Over damped System.
   - Critically damped system
6. To Study the frequency response of following compensating Networks, plot the graph and final out corner frequencies.
   Log Network
   Lead Network
   Log-lead Network.
7. To perform experiment on Potentiometer error detector.
8. To draw characteristics of a.c servomotor
9. Plot bode plot for a 2nd order system and find GM and PM..

Text Book(s)

1. I J Nagrath and M Gopal: Control Systems Engineering, 3rd Ed, New Age Publication.
2. B C Kuo: Modern Control Engineering, , New Age Publication
3. Katsuhiko Ogata, "Modern Control Engineering", PHI Learning Pvt. Ltd., New Delhi

Reference Book(s)

1. Robert H Bishop : Modern Control Systems, Boyd and Fraser pub
2. Norman S.Nise, "Control System Engineering", John Wiley & Sons.
3. Gene F. Frankline, J. David Powell, Abbas Emami-Naeini, "Feedback Control of Dynamic Systems", Pearson Education Inc., 2006

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
MA 502	Optimization Techniques	3	1	0	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test – I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks
20	20	40	10	10	100	-	-	-	-	-

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

- **Introduction:** Introduction to Optimization and its scope, Formulating a Mathematical Model, Deriving Solutions from the Model
- **Linear Programming Problems:** Revised Simplex Method, Duality Theory and Sensitivity Analysis, Dual Simplex Method, Transportation Problem, Assignment Problem
- **Non-linear Programming:** Introduction, Single variable and multi variable optimization, Constrained and unconstrained problems, Kuhn-Tucker conditions
- **Other Optimization Models:** Dynamic Programming, Game Theory, Project Management with CPM/PERT
- **Simulations:** Simulation V/s mathematical modeling, Monte Carlo simulation, simulation language, ARENA, Example & cases
- **Queuing Theory**: Basic structure of queuing models, role of the exponential distribution, The birth and death processes, queuing models based on birth and death processes (M/M/1 Model)
- **Inventory Theory**: Components of inventory models, deterministic continuous review models
- **Sequencing Theory:** Johnsons Algorithm for n Jobs and Two machines, n Jobs and Three Machines, Two jobs and m Machines Problems

Text books and Reference books

1. S S Rao, *Engineering Optimization: Theory and Practices*, New Age International, 1996.
2. Hillier F.S. and Lieberman G.J., *Introduction to Operations Research: Concepts and Cases*, Tata McGraw Hill, 8th Ed., (Indian Adapted Edition), 2005.
3. Taha. H. A, *Operations Research: An Introduction*, Pearson Education, 7th ed., 2003.
4. Ronald L. Rardin, *Optimization in Operations Research.* Pearson Education, First Indian Reprint 2002.
5. Pant.J.C., *Introduction to Optimization: Operations Research*, Jain Brothers, 5th Ed., 2000.
6. Sharma. S. D., *Operations Research*, Kedarnath Ramnath & Co., 15th Edition, 2006.
7. Kalyanmoy Deb, *Optimization for Engineering Design: Algorithms and Examples*, PHI.
8. Kasana H.S. and Kumar K.D., *Introductory Operations Research: Theory and Applications*, Springer.

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

4 Year B. Tech Programme

(Branch: Electronics & Communication Engineering)

Batch 2014-18

SEMESTER-SIX

Detailed Syllabus

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Scheme of Examination

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE601	Microwave Engineering-II	3	0	2	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test – I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Course Syllabi (Theory):

- **Microwave network theory and passive devices:** Scattering matrix -Concept of N port scattering matrix representation-Properties of S matrix- S matrix formulation of two-port junction. Power divider,Microwave junctions -Tee junctions -Magic Tee - Rat race - Corners - bends and twists - Directional couplers -two hole directional couplers- Ferrites - important microwave properties and applications– Termination - Gyrator- Isolator-Circulator - Attenuator - Phase changer – Micro strip Transmission line (TL), Coupled TL, Strip TL, Coupled Strip Line, Coplanar TL.
- **Microwave Antennas:** Directional characteristics of antennas. Dipole, folded dipole and Yagi antenna, Broadband, Antenna arrays, Horn antennas.Parabolic antenna, Lens antenna.
- **RF and Microwave propagation**:Ground, Space and Sky wave propagation.
- **Applications of microwave:** Radar systems, Satellite Communication System, Industrial Applications.
- **Microwave Measurements:** Power measurement; Calorimeter method, Bolometer bridge method, thermocouples, Impedance measurement, Measurement of frequency and wavelength, Measurement of unknown loads, Measurement of reflection coefficient, VSWR and Noise.

Course Syllabi (Practical):

1. VSWR meter
2. The Slotted Line(waveguide hardware, measurement of SWR, λg, impedance)
3. The Vector Network Analyzer(one- and two-port network analysis, frequency response)
4. The Gunn Diode(the spectrum analyzer, power meter, V/I curve, mixers)
5. Impedance Matching and Tuning(stub tuner, λ/4 transformer, network analyzer)
6. Cavity Resonators(resonant frequency, Q, frequency counter)
7. Directional Couplers(insertion loss, coupling, directivity)

Text Books:

1. Microwave Engineering by David M. Pozar, WILEY India
2. Microwave Devices and Circuits by S.Y. Liao, Pearson

Reference Books:

1. Microwave Engineering by Annaparna & Sisir Das, McGraw Hill
2. Foundations for Microwave Engineering by Robert E. Collin, Wiley India.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE602	Digital Communications	3	0	2	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Course Syllabi (Theory):

- **Elements of Digital Communication Systems :** Elements of Digital Communication Systems: Model of Digital Communication Systems, Digital Representation of Analog Signal, Certain issues in Digital Transmission, Advantages of Digital Communication Systems, Bandwidth-S/N tradeoff,bHartley Shannon Law, Sampling Theorem
- **Pulse Code Modulation:** Pulse Code Modulation: PCM Generation and Reconstruction, Quantization noise, Non uniform Quantization and Companding, DPCM, Adaptive DPCM, DM and Adaptive DM. Noise in PCM and DM.
- **Digital Modulation Techniques:** Digital Modulation Techniques: Introduction, ASK,ASK Modulator, Coherent ASK Detector, Non-Coherent ASK Detector, FSK, Bandwidth and Frequency Spectrum of FSK. Non coherent FSK Detector, Coherent FSK Detector, FSK Detection Using PLL, BPSK, Coherent PSK Detection, QPSK, Differential PSK.
- **Baseband transmission and Optimal Reception of Digital Signal:** Baseband transmission and Optimal Reception of Digital Signal: Pulse shaping for optimum transmissions. A Baseband Signal Receiver, Probability of Error. Optimum Receiver, optima! of Coherent Reception. Signal Space Representation and Probability of Error, eye diagrams, Cross talk.
- **Spread Spectrum Modulation:** Spread Spectrum Modulation: Use of Spread Spectrum, Direct Sequence Spread Spectrum (DSSS), Code Division Multiple Access, Ranging using DSSS.
- Frequency Hopping Spread Spectrum, PN - sequences: Generation and Characteristics. Synchronization in Spread Spectrum Systems.

Course Syllabi (Practical):

1. Pulse Amplitude Modulation and demodulation.
2. Pulse Width Modulation and demodulation.
3. Pulse Position Modulation and demodulation.
4. Sampling Theorem – verification.

5. Time division multiplexing.

6. Pulse code modulation.

7. Differential pulse code modulation.

8. Delta modulation.

9. Frequency shift keying.

10. Phase shift keying .

11. Differential phase shift keying.

Text Books:

1. Principles of communication systems - Herbert Taub. Donald L Schiling, Goutam Sana, 3rdEdition, McGraw-Hill, 2008.
2. Digital and Analog Communicator Systems - Sam Shanmugam, John Wiley, 2005.

Reference Books:

1. Digital Communications - John G. Proakis .Masoudsalehi – 5th Edition, McGraw-Hill, 2008.
2. Digital Communication - Simon Haykin, Jon Wiley, 2005.D
3. Communications - Ian A. Glover, Peter M. Grant, Edition, Pearson Edu.
4. Communication Systems-B.P. Lathi, BS Publication, 2006

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE603	Digital Signal Processing	3	1	2	5

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Course Syllabi (Theory):

- **Sampling:** Basic elements of digital signal Processing–Concept of frequency in continuous time and discrete time signals –Sampling theorem –Discrete time signals.
- **Frequency domain analysis:** Discrete Time Fourier Transform (DTFT) and Discrete Fourier Transform (DFT), Periodic convolution, Direct evaluation of DFT, FFT algorithms- decimation in time and frequency, Relationship between Fourier and Z-transforms.
- **Digital filter Structures:** Direct form I & II, cascade form, parallel form, Signal flow graphs.
- **Filter Function Approximations and Transformations:** Review of approximations of ideal analog filter response, Butterworth filter, Chebyshev Type I & II.
- **Design of FIR Digital filters:** Symmetric and anti-symmetric FIR filters, design of linear phase FIR filters using windows and frequency– sampling methods, design of optimum equiripple linear phase FIR filters, comparison of FIR and IIR filters.
- **Design of IIR Digital Filters:** Design based on analog filter approximations, Impulse invariance method, Matched Z-transformation, Bilinear transformation.

Course Syllabi (Practical):

1. Generation of continuous and discrete elementary signals (periodic and non-periodic) using mathematical expression.
2. Generation of Exponential and Ramp signals in Continuous & Discrete domain.
3. Continuous and discrete time Convolution
4. Adding and subtracting two given signals. (Continuous as well as Discrete signals)
5. Circular Convolution
6. To generate random sequences with arbitrary distributions, means and variances for following :
    - Rayleigh distribution
    - Normal distributions: N(0,1)
    - Gaussion distributions: N (m_x, σ_x^2)
7. Power Spectral Density of a sinusoidal signals
8. MATLAB program to generate sum of sinusoidal signals
9. MATLAB program to find frequency response of analog(LP/HP)
10. To design and simulate FIR digital filter (LP/HP).

11. To design and simulate IIR digital filter (LP/HP).

Text Books:

1. Oppenheim, Buck, Schafer, "Discrete-Time Signal Processing", Pearson Education.
2. Proakis & Manolakis, "Digital Signal Processing: Principles, Algorithms, and Applications", Pearson Education.
3. Rabiner & Gold, "Theory and applications of DSP", PHI.

Reference Books:

1. Antonious, "Digital Filter Design", Mc-Graw-Hill International Editions.
2. De Fatta, Lucas & Hodgkiss, "Digital Signal Processing", WILEY India.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE604	Electronic Circuit Design	3	0	2	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Course Syllabi (Theory):

Several objectives are implicit to an engineering analysis of an integrated circuit proposed for design and ultimate monolithic fabrication.

- First, the analysis must be analytically insightful; that is, it must inspire a fundamental understanding of the electrical dynamics implicit to the network undergoing investigation.
- Second, the understanding that accrues from engineering analysis must forge innovative new network topologies or, at a minimum, optimization guidelines for existent networks that reinforce circuit attributes and circumvent serious circuit performance limitations.
- Third, analysis must reveal parametric sensitivities that impact circuit reliability and manufacturing reproducibility.
- An analysis that achieves the foregoing objectives invariably mandates the use of approximate models of devices embedded in the network undergoing study. But the understanding that accrues from computationally efficient, albeit approximate, manual analyses pave the way toward efficient and meaningful computer-aided investigations of the actual circuits proposed for design.
- Such understanding, complemented by the technical illumination afforded by high order network simulations, is a prerequisite to the reliable, reproducible, and cost effective design of high performance integrated circuits.

Course Syllabi (Practical):

1. Introduction to Electronic Devices
2. Types of Breadboards and their applications
3. Use of Operational amplifiers on breadboard
4. Use of LM 555 versatile timer for different applications
5. Printed Circuit Boards and fabrication techniques
6. Soldering Techniques
7. Use of intelligent instruments
8. Data acquisition and control
9. Applications of microcontrollers for industrial automation

Text Book

1. Nihal Kularatna, Electronic Circuit Design, CRC Press, Taylor and Fransis, 1st ed., 2008.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE622	Microprocessors & Interfacing	3	0	2	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Course Syllabi (Theory):

- Revision of logic circuits with emphasis on control lines, SAP concepts with stress on timing diagrams, Microinstructions, Microprogramming, Variable machine cycle, Architecture of 8085 Processor , Functions of all signals, Bus concepts, Multiplexed and De-multiplexed Bus, Minimum system.
- Instruction set, Addressing modes, Stack operation, Timing diagrams, Programming examples like Time delay, Looping, Sorting, Code conversions like BCD to Binary, Binary to BCD, HEX to ASCII, ASCII to HEX, BCD Arithmetic etc.
- 8085 based Microcomputer system, Memory Organization, Memory Interfacing, Memory Mapped I/O, I/O Mapped I/O, Interrupts, Hardware and Software Interrupts, Interrupt instructions, Programmed I/O, Interrupt driven I/O, DMA.
- Architecture of 8255 I/O peripheral chip, Modes of operation, Hand shake mode operation, BSR mode, ADC 0801 and ADC 0808 Interfacing with microprocessor, Analogue multiplexed ADC, DAC 0808 specifications, DAC Interfacing.
- 8253 timer, Modes of operation, Applications, 8279 Keyboard/Display Interface, Different modes of operation, Interfacing, Programming examples, 8237 DMA Controller.
- Introduction to Microcontrollers, 8051 Microcontroller, Memory Organization, Programming techniques, Addressing modes, Instruction set, Interrupt structure, Port structure, Different modes of operation, Programming examples.

Course Syllabi (Practical):

1. Familiarization with 8085 register level architecture and trainer kit components, including the memory map. Familiarizationwiththeprocessofstoringandviewingthecontentsofmemoryaswellas registers.
2. Study of prewritten programs on trainer kit using the basic instruction set (data transfer, Load/Store, Arithmetic, Logical)
3. Transfer of a block of data in memory to another place in memory in the direct and reverse order.
4. Searching a number in an array and finding its parity.

5. Serial and Parallel data transfer on output port 8155 & 8255 & designing of disco light, running light, and sequential lights on off by above hardware.
6. Generation of different waveform on 8253/ 8254 programmable timer.
7. Program using subroutine calls and IN/OUT instructions using 8255 PPI on the trainer kit eg, subroutine for delay, reading switch state & glowing LEDs accordingly, finding out the frequency of a pulse train etc
8. Interfacing any 8 bit Latch (eg,74LS373) with trainer kit as a peripheral mapped output port with absolute address decoding.

Text Books:

1. Ramesh S. Gaonkar, "Microprocessor Architecture, programming and applications with the 8085", Penram International
2. Muhammad Ali Mazidi, "The 8051 Microcontroller and embedded systems, Pearson Ed.
3. S. K. Venkata Ram, "Advanced Microprocessors and Microcontrollers", McGraw Hill.

Reference Books:

1. Uffenbeck, John, "Microcomputers and Microprocessors", PHI.
2. Douglas Hall, "Microprocessor and Interfacing, Programming of Hardware",McGraw Hill.
3. Krishna Kant, "Microprocessors and Microcontrollers", PHI.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE624 (Elective-I)	Industrial Instrumentation & Control	3	1	2	5

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test – I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Course Syllabi (Theory):

- Introduction to process control;
- Elements of process loop;
- Controller principle;
- Hydraulic, pneumatic, electronic controllers;
- Controller tuning; Final control elements;
- Control loop characteristics;
- Complex control systems;
- Intelligent controllers;
- Programmable logic controllers;
- Distributed control systems;
- Digital control principles

Course Syllabi (Practical):

1. Introduction to PLC Laboratory
2. DC Motor START and STOP Control
3. Use of Counters for DC Motor Control
4. Use of TON, TOF and RTO for Motor Control
5. Sequential control of devices
6. Direction and Position Control of Electrical Machines
7. PID Control
8. Use of Human Machine Interface for Process Health Monitoring
9. Stepper Motor Control
10. Star Delta Motor Starter using PLC

Text Book :

2. Surekha Bhanot, *Process Control : Principles and Applications,* Oxford University press, Fourth Impression 2010

Reference Book :

1. C.D. Johnson, *Process Control Instrumentation Technology*, Prentice Hall of India, New Delhi , 1993
2. Liptak B.G., *Process Control : Instrument Engineer's handbook,* Butterworth Heinemann

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE625 (Elective-I)	Virtual Instrumentation	3	1	2	5

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test – I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Course Syllabi (Theory):

- Historical perspective, advantages,
- Block diagram, Architecture o f a Virtual Instrument,
- Data Flow Techniques, Graphical programming in data flow, comparison with Conventional programming.
- VIs and sub-VIs, loops and charts, arrays, clusters and graphs, case and sequence structures,formula nodes, local and global variables, string and file I/Os, ADC, DAC, DIO, counters & timers,
- PC Hardware structure, timing, Interrupts DMA, software and hardware installation.
- Fourier transforms, power spectrum, correlation methods, windowing & filtering.
- VI applications in various fields –Biomedical engineering, optical engineering, remote testing of instruments, aerospace engineering.

Course Syllabi (Practical):

1. Introduction in LabVIEW (front panel, diagram block)
2. Programming structures
3. Data Structures
4. Strings, files, nodes
5. Creating Virtual Instruments
6. Analogic Signals acquisition
7. Signals generation
8. Graphics

Text Book :

1. Jerome, Jovitha, "Virtual Instrumentation and LABVIEW", PHI Learning, New Delhi, 1st Edition, 2010.
2. Gupta, "Virtual Instrumentation Using Lab View", Tata McGraw Hill, New Delhi,1st Edition, 2008.

Reference Book :

1. Ronald W. Larsen, "LabVIEW for Engineers", Prentice Hall Ltd, USA Jan 2010.
2. LabVIEW: Basics I & II Manual, National Instruments, 2005.
3. Sanjay Gupta and Joseph John, " Virtual Instrumentation using LabVIEW", TataMc Graw – Hill Publishing Company Limited, New Delhi, 1st Edition, 2005.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
EE603 (Elective-I)	Industrial Electronics	3	1	2	5

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test – I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Course Syllabi (Theory):

UNIT I

INTRODUCTION TO SOLID STATE POWER DEVICES & OPERATION : SCR, G.T.O., Power transistor, Classification of SCR triggering methods, design and operation of triggering circuits, commutation methods, pulse transfer and isolation scheme, protection of power devices. Series & parallel operation of SCRs.

UNIT II

PHASE CONTROLLED CONVERTERS: Single phase uncontrolled, half-controlled and fully controlled converters. Three-phase half-controlled and full controlled bridge converters.

UNIT III

CHOPPERS: Principle of operation of chopper, types of choppers (single, two and four quadrant choppers), various commutation methods, and voltage commutated chopper and current commutated choppers, Principle of cycloconverter operation, single phase to single phase cycloconverter circuit

UNIT IV

REGULATORS: Single phase A.C. Regulators-different circuit configurations and their operation.

INVERTERS: Voltage & current source inverters, single phase half bridge and full bridge inverter with resistive load and inductive load, concept of feedback diode, three phase bridge inverters. Basics of PWM inverters.

CYCLOCONVERTERS: Three-phase to single-phase and three-phase to three phase configurations.

Syllabus (Practical)

1. Determine V-I characteristics of SCR and measure forward breakdown voltage, latching and holding currents.
2. Find V-I characteristics of TRIAC and DIAC
3. Find transfer and output characteristics of MOSFET and IGBT
4. Find output characteristics of MOSFET and IGBT
5. Study and test firing circuits for SCR-R, RC and UJT firing circuits.

6. Study and test 3-phase diode bridge rectifier with R and RL loads. Study the effect of filters
7. Study and obtain waveforms of single-phase half wave controlled rectifier with and without filters. Study the variation of output voltage with respect to firing angle
8. Study and obtain waveforms of single-phase half controlled bridge rectifier with R and RL loads. Study and show the effect of freewheeling diode.
9. Study and obtain waveforms of single-phase full controlled bridge converter with R and RL loads.
10. Study Control the speed of a dc motor using single-phase half controlled bridge rectifier and full controlled bridge rectifier. Plot armature voltage versus speed characteristics

Text Book(s)

1. Bimbhra.P.S. "Power Electronics" Khanna Publisher.
2. Singh .M.D. & Khanchandani K.B. "Power Electronics" Tata McGraw Hill
3. Sen. P.C. "Power Electronics", Tata McGraw Hill

Reference Book(s)

1. M. Ramamurthy: An Introduction to Thyristors and their Applications, East West Press Pvt Ltd.
2. Mohammad H. Rashid : Power Electronics Circuits, Devices and Applications, Prentice Hall of India Pvt Ltd.

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

4 Year B. Tech Programme

(Branch: Electronics & Communication Engineering)

Batch 2014-18

SEMESTER-SEVEN

Detailed Syllabus

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Scheme of Examination

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE701	Antenna & Wave Propagation	3	0	2	4

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

**The ratio of weightage between Theory and Practical content will be 60%: 40%

Course Syllabi (Theory):

- **Electromagnetic Radiation:** Radiation from a current element in free space, Quarter and half wave antenna.
- **Fundamentals of Antennas:** Patterns, Beam area, Radiation intensity, Gain, Beam width & Directivity, Efficiency, Polarization, Effective length & aperture, Antenna temperature, Bandwidth, Impedance, Reciprocity Theorem
- **Linear wire antennas and other basic Radiators:** Effect of ground on antennas, Resonant & non-resonant antennas, Long wire, Loop, Helical, Horn, Slot, Patch(Microstrip), Surface wave & Leaky wave-antennas
- **Antenna Arrays:** Two-element array, N-element linear arrays, Broadside, end fire, collinear & combinational arrays, multiplication of patterns, binomial arrays, Long-wire arrays, Horn and slot arrays, Phased arrays
- **Reflector antennas and Lens antennas:** Focusing and collimation, Feed radiators, Plane, Corner, Parabolic and Cassegrain-reflectors, Real dielectric and artificial dielectric lenses, Delay lens, E-plane & H-plane Metal plate lens, Luneberg lens
- **Broadband and Frequency independent Antennas:** Broadband principle, Biconical antennas, Folded dipoles, Superturnstile antenna, Frequency independent(log periodic) antenna
- **Radio Wave propagation:** Mechanism, Reflection, refraction, interference and diffraction of radio waves, Ground, Space and Sky wave propagation
- **Antenna Measurements:** Basic concepts, Sources of errors, measurement ranges, measurement of different antenna parameters.

Course Syllabi (Practical):

1. Measurement of antenna characteristics: Radiation Pattern on polar plots, Beam width and Gain of main lobe for the following types of antennas.
    - Half wave and quarter wave dipole
    - Folded dipole
    - Yagi Uda
    - Hertz Antenna
    - End fire array and broad side array
    - Helix antenna
    - Paraboloid reflector antenna
    - Loop antenna
    - Ground plane antenna
    - Log periodic antenna
    - Rhombus antenna
    - Slot antenna
2. Demonstration of modeling of wire antenna using appropriate design software.
3. Simulation of antenna arrays using appropriate software.
4. Design and testing of microstrip rectangular patch antenna using appropriate software.
5. Investigate the transmission characteristics of the link and measure the gain of the microstrip patch antennas. Draw the antenna radiation diagram.
6. Radar Trainer: Working of Doppler radar, velocity of moving object, time and frequency measurement and other applications.
7. To establish analog/digital communication link and transmit & receive three signals (audio, video, tone) simultaneously using Satellite Communication Trainer.
8. Antenna characteristics using anechoic chamber.

Text Book(s)

1. Kraus & Mahefka, "Antenna and Wave Propagation", WILEY India.
2. C. A. Balanis, "Antenna and Wave Propagation", WILEY India.

Reference Book(s)

1. GSN Raju, "Antenna and Wave Propagation", Pearson India.
2. R L Yadava, "Antenna and Wave Propagation", PHI.
3. Collin R., "Antennas and Radiowave Propagation", McGraw Hill.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE702	Wireless Communication	3	0	0	3

Evaluation Scheme (Theory)					
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks*
20	20	40	10	10	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

- Overview, history and evolution of Wireless communication systems, 2G cellular networks, 2.5G, 3G systems, WLANS /PANS.
- Frequency reuse, Channel assignment, handoff, interference and system capacity, Large Scale propagation & models, Small scale fading and multipath.
- Overview of modulation techniques and their performance in fading and multipath channels, Review of Spread Spectrum techniques and performance in fading channels, Survey of equalization techniques and Equalizers, Polarization frequency, time and space diversity.
- FDMA, TDMA, CDMA and Packet Radio, RF system design and link analysis, Overview of the GSM and CDMA cellular systems.
- Wireless LAN: 802.11x standards and Hyper-LANs, DECT & PACS, Bluetooth, Multicarrier modulations, OFDMA and security issues.

Text Book(s)

1. Wireless Communication Principles and Practice, Theodore S. Rappaport, Second Edition, Pearson Education, 2002.
2. Mobile Communication, Jochen H. Schiller, Pearson Education., 2000.

Reference Book(s)

1. Digital Communications, Bernard Sklar, 2nd Edition, Pearson Education, 2001
2. Mobile Cellular Telecommunications, Lee, 2nd Edition, McGraw Hill, 1995.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE703	Optical Fiber Communication	3	0	0	3

Evaluation Scheme (Theory)					
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks*
20	20	40	10	10	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

- Introduction to Optical Communication- Basic optical laws and definitions, Principles of light propagation in fibers, Ray theory, Optical fiber modes and configurations, Step index and graded index fibers, Monomode and multimode fibers, Fiber materials, fiber fabrication, Fiber optic cables. Attenuation, signal distortion in optical fibers, Dispersion-intra modal & inter modal, Dispersion shifted and flattened fiber.
- Optical Sources- LED's- Structure, Materials, Characteristics, Modulation, Power & efficiency, Laser Diodes - Basic concept, Hetro Structure, properties and modulation.
- Optical Detectors - PIN and Avalanche photo diodes, photo detector noise, detector response time, Avalanche multiplication noise. Photo diode materials. Fundamental of Optical Receiver Operation.
- Optical Fiber Communication Systems- Source to fiber coupling, fiber to fiber joints, fiber splicing, fiber connectors. Principal components. Link design calculation, Applications, Wavelength division multiplexing.
- Optical Fiber Measurements- Measurements of Fiber attenuation, Dispersion, refractive index profile, NA & diameter

Text Book(s)

1. Keiser Gerd, "Optical Fiber Communications", Tata McGraw-Hill, Fourth edition 2008.
2. John M. Senior, "Optical Fiber Communication: Principle and Practice", Pearson.

Reference Book(s)

1. Ghatak A.K. and Thyagarajan, "Optical electronics", Cambridge University Press 1991.
2. Gowar J.,"Optical Communication Systems', PHI, second edition, 1993.
3. Khare R.P, "Fiber Optics and Optoelectronics", Oxford University Press 2004.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
HS 701	Principles of Economics	3	0	0	3

Evaluation Scheme (Theory)					
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks*
20	20	40	10	10	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations /Mock Interviews/others

Course Syllabi (Theory):

- Definition of Economics and role of economics in Engineering and Technology; Basic economic terms; The economy, working of an economy, kinds of an economy and its basic problems; Laws of Demand and Supply and market Equilibrium; Elasticity of demand its measurements and application, Production function and law of Variable Proportion and Law of Returns to Scale; Concepts of cost and revenue, short run and long run cost function; Profit maximization hypothesis, Price and output determination under Perfect Competition, Monopolistic competition and Monopoly.
- Measurement of macroeconomic aggregates, National Income, Consumption, saving and investment function; Macroeconomic issues: Inflation, Unemployment and Economic growth International aspects of macroeconomics; Foreign Exchange rate and Balance of payments.

Text Books:

1. T.R. Jain and M.L. Grover, "Economics for Engineers", V. K. (India) Enterprises

Reference Books:

1. D N Dwivedi "Principles of Economics", Vikas Publishing House Pvt Ltd.
2. G. Mankiew. Economics Principles and Applications. Cengage Learning

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE722 (Elective-II)	Biomedical Engineering	3	0	0	3

Evaluation Scheme (Theory)					
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks*
20	20	40	10	10	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

1. PHYSIOLOGY OF SYSTEMS AND ELECTRODES: Brief description of neural, muscular, cardiovascular and respiratory systems; their electrical, mechanical and chemical activities. Biopotential electrode, Active & passive transducers, Biochemical transducers. Resting & action potential, Polarization & depolarization, Propagation & action potential, Bioelectronic potential.
2. CARDIOVASCULAR SYSTEM MEASUREMENTS: Measurement of blood pressure, blood flow, cardiac output, cardiac rate, heart sounds, Electrocardiograph, phonocardiograph, Plethysmograph, Echocardiograph.
3. INSTRUMENTATION FOR CLINICAL LABORATORY: Measurement of pH valve of blood, ESR measurement, hemoglobin measurement, O_2 and CO_2 Concentration in blood, GSR measurement.
4. MEDICAL IMAGING: Diagnostic X-rays, CAT, MRI, thermography, Ultrasonography, medical use of isotopes, endoscopy.
5. PATIENT CARE, MONITORING AND SAFETY MEASURES: Elements of Intensive care monitoring basic hospital systems and components, physiological effect of electric current shock hazards from electrical equipment, safety measures, Standards & practices.
6. THERAPEUTIC DEVICES AND BIOTELEMETRY: Introduction to cardiac pacemakers, defibrillators, ventilators, muscle stimulators, diathermy, heart lung machine, Hemodialysis, Applications of Laser. Real time computer applications

Text Books:

1. T. Cromwell, "Biomedical Instrumentation & Measurements", P

Reference Books:

3. R.S. Khanpur, "Handbook of Biomedical Instrumentation" Tata McGraw Hill.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE728 (Elective-II)	VLSI Design	3	0	0	3

Evaluation Scheme (Theory)					
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks*
20	20	40	10	10	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Course Syllabi (Theory):

- INTRODUCTION TO MOS TECHNOLOGY- Basic MOS transistors, Enhancement Mode transistor action, Depletion Mode transistor action, NMOS and CMOS fabrication.
- BASIC ELECTRICAL PROPERTIES OF MOS CIRCUITS- Ids versus Vds relationship, Aspects of threshold voltage, Transistor Transconductance gm. The nMOS inverter, Pull up to Pull-down ratio for a NMOS Inverter and CMOS Inverter (Bn/Bp), MOS transistor circuit Model, Noise Margin.
- CMOS LOGIC CIRCUITS- The inverter, Combinational Logic, NAND Gate NOR gate, Compound Gates, 2 input CMOS Multiplexer, Memory latches and registers, Transmission Gate, Gate delays, CMOS-Gate Transistor sizing, Power dissipation.
- Basic physical design of simple Gates and Layout issues. Layout issues for inverter, Layout for NAND and NOR Gates, Complex Logic gates Layout, Layout optimization for performance.
- Introduction to VHDL, Prolog & other design tools. VHDL Code for simple Logic gates, flip-flops, shift registers.

Text Books:

1. CMOS Digital Integrated Circuits Analysis and Design by Kang, Leblebici, McGraw Hill
2. Basic VLSI Design by Douglas A. Pucknell, PHI

Reference Books:

1. CMOS VLSI Design: A Circuits and Systems by Weste, Harris, Banerjee, Pearson India.
2. Principles of C-MOS VLSI Design A systems Perspective by Weste, Eshraghian, Pearson.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
CSE728 (Elective-II)	Digital Image Processing	3	0	0	3

Evaluation Scheme (Theory)					
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks*
20	20	40	10	10	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

- Image Processing, The origins of Digital Image Processing, Examples of Fields that use Digital Image Processing, Fundamentals Steps in Digital Image Processing, Components of an Image Processing System.

- Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization, Some Basic Relationship between Pixels, An Introduction to the Mathematical Tools Used in Digital Image Processing

- Intensity Transformation and Spatial Filtering, Background, Some Basic Intensity Transformation Functions, Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters

- Filtering in the Frequency Domain, Concepts, Sampling and the Fourier Transform of Sampled
- Functions, The Discrete Fourier Transform (DFT) of One Variable, Extension to Functions of Two Variables,, Some Properties of the 2-D Discrete Fourier Transform, The Basics of Filtering in the Frequency Domain, Image Smoothing Using Frequency Domain Filters, Image Sharpening Using Frequency Domain Filters.

- Color Fundamentals, Color Models, Pseudocolor Image Processing, Basics of Full-Color Image Processing, Color Transformations, Smoothing and Sharpening.

Text Books:

1. Rafael C Gonzalez, Richard E Woods 2nd Edition, Digital Image Processing - Pearson Education 2003.

Reference Books:

1. Chanda and D. Dutta Majumder, "Digital Image Processing and Analysis", PHI Publication.

2. Madhuri A. Joshi, "Digital Image Processing – An Algorithmic Approach, PHI Publication.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE729 (Elective-II)	Information Theory & Coding	3	0	0	3

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Course Syllabi (Theory):

- Information theory – Concept of amount of information -units, Entropy -marginal, conditional and joint entropies -relation among entropies Mutual information, information rate, channel capacity, redundancy and efficiency of channels.
- Discrete channels – Symmetric channels, Binary Symmetric Channel, Binary Erasure Channel, Cascaded channels, repetition of symbols, Binary unsymmetrical channel, and Shannon theorem. Continuous channels – Capacity of band limited Gaussian channels, Shannon-Hartley theorem, Tradeoff between band width and signal to noise ratio, Capacity of a channel with infinite band width, Optimum modulation system.
- Source coding – Encoding techniques, Purpose of encoding, Instantaneous codes, Construction of instantaneous codes, Kraft's inequality, Coding efficiency and redundancy, Noiseless coding theorem. Construction of basic source codes – Shannon-Fano algorithm, Huffman coding, Arithmetic coding, ZIP coding.
- Codes for error detection and correction – Parity check coding, Linear block codes, Error detecting and correcting capabilities, Generator and Parity check matrices, Standard array and Syndrome decoding, Hamming codes, Encoding and decoding of systematic and unsystematic codes. Cyclic codes – Generator polynomial, Generator and Parity check matrices, Encoding of cyclic codes, Syndrome computation and error detection, Decoding of cyclic codes, BCH codes, RS codes, Burst error correction.
- Convolutional codes – Encoding- State, Tree and Trellis diagrams, Maximum likelihood decoding of convolutional codes -Viterbi algorithm, Sequential decoding -Stack algorithm. Interleaving techniques – Block and convolutional interleaving, Coding and interleaving applied to CD digital audio system -CIRC encoding and decoding, interpolation and muting. ARQ – Types of ARQ, Performance of ARQ, Probability of error and throughput.

Text Books:

1. Communication Systems by Simon Haykin, John Wiley & Sons. Pvt. Ltd.
2. Principles of Communication Systems by Taub & Schilling, Tata McGraw-Hill
3. Principles of Digital Communication by Das, Mullick & Chatterjee, Wiley Eastern Ltd

Reference Books:

1. Error Control Coding Fundamentals and Applications by Shu Lin & Daniel J. Costello Jr., Prentice Hall Inc.
2. Digital Communications Fundamentals and Applications by Bernard Sklar, Person Education Asia

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE726 (Elective-III)	VERILOG HARDWARE DESCRIPTION LANGUAGE	3	0	0	3

Evaluation Scheme (Theory)					
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks*
20	20	40	10	10	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

- Introduction: Fundamental & history of various hardware description languages, Design flow of ASICs and standard logic circuits using software.
- Combinational Circuits Building Blocks: Multiplexer, Decoders, encoders, Code Converters, VHDL Code for Combinational Circuits.
- Sequential Circuits: VHDL code for Flip-Flops, shift registers, counters.
- Synchronous / Asynchronous Sequential Circuits: Mealy & Moore type FSMs, VHDL Code for Mealy & Moore Machines, VHDL Codes for Serial Adder, Vending Machine.
- Digital System Design: Building Block circuits, Memory organization, SRAM, Design examples of divider, Multiplier, Shifting & Sorting Operations, Clock Synchronization, CPU organization and design concepts.

Text Books:

1. VHDL: Programming by Examples, Douglas L Perry, McGraw Hill, 4th Edition.
2. A VHDL Primer, Jayaram Bhaskar, Prentice Hall, 3rd Edition.

Reference Books:

1. Circuit Design with VHDL, Volnei A. Pedroni, MIT Press.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE725 (Elective-III)	IC Technology	3	0	0	3

Evaluation Scheme (Theory)					
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks*
20	20	40	10	10	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Course Syllabi (Theory):

- Introduction to Semiconductor Physics:Review of quantum mechanics, Electrons in periodic lattices, E-k diagrams, Quasiparticles in semiconductors, electrons, holes and phonons. Boltzmann transport equation and solution in the presence of low electric and magnetic fields - mobility and diffusivity; Carrier statistics; Continuity equation, Poisson's equation and their solution; High field effects: velocity saturation, hot carriers and avalanche breakdown.
- Semiconductor Junctions:Schottky, homo- and hetero-junction band diagrams and I-V characteristics, and small signal switching models; Two terminal and surface states devices based on semiconductor junctions.
- MOS Structures: Semiconductor surfaces; The Ideal and Non-ideal MOS Capacitor band diagrams and CVs; Effects of oxide charges, defects and interface states; Characterization of MOS capacitors: HF and LF CVs, avalanche injection; High field effects and breakdown.
- Characterization of Semiconductors: Four probe and Hall measurement; CVs for dopant profile characterization; Capacitance transients and DLTS.

Text Books:

1. S. M. Sze, Physics of Semiconductor Devices, 2nd edition John Wiley, 1981.
2. J. P. McKelvey, introduction to Solid State and Semiconductor Physics, Harper and Row and John Weathe Hill, 1966.

Reference Books:

1. E. H. Nicollian and J. R. Brews, MOS Physics and Technology, John Wiley, 1982

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
ECE727 (Elective-III)	RADAR & Satellite Communication	3	0	0	3

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
20	20	40	10	10	100	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Syllabus (Theory)

- Introduction to radar, radar block diagram and operation, radar frequencies, Applications of radar, Prediction of range performance, minimum detectable signal, receiver noise, probability density function, SNR, Integration ofradar pulses, radar cross-section of targets, PRF and range ambiguities, transmitter power, system losses.
- Doppler effect, CW radar, FM CW radar, multiple frequency CW radar. MTI radar, delay line canceller, rangegated MTI radar, blind speeds, staggered PRF, limitations to the performance of MTI radar, non-coherent MTI radar.
- Tracking radar: sequential lobing, conical scan, monopulse: amplitude comparison and phase comparison methods, Radar antennas. Radar displays. Duplexer.Orbital aspects of Satellite Communication: Introduction to geo-synchronous and geo-stationary satellites, Kepler's laws, Locating the satellite with respect to the earth, sub-satellite point, look angles, mechanics of launching a synchronous satellite, Orbital effects, Indian scenario in communication satellites.
- Satellite sub-systems: Attitude and Orbit control systems, Telemetry, Tracking and command control system, Power supply system, Space craft antennas, multiple access techniques, comparison of FDMA, TDMA, CDMA.
- Introduction to satellite link design, basic transmission theory, system noise temperature and G/T ratio, design of down link and uplink, design of satellite links forspecified C/N, satellite data communication protocols

Text Books:

1. Merril. I. Skolnik, *"Introduction to radar systems"*, 2/e, MGH, 1981.
2. Timothy Pratt and Charles Bostian, *"Satellite Communications"*, John Wiley, 1986.
3. Toomay, *"Radar Principles of Radar"*, PHI, 2/e, 2002.

Reference Books:

1. Dennis Roddy, *"Satellite Communications"*, 3/e, MGH, 2001.
2. M.Richharia, *"Satellite Communication Systems:Design Principles"*, MacMillan, 2/e, 2003.

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
SEM701	Seminar	0	0	4	2

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test – I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation*	Total Marks**	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks**
-	-	-	-	-	-	20	40	15	25	100

*Additional Continuous Evaluation: Quizzes/Assignments/Presentations/Practical Records/Mock Interviews/others

Operation Procedure

1. Student has to devote full semester for SEM701 course.
2. Student has to report to the Supervisor regularly.
3. Seminars s evaluation has to be carried out in the presence of a two member Committee comprising.
4. Experts in the relevant area constituted by the Supervisor.

Final Seminar Report to be submitted has to be in formal hard bound cover bearing of the Institute emblem.

Reference(s)

1. Based on literature survey to be done with peer reviewed journals and magazines.

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INSTITUTE OF ENGINEERING AND TECHNOLOGY

4 Year B. Tech Programme

(Branch: Electronics & Communication Engineering)

Batch 2014-18

SEMESTER-EIGHT

Detailed Syllabus

&

Scheme of Examination

Course code	Course Title	Teaching Scheme			
		L	T	P	Credits
HS801	Practice School - II	-	-	-	16

Evaluation Scheme (Theory)						Evaluation Scheme (Practical)				
Mid Term Test - I	Mid Term Test - II	End Term Test	Class Participation	Additional Continuous Evaluation	Total Marks	Mid Term Test - I	End Term Test	Class Participation	Additional Continuous Evaluation *	Total Marks
-	-	-	-	-	-	-	-	-	-	-

**** Duration for practice school is Five and a half month**

Course Syllabi:

This course is for five and half months (summer and one semester) in VII or VIII Semester. The objective of this programme is to provide the students, an opportunity to work on live projects of corporate world in various fields. During this programme, they will work on real world applications of their curricula through organizational function of their choice. The students are expected to be involved directly in problem solving efforts of specific interest to the host organization. The learning of PS-I will help them in completing PS-II successfully.

Evaluation Scheme:

S. No.	Evaluation Component	Marks (100) (Weightage %)
1	Quiz-I	4
2	Quiz-II	4
3	Group Discussion-I	4
4	Group Discussion-II	4
5	Seminar-I	4
6	Seminar-II	4
7	Diary-I	4
8	Diary-II	4
9	Observation-I	4
10	Observation- II	4
11	Mid Term Evaluation (Project Report and Presentation/Viva)	20
12	Final Evaluation (Project Report and Presentation/Viva)	40

Department of Electronics & Communication Engineering, IET, JKLU, Jaipur

Corrigendum of Course Booklet

Programme Name: B.Tech. Electronics & Communication Engineering

Batch: 2014-20

1. Code of Virtual Instrumentation, in the detailed syllabus, should be read as ECE625 in place of EE625.
2. Credit of ECE 604 Electronic Circuit Design , in the detailed syllabus should be read as 3.