आईएफटीएम विश्वविद्यालय, मुरादाबाद, उत्तर प्रदेश

IFTM University, Moradabad, Uttar Pradesh

NAAC ACCREDITED

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Study and Evaluation Scheme of
Bachelor of Technology
[Session 2020-21]

Electronics & Communication Engineering:	**Bachelor of Technology**
Course level:	**UG Degree**
Duration:	**Four years (Eight Semesters)**
Medium of Instruction:	**English**
Minimum required attendance:	**75%**
Maximum credits:	**226**

Electronics & Communication Engineering Outcome:

Students successfully completing this course will be able to:

- Analyze the concepts on electronics with respect to day to day life phenomenon.
- Apply concepts of basic electronics with respect to appliances at home.
- Analyze the working of digital meters in and around their environment.
- Develop understanding of fundamental concepts of engineering.
- May also develop an inquisitive mind that seeks problem solving approach.
- May develop an aptitude of research on the basis of technical know how.

IFTM UNIVERSITY, MORADABAD

STUDY & EVALUATION SCHEME

B. Tech. Electronics & Communication Engineering (EFFECTIVE FROM 2018 – 2019)

YEAR I, SEMESTER- I

S.N.	Course Code	Course Name	Periods			EVALUATION SCHEME				Course Total	Credits
						Internal Exam			End Sem Exam		
			L	T	P	Mid Sem Exam	AS +AT	Total			
THEORY											
1.	**EMA -101**	Engineering Mathematics-I	3	1	0	20	10	30	70	100	4
2.	**EPH -101**	Engineering Physics-I	3	1	0	20	10	30	70	100	4
3.	ECH -101/ **ECH-102**	Engineering Chemistry/ Environmental Science	3	1	0	20	10	30	70	100	4
4.	**EEG -101**/ EME-101	Professional Skill Development-I/ Engineering Mechanics	3	1	0	20	10	30	70	100	4
5.	**EEE -101**/ EEC-101	Electrical Engineering/ Electronics Engineering	3	1	0	20	10	30	70	100	4
6.	**EME-102** / ECS -101	Materials & Manufacturing / Computer Fundamentals & Programming	3	1	0	20	10	30	70	100	4
PRACTICALS / PROJECT											
7.	**EPH -151** / ECH -151	Physics Lab / Chemistry Lab	0	0	2	30	20	50	50	100	1
8.	**EEE -151**/ EEC-151	Electrical Engineering Lab / Electronics Engineering Lab	0	0	2	30	20	50	50	100	1
9.	**EME-152** / ECS -151	Materials & Manufacturing Lab / Computer Lab	0	0	2	30	20	50	50	100	1
10.	**EME-153**/ EME-151	Engineering Graphics Lab/ Mechanical Engg. Lab	0	0	2	30	20	50	50	100	1
11.	EGP-101	General Proficiency	-	-	-	-	-	100	-	100	1
		TOTAL	**18**	**06**	**08**	**-**	**-**	**-**	**-**	**1100**	**29**

YEAR I, SEMESTER- II

S.N.	Course Code	Course Name	Periods			EVALUATION SCHEME				Course Total	Credits
						Internal Exam			End Sem Exam		
			L	T	P	Mid Sem Exam	AS +AT	Total			
THEORY											
1.	**EMA -201**	Engineering Mathematics-II	3	1	0	20	10	30	70	100	4
2.	**EPH -201**	Engineering Physics-II	3	1	0	20	10	30	70	100	4
3.	ECH -202/ **ECH-201**	Environmental Science/ Engineering Chemistry	3	1	0	20	10	30	70	100	4
4.	**EME-201**/ EEG-201	Engineering Mechanics / Professional Skill Development-I	3	1	0	20	10	30	70	100	4
5.	**EEC-201**/ EEE-201	Electronics Engineering/Electrical Engineering	3	1	0	20	10	30	70	100	4
6.	**ECS -201** / EME -202	Computer Fundamentals & Programming / Materials & Manufacturing	3	1	0	20	10	30	70	100	4
PRACTICALS / PROJECT											
7.	**ECH -251** / EPH -251	Chemistry Lab / Physics Lab	0	0	2	30	20	50	50	100	1
8.	**ECS -251** / EME -251	Computer Lab / Materials & Manufacturing Lab	0	0	2	30	20	50	50	100	1
9.	EEE -251 / **EEC -251**	Electrical Engineering Lab / Electronics Engineering Lab	0	0	2	30	20	50	50	100	1
10.	**EME-251**/ EME-253	Mechanical Engg. Lab /Engineering Graphics Lab	0	0	2	30	20	50	50	100	1
11.	EGP-201	General Proficiency	-	-	-	-	-	100	-	100	1
		TOTAL	**18**	**06**	**08**	**-**	**-**	**-**	**-**	**1100**	**29**

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) - I Year (I Semester)

EMA – 101: ENGINEERING MATHEMATICS –I

Objective: -The main aims of this course are to recall and remember basics of matrices, differential, integral and vector calculus. The focus of the subject to understand the concepts of basic mathematical methods to solve engineering problems analyze engineering problems and evaluate the results.

UNIT – 1 **(12 Sessions)**

Matrices : Introduction of matrices, Special type of matrices, Elementary row and column transformation, Adjoint & inverse of matrices , Rank of matrix, , Consistency of linear system of equations, Characteristic equation, Cayley-Hamilton theorem, Eigen values and Eigen vectors, Linear dependency and Independency of vector, Diagonalisation of matrices.

UNIT – 2 **(10 Sessions)**

Differential Calculus–I: Successive differentiation, Leibnitz's theorem,Partial differentiation, Euler's theorem, Change of variables, Total differentiation,Jacobian, Expansion of function of several variables.

UNIT – 3 **(10 Sessions)**

Differential Calculus–II: Asymptotes, Curve tracing, Approximation of errors, Maxima & Minima of functions of several variables, Lagrange's method of multipliers.

UNIT – 4 **(08 Sessions)**

Multiple Integrals : Definite integral, Double and triple integral, Change of order, Change of variables, Beta and Gamma functions, Dirichlet integral, Liouville's extension formula, Applications to area and volume.

UNIT – 5 **(12 Sessions)**

Vector Calculus: Point functions, Gradient, Divergence and Curl of a vector and their properties, Line, Surface and Volume integrals, Green's, Stoke's and Gauss divergence theorems, Statements and problems (without proof).

Course Outcomes:

The student is able to

- Remember terminologies and formulae in matrices, differential, integral and vector calculus.
- Understand and interpret the concepts of matrices, differential, integral and vector calculus.
- Compare and analyze the methods in matrices, differential, integral and vector calculus.
- Predict and evaluate the problems in matrices, differential, integral and vector calculus.

Suggested Readings:

1. Prasad C. Advanced Mathematics for Engineers, Prasad Mudralaya.
2. B. S .Grewal, Engineering Mathematics, Khanna Publishers.
3. E.Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.
4. C.Ray Wylie & Louis C . Barrett , Advanced Engineering Mathematics ,Tata Mc Graw –Hill Publishing Company Ltd.
5. Chandrika Prasad, Advanced Mathematics for Engineers, Prasad Mudranalaya.

Website Sources:

- www.pdfdrive.com
- www.dmi.gov.in
- www.yourarticlelibrary.com
- onlinecourses.nptel.ac.in
- en.wikipedia.org

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) - I Year (I Semester)

EPH-101: Engineering Physics-I

Objective: The aim of this course is to impart knowledge of statistical mechanics, quantum mechanics, Laser system and their applications. The broad education is necessary to understand special theory of relativity.

UNIT- I **(8 sessions)**
Relativistic Mechanics: Frame of reference, Michelson-Morley Experiment, Lorentz transformation equation, Length contraction & Time dilation, Addition of velocities, Variation of mass with velocity and Mass energy relation.

UNIT- II **(10 sessions)**
Statistical Mechanics: Concept of phase space, Density of states as a function of energy, Maxwell- Boltzmann statistics, Distribution law and its application in case of ideal gas, Energy and velocity distribution.
Bose -Einstein statistics Distribution Law and its application to Black body radiation to obtain Plank's law of radiation.
Fermi –Dirac statistics, Distribution law and its application to electrons in metals, Calculation of Fermi energy and average energy of electrons in metals.

UNIT- III **(10 sessions)**
Quantum Mechanics: De-Broglie Hypothesis, Davisson -Germer Experiment, wave function and its properties, Uncertainty principle. Time Dependent & Time Independent Schrodinger Equation, Particle in one dimensional box, Eigen values and eigen function

UNIT- IV **(8 sessions)**
Laser: Principle of Laser, Stimulated and spontaneous emission, Population inversion, Einstein's Coefficients, He-Ne Laser, Ruby Laser, Application of Lasers.

UNIT- V **(8 sessions)**
Fibre Optics: Fundamental ideas of optical Fiber, PropagationMechanism, Numerical aperture, Acceptance angle and Acceptance cone, Single and multi modefibers, Applications of optical fibres.

Course Outcomes:
The students completing this course will be able to:
- Learn Frame of reference, Lorentz transformation equation
- Understand Statistical Mechanics, Maxwell- Boltzmann statistics and its applications.
- Study Bose -Einstein statistics and Fermi –Dirac statistics
- Understand De-Broglie Hypothesis, Davisson -Germer Experiment
- StudyTime Dependent & Time Independent Schrodinger Equation and applications of these equations.
- Attain basic knowledge on different types of LASERs and their applications.
- Gain knowledge of optical fibre.

Suggested Readings:

1. A. Beiser, "Concepts of Modern Physics
2. C. Kittel, "Mechanics", Berkeley Physics Course, Vol.- I.
3. W.T. Silf vast, "Laser Fundamental" Cambridge University Press(1996).
4. G. Keiser "Optical Fiber Communication" New york.
5.K.M. khanna" Statistical Mechanics"
6. C.Kittel" Elementary Statistical Mechanics"

Website Sources:
- https://web.stanford.edu
- https://sites.google.com
- https://en.wikipedia.org
- https://www.khanacademy.org
- https://www.rp-photonics.com
- https://nptel.ac.in
- https://www.eatm.in

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) - I Year (I Semester)

ECE-101: Environmental Science

Course Objective:
The goals of environmental science are to provide every student with opportunities to acquire the knowledge, values, attitudes, commitment, and skills needed to protect and improve the environment. To develop and reinforce new patterns of environmentally sensitive behavior among individuals, groups and society as a whole for a sustainable environment. Understand the trans-national character of environmental problems such as global warming, climate change, ozone layer depletion etc and ways of addressing them, including interactions across local to global scales.

UNIT I **(12 Sessions)**
Environment: Definition of environment. Environmental education. Need for the public awareness. : Concept of Ecology: Ecosystem, energy and nutrients flow in ecosystem food chain.
Environmental segment: Atmospheric structure. Classification of air pollutants, sources of air pollution and their effect on human health and property.

UNIT II **(10 Sessions)**
Air quality and standard: Meteorological phenomenon and their influence on air quality, lapse rates, dispersion of pollutants. Air pollution control: Introduction to particulates and gaseous pollutants such as SOx, NOx& CO, and their effects.

UNIT III **(10 Sessions)**
Water quality: Physical. Chemical & biological parameters. Water quality standard, BOD.COD and BOD COD calculations. : Environmental Analysis: pH, alkalinity, conductivity, ammonia, fluoride, sulphate, chloride. Analysis and measurement of gaseous pollutants.

UNIT IV **(8 Sessions)**
Pollution: Pollution from industry and agriculture. polymers and plastic ,food additives, fertilizers, insecticides, fungicides and herbicides. Heavy metal and energy their environmental implications.Solid waste and its managements.pollution and public health aspect Environmental Protection- Role of government, initiatives by non-governmental organizations (NGO).

Course outcomes:
After completion of this course student,

- Understand the issues and challenges related to environmental and ecosystem due to some human activities.
- Understand key concepts from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
- Appreciate concepts and methods from ecological and physical sciences and their application in environmental problem solving.
- Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
- Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

Suggested Readings:

- "Environmental studies" Benny Joseph, Tata McgrawHill-2005
- "Environmental studies"-Dr D.L. Manjunath, Pearson Education-2006
- "Environmental studies" R. Rajagopalan, Oxford Publication-2005
- "Text book of environment science & Technology", M.Anji Reddy,BS Publication.

Website Sources:

- https://www.india.gov.in/official-website-ministry-environment-and-forests-0
- https://www.earthshare.org/environews/

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) - I Year (I Semester)

EEG-101: PROFESSIONAL SKILL DEVELOPMENT-I

Course Objectives: The objectives of Professional Skill Development-I are:

- To develop knowledge and understanding of grammar.
- To develop abilities to make use of the grammar in own writing English.
- To increase understanding and recall of what is read and listen including facts and main idea.
- To enhance competencies in writing paragraph, gist or abstract/précis of the passage in own words/ language and in writing resume, bio-data, letters and applications of different kinds.
- To develop all the four skills of English language.

Unit I **(08Session)**

Basic Applied Grammar and Usage

The Sentences: Parts – Subject and Predicate; Kinds of Sentences and their Transformation. Parts of Speech. **Noun:** Kinds; Gender; Case; Number; Usage**. Pronouns:** Definition; Kinds; Usage. **Adjectives:** Kinds, Degrees of Comparison, Transformation of Degrees. **Determiners:** Kinds: many, many a, a great many; less and fewer; each and every; elder, eldest and older, oldest; much, many; little, a little, the little. **Articles:** Kinds, Articles and Number system, Articles and Gender system, Omission of Articles, Repetition of Articles. **Verbs:** Kinds; Auxiliaries: Principal Auxiliaries; Modal Auxiliaries; Semi-Modals; Usage

Unit II

Basic Applied Grammar Continued **(06Session)**

Non-Finite Verbs: Kinds; Infinitives; Gerund; Participle. **Adverbs:** Kinds and Usage. **Prepositions:** Kinds and Usage. **Conjunctions:** Kinds; Usage. **Interjections:** Definition; Usage.

Unit III **(10Session)**

Clauses and Phrases, Tenses, Active and Passive Voice, Direct and Indirect Speech

Unit IV **(06Session)**

Précis Writing: Techniques of Précis Writing; examples**. Paragraph Writing:** Structure of Paragraph, Construction of Paragraphs; Techniques of Paragraph Writing: Unity, Coherence, Emphasis. **Reading Comprehension. Listening Comprehension.**

Unit V **(08Session)**

Writing of Resume, Bio-Data. **Writing of Letters and Applications:** Formats; Elements; Kinds: Leave Applications, Job Applications, Order Letters, Letters of Claims and Complaints, Letters of Adjustment.

Course Outcomes:

Students completing this course will be able to:

- Write paragraph, gist or abstract/précis of the passage in own words/ language and resume, bio-data, letters and applications of different kinds.
- Use targeted grammatical structures meaningfully and appropriately in oral and written production.
- Enhance competence in the four modes of literacy: writing, speaking, reading & listening.
- Understand and recall of what is read and listen including facts and main idea.

Suggested Readings:

(1) Remedial English Language by Malti Agarwal, Krishna Publications, Meerut.
(2) Professional Communication by Malti Agarwal, Krishna Publications, Meerut.
(3) High School English Grammar & Composition by Wren & Martin, S. Chand & Company LTD., New Delhi.

Website Sources

- www.wikipedia.com
- www.englishgrammar.org
- www.usingenglish.com
- www.grammarly.com

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) - I Year (I Semester)

EEE-101: ELECTRICAL ENGINEERING

Objective:

1. To provide comprehensive idea about AC and DC circuits and its analysis
2. To provide the working principles and applications of basic machines in electrical engineering.

UNIT-I **(08 Sessions)**

D.C. Circuit Analysis: Network, Active And Passive Elements, Concept of Linearity And Linear Network, Unilateral And Bilateral Elements, Sources, Source Transformation, Kirchhoff's Laws, Star-Delta Transformation, **Network Theorems:** Thevenin's Theorem, Superposition Theorem, Norton's Theorem, Maximum Power Transfer Theorem.

UNIT-II **(08 Sessions)**

Single Phase AC Circuits: AC Waveforms, Average and Effective Values, Form and Peak Factors, Analysis of Series, Parallel and Series-Parallel RLC Circuits, Active, Reactive and Apparent Powers, Power Factor, Causes of Low Power Factor, Resonance in Series and Parallel Circuits.

UNIT-III **(08 Sessions)**

Three Phase AC Circuits: Three Phase System, Advantages, Phase Sequence, Star and Delta Connections, Balanced Supply and Balanced Load, Three-phase Power and its Measurement,

Measuring Instruments: Types of Instruments, PMMC and Moving Iron Instrument, Single-Phase Dynamometer Wattmeter, Induction Type Energy Meter.

UNIT-IV **(08 Sessions)**

Magnetic Circuits: Magnetic Circuit Concepts, Analogy between Electric & Magnetic Circuits, Magnetic Circuits with DC and AC Excitations, B-H Curve, Hysteresis and Eddy Current Losses,

Single Phase Transformer: Principle, Working, Construction, E.M.F. Equation, Power Losses, Efficiency, Introduction to Auto-Transformer (Excluding Numericals).

UNIT-V **(08 Sessions)**

Principles of Electro-Mechanical Energy Conversion,

DC Generator: Construction & Working, E.M.F. Equation of Generator, Types of D.C. Generator, Applications, **D.C. Motor:** Principle of operation, Torque Equation of a Motor, Types of D.C. Motor, Applications (Excluding Numericals)

Three Phase Induction Motor: Construction-(Squirrel cage and slip-ring motor), Principle of Operation, Applications (Excluding Numericals)

Course Outcome:

On completion of the course students will be able to

- Predict the behavior of any electrical and magnetic circuits.
- Formulate and solve complex AC, DC circuits.
- Identify the type of electrical machine used for that particular application.
- Realize the requirement of transformers in transmission and distribution of electric power and other applications.
- Awareness of general structure of power systems.
- Acquire knowledge about the single phase and three base electrical circuits

Suggested Readings:

1. V. Del Toro, "Principles of Electrical Engineering" Prentice Hall International
2. I.J. Nagarath, "Basic Electrical Engineering" Tata McGraw Hill
3. D.E. Fitzgerald & A. Grabel Higginbotham, "Basic Electrical Engineering" Mc- Graw Hill
4. T.K. Nagsarkar & M.S. Sukhija, "Basic Electrical Engineering" Oxford University Press
5. W.H. HaytP, "Engineering Circuit Analysis" Mc Graw Hill

Website Sources:

- www.lecturenotes.in
- www.iare.ac.in
- www.ocw.mit.edu
- www.nptel.ac.in
- www.vlab.co.in

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) - I Year (I Semester)

EME-102: MATERIALS & MANUFACTURING

Objective: The objective of this course is to familiarize the students with different types of engineering materials and manufacturing processes and to understand the design, selection and processing of materials for a wide range of applications in engineering and elsewhere.

UNIT I **(9 Sessions)**

Basic Manufacturing: Importance of Materials & Manufacturing towards Technological & Socio-Economic developments, Classification of manufacturing processes, Plant location, Plant layout and its types, Production and its classification, Production versus Productivity, Misc. Processes: Powder-metallurgy process and its applications, Plastic-products manufacturing, Galvanizing and Electroplating, Properties of Engineering Materials: Mechanical properties, Chemical properties, Electrical properties, Dielectric and Magnetic properties, Optical and Physical properties, Introduction to elementary corrosion and oxidation, Elementary ideas of fracture, fatigue & creep.

UNIT II **(9 Sessions)**

Engineering Materials: Ferrous Materials, Iron ore and its extraction, Furnaces, Cast iron, Steels & its classification based on percentage of carbon, its properties & applications. Alloy steels: stainless steel and tool steel, Non-Ferrous metals & alloys: Various non-ferrous metals, Common uses of various non-ferrous metals. Alloying elements and their effect, Cu-alloys: Brass, Bronze, Al-alloys such as Duralumin, Non-Metallic Materials: Common types & uses of different non-metals such as Wood, Cement-concrete, Ceramics, Rubber, Plastics and Composite materials.

UNIT III **(9 Sessions)**

Introduction to Metal Forming and its applications: Basic metal forming process: hot working and cold working process, Rolling, Forging, Extrusion, Drawing, Wire & Tube-drawing, Product applications and their defect. Press - work, Die & Punch assembly, Sheet metal operations, Cutting and forming and its applications. Casting: Casting terms. Casting processes, Pattern & allowances, Pattern and mold making materials and its desirable properties, Molding method, mould making with the use of a core, Gating system, Die-casting and its uses, Casting defects & remedies, Heat Treatment: Elementary introduction to Heat-treatment of carbon steels: annealing, normalizing, quenching, tempering and case-hardening.

UNIT IV **(7 Sessions)**

Introduction to Metal Cutting: Cutting tool, Chips and its formation process; Working principle, classification and operations performed on Lathe machine, Shaper machine and Planer machine. Operations performed on Drilling, Milling & Grinding machine.

UNIT V **(6 Sessions)**

Introduction to Welding and its applications: Importance and basic concepts of welding, Classification of welding processes. Gas-welding, Types of flames, Electric-Arc welding, Resistance welding, Soldering & Brazing and its uses.

Course Outcomes:

Students completing this course will be able:

- To understand how and why the properties of materials are controlled.
- To understand how and why the structure and composition of a material may be controlled by processing.
- To identify the positive and negative impacts of manufacturing on society.
- To apply the knowledge in industries and organizations.

Suggested Readings:

1. *Manufacturing Process*, B.S Raghuvanshi, Dhanpat Rai Publication.
2. *Manufacturing Processes*, R.S. Khurmi and J.K. Gupta, S. Chand Publishing.
3. *Materials Science*, Narula & Narula, McGraw Hill Education Private Limited.
4. *Manufacturing Technology*, R. K. Rajput, Laxmi Publications Private Limited.
5. *An Introduction to Engineering Materials and Manufacturing Processes*, NIIT, Prentice Hall of India Private Limited.

Website Sources:

- www.wikipedia.org
- www.sciencedaily.com
- www.youtube.com
- www.slideshare.net
- https://onlinecourses.nptel.ac.in

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) - I Year (I Semester)

EPH-151: Physics Lab

Objective: To achieve perfectness in experimental skills. The study of practical applications will bring more confidence and to learn the usage of electrical and optical systems for various measurements.

List of Experiments (Any Ten) **(20 Sessions)**

1. To determine the wavelength of monochromatic light by Newton's ring.
2. To determine the wavelength of monochromatic light with the help of Fresnel's biprism.
3. To determine the focal length of two lenses by nodal slide and locate the position of cardinal points.
4. To determine the specific rotation of cane sugar solution using half shade polarimeter.
5. To determine the wavelength of spectral lines using plane transmission grating.
6. To determine the specific resistance of the material of given wire using Carey Foster's bridge.
7. To determine the variation of magnetic field along the axis of a current carrying coil and then to estimate the radius of the coil.
8. To verify Stefan's Law by electrical method.
9. To calibrate the given ammeter and voltmeter.
10. To study the Hall Effect and determine Hall coefficient, carrier density and mobility of a given semiconductor material using Hall-effect set up.
11. To determine energy bank gap of a given semiconductor material.
12. To determine E.C.E. of copper using Tangent or Helmholtz galvanometer.
13. To draw hysteresis curve of a given sample of ferromagnetic material and from this to determine magnetic susceptibility and permeability of the given specimen.
14. To determine the ballistic constant of a ballistic galvanometer.
15. To determine the viscosity of a liquid.

Course Outcomes:
The students completing this course will be able to:

- Understand principle, concept, working and application of technology and comparison of results with theoretical calculations.
- Apply the various procedures and techniques for the experiments.
- Understand usageof instruments and real time applications in engineering studies.
- Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results.

Suggested Readings:

1. Engineering Practical Physics by S. L. Gupta
2. Engineering Practical Physics by Navneet Gupta
3. Engineering Practical Physics by S. K. Gupta

Website Sources:

- http://www.iiserpune.ac.in
- https://www.toppr.com
- https://wp.optics.arizona.edu
- https://www.gopracticals.com
- http://vlab.amrita.edu
- https://circuitglobe.com

Note: Latest editions of all the suggested readings must be used

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) - I Year (I Semester)

EEE-151: ELECTRICAL ENGINEERING LAB

Objective:

1. To design electrical circuits on bread board.
2. To analyze a given network by applying various network theorems.
3. To expose the students to the operation of dc generator
4. To expose the students to the operation of dc motor and transformer.
5. To examine the self -excitation in dc generators.

LIST OF EXPERIMENTS: **(16 Sessions)**

1. Verification of Kirchhoff's current law.
2. Verification of Kirchhoff's voltage law
3. Verification of Superposition theorem.
4. Verification of Thevenin's Theorem.
5. Verification of Maximum Power Transfer Theorem.
6. To study a Single phase induction motor and its various methods of starting.
7. To study running and speed reversal of a Three Phase Induction Motor and determine the slip.
8. To determine the transformation ratio and turns ratio and current ratio of a single-phase transformer.
9. To study the construction of a dc machine.
10. To study a single phase Induction type Energy meter.

Course Outcome:

After successfully studying this course, students will be able to:

- Explain the concept of circuit laws and network theorems and apply them to laboratory measurements.
- Be able to systematically obtain the equations that characterize the performance of an electric circuit as well as solving both single phase and DC Machines
- Acknowledge the principles of operation and the main features of electric machines and their applications.
- Acquire skills in using electrical measuring devices.

Suggested Readings:

1. V. Del Toro, "Principles of Electrical Engineering" Prentice Hall International
2. I.J. Nagarath, "Basic Electrical Engineering" Tata McGraw Hill
3. D.E. Fitzgerald & A. Grabel Higginbotham, "Basic Electrical Engineering" Mc- Graw Hill
4. T.K. Nagsarkar & M.S. Sukhija, "Basic Electrical Engineering" Oxford University Press
5. W.H. HaytP, "Engineering Circuit Analysis" Mc Graw Hill.

Website Sources:

- www.iare.ac.in
- www.ocw.mit.edu
- www.nptel.ac.in
- www.vlab.co.in

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) - I Year (I Semester)

EME-152: MATERIALS & MANUFACTURING LAB

Objective: The objective of this course is to meet curriculum requirements and provide knowledge of different types of tools, instruments and machines and their applications in manufacturing to produce different metal components and articles and develop skills in the students.

List of Experiments: (Minimum 10 experiments are required to be performed)

1. Carpentry Shop: **(03 Sessions)**
a. Study of tools & operations and carpentry joints.
b. Simple exercise using jack plane.
c. To prepare half-lap corner joint, mortise & tenon joints.
d. Simple exercise on woodworking lathe.

2. Fitting Bench Working Shop: **(03 Sessions)**
a. Study of tools & operations
b. Simple exercises involving fitting work.
c. Making perfect male-female joint.
d. Simple exercises involving drilling/tapping/dieing.

3. Black Smithy Shop: **(03 Sessions)**
a. Study of tools & operations
b. Simple exercises based on black smithy operations such as upsetting, drawing down, punching, bending, fullering & Swaging.

4. Welding Shop: **(03 Sessions)**
a. Study of tools & operations of Gas welding & Arc welding
b. Making simple Butt and Lap arc welded joints.
c. Simple exercises involving Oxy-acetylene Gas welding.

5. Sheet-metal Shop: **(02 Sessions)**
a. Study of tools & operations.
b. Making Funnel complete with 'soldering'.
c. Fabrication of tool-box, tray, electric panel box etc.

6. Machine Shop: **(03 Sessions)**
a. Study of machine tools and operations.
b. Simple exercises involving Plane turning.
c. Simple exercises involving Step turning
d. Simple exercises involving Taper turning.

7. **Foundry Shop:** **(03 Sessions)**
a.Study of tools and operations.
b. Preparation of sand for moulding.
c. Mould making using core.

Course Outcome: Students completing this course will be able:

- To define and use different manufacturing process e.g. casting, forging, turning, drilling etc.
- To define and use different welding processes e.g. gas welding and electric arc welding.
- To acquire thorough knowledge of carrying out various operations in this lab.
- To acquire skills for creating different objects from raw materials.

Suggested Readings:

1. *Manufacturing Process,* B.S Raghuvanshi, Dhanpat Rai Publication.
2. *Manufacturing Processes,* R.S. Khurmi and J.K. Gupta, S. Chand Publishing.
3. *Materials Science,* Narula & Narula, McGraw Hill Education Private Limited.
4. *Manufacturing Technology,* R. K. Rajput, Laxmi Publications PVT. LTD.

Website Sources:

- www.wikipedia.org
- www.brcmcet.edu.
- www.slideshare.net
- https://onlinecourses.nptel.ac.in

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) - I Year (I Semester)

EME 153: Engineering Graphics Lab

Objective:

- The course is aimed at developing Basic Graphic skills.
- Develop Skills In Preparation Of Basic Drawings.
- Skills in Reading and Interpretation of Engineering Drawings.

1. Introduction **(03 Sessions)**

Introduction, Drawing Instruments and their uses, BIS conventions, Lines & Lettering, Dimensioning and free hand practicing. Coordinate system and reference planes. Definitions of HP, VP, RPP & LPP. Creation of 2D/3D environment. Selection of drawing size and scale.

2. Orthographic Projections **(05 Sessions)**

Introduction, Definitions- Planes of projection, reference line and conventions employed. Principle of Orthographic projections, First and Third Angle projections.
Projection of Points, Pictorial view.
Terms used in Projection of lines. Projection of lines parallel to both the planes. Parallel to one and inclined to other, Inclined to both the planes. Application to practical problems.**(First Angle Projection Only)**

3. Projections of Solids (First Angle Projection Only) **(06 Sessions)**

Introduction, Definitions- Projections of right regular- tetrahedron, hexahedron (cube), prisms, pyramids, cylinders and cones in different positions. Sections and Development of Lateral Surfaces of Solids, Sectional views, apparent shapes and True shapes of Sections of right regular prisms, pyramids, cylinders and cones resting with base on HP. Development of lateral surface of above solids, their frustums and truncations.

4. Isometric Projection (Using Isometric Scale Only) **(06 Sessions)**

Introduction, Principle of isometric projection, Terminology, Isometric scale, Isometric Projection of simple plane figures, Isometric Projection of tetrahedron, hexahedron (cube), right regular prisms, pyramids, cylinders, cones, spheres, cut spheres and combination of solids.

Course outcome: Students completing this course will be able to:

- Use the drawing instruments effectively and able to dimension the given figures
- Appreciate the usage of engineering curves in tracing the paths of simple machine components
- Understand the concept of projection and acquire visualization skills, projection of points
- Able to draw the basic views related to projections of Lines, Planes

Suggested Readings:

- Engineering Drawing – N.D. Bhatt & V.M. Panchal, 48th edition, 2005 Charotar Publishing House, Gujarat.
- A Primer on Computer Aided Engineering Drawing-2006, Published by VTU, Belgaum.
- Engineering Graphics – K.R. Gopalakrishna, 32nd edition, 2005 – Subash Publishers Bangalore.
- Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production – Luzadder Warren J., duff John M., Eastern Economy Edition, 2005 – Prentice- Hall of India Pvt. Ltd., New Delhi.
- Engineering Drawing with an introduction to Auto CAD by Dhananjay A Jolhe, Tata Mc Graw Hill Book Company, New Delhi.

Website Sources:

- https://lecturenotes.in/
- http://home.iitk.ac.in/
- http://www.fkm.utm.my/
- https://lecturenotes.in/

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech- I Year (II Semester)

EMA – 201: ENGINEERING MATHEMATICS – II

Objective: - The main aims of this course are to develop the basic Mathematical skills of engineering students that are imperative for effective understanding of engineering subjects. The topics Differential equation, series solutions, Fourier series and PDE introduced to serve as basic tools for specialized studies in many fields of engineering and technology.

UNIT – 1 **(12 Sessions)**

Differential Equations: Ordinary differential equations of first order and first degree, Linear differential equations of n^{th} order with constant coefficients, Complementary functions and particular integrals, Simultaneous linear differential equations, Solutions of second order differential equations by changing dependent and independent variables, Method of variation of parameters, Applications to engineering problems (without derivation).

UNIT – 2 **(10 Sessions)**

Series Solutions and Special Functions: Series solutions of ODE of 2nd order with variable coefficients with special emphasis to differential equations of Legendre and Bessel, Legendre polynomials, Bessel's functions**.**

UNIT – 3 **(10 Sessions)**

Fourier Series: Periodic functions, Trigonometric series, Fourier series of period 2π , Euler's formulae, Functions having arbitrary period, Change of interval, Even and odd functions, Half range sine and cosine series.

UNIT – 4 **(10 Sessions)**

Partial Differential Equations: Introduction of partial differential equations, Solution of first order differential equations,Linear partial differential equations with constant coefficients of second order and their classification – Parabolic, Elliptic and Hyperbolic with illustrative examples.

UNIT – 5 **(10 Sessions)**

Applications of Partial Differential Equations : Method of separation of variables for solving partial differential equations, Wave equation upto two dimensions, Laplace equation in two-dimensions, Heat conduction equations upto two-dimensions, Equations of transmission Lines.

Course Outcomes:

The student is able to

- Classify differential equations according to certain features.
- Solve first order linear differential equations and nonlineardifferential equations of certain types and interpret the solutions.
- Solve second and higher order linear differential equations with constant coefficients and construct all solutions from the linearly independent solutions.
- Find series solutions about ordinary and regular singular points for second order linear differential equations.
- Apply Fourier series to analyze the engineering problem.
- Solve partial differential equations with methods & its Applications.

Suggested Readings:

6. Prasad C. Advanced Mathematics for Engineers, Prasad Mudralaya.
7. A Textbook of Differential Equations, Pitamber Publications.
8. B. S .Grewal , Engineering Mathematics , Khanna Publishers, New Delhi.
9. E.Kreyszig, Advanced Engineering Mathematics , John Wiley & Sons.
10. C.Ray Wylie & Louis C . Barrett , Advanced Engineering Mathematics ,Tata Mc Graw –Hill Publishing Company Ltd.
11. Chandrika Prasad ,Advanced Mathematics for Engineers, Prasad Mudranalaya.

Website Sources:

- www.pdfdrive.com
- www.dmi.gov.in
- www.yourarticlelibrary.com
- onlinecourses.nptel.ac.in
- en.wikipedia.org

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) - I Year (II Semester)

EPH-201: Engineering Physics-II

Objective: The goal of this course is to familiarize students about electromagnetic theory, magnetic materials, solid state Physics, superconductors and their applications.

UNIT- I **(10 Sessions)**

Electromagnetic Theory

Gauss law, continuity equation, Ampere's Law, Maxwell's equations (differential and integral forms), Pointing vector and Pointing Theorem , propagation of plane electromagnetic waves in free space Non conducting and in conducting media, Skin depth.

UNIT- II **(08 sessions)**

Dielectric and Magnetic Properties of Materials

Dielectric Properties: Dielectric constants, Polarization of dielectric materials, Polarizability, Claussius- Mossotti Equation, Application of dielectric.

Magnetic Properties: Magnetization, Magnetic moment, Dia, Para and Ferro magnetism, Langevin theory for diamagnetic material, Hysteresis Curve.

UNIT – III **(08 Sessions)**

Solid State Physics

Energy bands in metals, Semiconductors and insulators, Intrinsic and extrinsic semiconductors, Fermi energy levels for doped, undoped semiconductors, P-N junction, Tunnel diode, Zener diode.

UNIT- IV **(08 Sessions)**

Superconductivity: Meissner Effect, Type I and Type II Superconductors, BCS theory (Qualitative only), London's Equation, Properties of superconductors & applications of superconductors.

Nano Materials: Basic principle of nano science and technology, Structure, properties and uses of Fullerene and carbon nano tubes, Application of nano technology.

Unit- V **(08 Sessions)**

X-Rays: Diffraction of X-rays, Production and properties, Bragg's Law, Bragg's spectrometer, Applications of X-rays.

Ultrasonics: Introduction, Production of Ultrasonics (Magneto striction and piezoelectric methods), properties & applications of Ultrasonic waves.

Course outcome: The students completing this course will be able to:

- Understand Gauss law, Ampere's Law, Maxwell's equations and their applications.
- Study of Propagation of plane electromagnetic waves in free space.
- Understand Dielectric and magnetic properties of the materials.
- Explain Intrinsic and extrinsic semiconductors.
- Construction, Operation and characteristics of diodes.
- Understand concepts of superconductors, Properties of superconductors & applications of superconductors.
- Gain basic knowledge on the properties, production and applications of X-rays.
- Basic principle of nano science and technology and applications of nanotechnology.

Suggested Readings:

- Concept of Modern Physics: A. BEISER
- Atomic Physics: Rajam
- Greiner : Quantum Physics
- Griffth : Introduction to Electrodynamics
- S. K. Gupta: Engineering Physics
- Beiser : Perspective of Modern Physics

Website Sources:

- https://www2.ph.ed.ac.uk
- http://web.mit.edu
- http://pcwww.liv.ac.uk
- http://sites.science.oregonstate.edu
- https://eng.libretexts.org
- https://shodhganga.inflibnet.ac.in
- https://www.electrical4u.com
- https://vardhaman.org

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -I Year (II Semester)

ECH-201: ENGINEERING CHEMISTRY

Objectives:

1. To emphasize the relevance of fundamentals and applications of chemistry in the field of engineering.
2. To take into account appropriate combinations of old and new emerging concepts for the potential uses in engineering.
3. To address the principles of general chemistry and specific topics relevant to various engineering disciplines.
4. To bring potential applications of chemistry and practical utility in order to become good engineers and entrepreneurs.

UNIT-I **(08 SESSIONS)**

Matter - Chemical Bonding and Its States :Types of bonds (Ionic, covalent and chemical bonds), valence bond theory, molecular orbital theory and its applications to homo and hetero (CO & NO) diatomic molecules. Solid state- Types of unit cells, space lattice (only cubes) calculation of density of the unit cell, two dimensional solids such as graphite and its conduction properties. Fullerenes and their applications.

UNIT-II **(08 SESSIONS)**

Chemical Kinetics and Electrochemistry :Molecularity and order of reactions, zero, first and second order reactions, theories of reaction rates, electrode potential, electrochemical cells (galvanic and concentration), Nernst equation, electrochemical and galvanic series, definition, significance and classification of corrosion, electrochemical corrosion.

UNIT-III **(08 SESSIONS)**

Reaction Mechanism and Spectroscopy:Electrophile, Nucleophile (SN^1 and SN^2reactions)
Mechanism of the following reactions: Aldol condensation (ii) Beckmann rearrangement (iii) Cannizaro reaction
(iv) Hoffmann rearrangement (v) Diels-Alder reaction and ((vi) Friedel craft reaction
Basic principle, instrumentation and general application of UV, Visible, IR/ FTIR & ^{1H}NMR spectroscopy (excluding specific applications).

UNIT-IV **(08 SESSIONS)**

POLYMERS:Polymers, classification and applications, polymerization (addition and condensation), Thermoplastic and Thermosetting polymers, preparation, properties and uses of PVC, Dacron, nylon66 and Bakelite. Elastomers (Natural rubber, buna-N, buna-S) vulcanization, conducting polymers (Intrinsic & Extrinsic), doping, ion exchange resins, biodegradable polymers.

UNIT-V **(08 SESSIONS)**

WATER TREATMENT AND FUELS :Hardness of water, calculation on hardness and its determination by EDTA method, sludge and scale formation, causes and prevention of scale formation (colloidal, phosphate, and calgon conditioning), removal of hardness (Soda lime process, zeolite process & ion-exchange process), calculations based on lime soda process.
Definition of fuels, classification of fuels, calorific value, determination by Dulong's formula, analysis of coal (Proximate and ultimate analysis), petroleum, important fractions of petroleum and their uses, gaseous fuels (CNG & LPG)

Course Outcomes:

1. Demonstrate knowledge of science behind common impurities in water and methods to treat them and also different methods to remove hardness of water .
2. Students will also be able to understand and relate electrochemistry and corrosion.
3. to analyze the basic knowledge of various types of Fuels, their properties and Industrial Applications ALONG WITH THE determination OF the calorific value of fuels .
4. Apply the science for understanding corrosion and its prevention.
5. Demonstrate knowledge of superconducting and organic electronic materials.

Suggested Readings:

1. Text Book of Polymer Science by F.W. Billmeyer, John Wiley & sons, 1994.
2. Liquid Crystals and Plastic Crystals, vol.-I, edited by G.W. Gray and P.A. Winsor, Ellis Harwood Series in Physical Chemistry, New York.
3. Corrosion Engineering by M.G. Fontana McGraw Hill Publications
4. Engineering Chemistry by J C Kuriacose and J. Rajaram, Tata McGraw-Hill Co, New Delhi (2004)
5. Chemistry of Engineering Materials by C.P. Murthy, C.V. Agarwal and A. Naidu BS Publication Hyd.

Website sources:

1. http://www.commonchemistry.org/
2. https://uri.idm.oclc.org/login?url=https://www.engineeringvillage.com/search/quick.url?CID=quickSearch&database=1
3. https://www.technicalsymposium.com/

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) - I Year (II Semester)

EME – 201: ENGINEERING MECHANICS

Objective: The primary purpose of the study of engineering mechanics is to develop the capacity to predict the effects of force and motion while carrying out the creative design functions of engineering. This capacity requires more than a mere knowledge of the physical and mathematical principles of mechanics; also required is the ability to visualize physical configurations in terms of real materials, actual constraints ,and the practical limitations which govern the behavior of machines and structures.

Unit-1 **(SESSIONS 10)**

Two Dimensional Force Systems: Basic concepts, Laws of motion, Principle of Transmissibility of forces, Transfer of a force to parallel position , Resultant of a force system, Simplest Resultant of Two dimensional concurrent and non-concurrent force systems, Free body diagrams, Equilibrium and Equations of Equilibrium, Applications.

Unit-2 **(SESSIONS 08)**

Trusses: Introduction, Simple Truss and solution of simple truss, Method of Joints and Method of Sections.
Friction: Introduction, Laws of Coulomb Friction, Equilibrium of Bodies involving Dry-friction, Belt friction, Application.

Unit-3 **(SESSIONS 08)**

Centroid and Moment of Inertia: Centroid of plane, curve, area, volume and composite bodies, Moment of inertia of plane area, Parallel Axes Theorem, Perpendicular axes theorem, Principal Moment Inertia, Mass Moment of Inertia of Circular Ring, Disc, Cylinder, Sphere and Cone about their Axis of Symmetry.

Unit-4 **(SESSIONS 06)**

Beam: Introduction, Shear force and Bending Moment, Differential Equations for Equilibrium, Shear force and Bending Moment Diagrams for Statically Determinate Beams.

Unit-5 **(SESSIONS 08)**

Kinematics of Rigid Body: Introduction, Plane Motion of Rigid Body, Velocity and Acceleration under Translation and Rotational Motion. Relative Velocity.
Kinetics of Rigid Body: Introduction, Force, Mass and Acceleration, Work and Energy, Impulse and Momentum, D'Alembert's Principles and Dynamic Equilibrium.

Course outcomes: Students completing this course will be able to

- Recognize different force systems, moments and couple.
- To draw Free Body Diagram and label the reactions on it.
- Apply equilibrium equations in statics.
- Understand Newton's law in motion, and recognize different kinds of particle motions.

Reference Books:

1. Engineering Mechanics by Irving H. Shames, Prentice-Hall
2. Mechanics of Solids by Abdul Mubeen, Pearson Education Asia.
3. Engineering Mechanics by R.K.Bansal, Laxmi Publications, New Delhi.
4. Engineering Mechanics by SS BhaviKatti, New age International Publisher, New Delhi.

Suggested Readings:

- https://nptel.ac.in/courses/122/104/122104014/
- https://www.coursera.org/learn/engineering-mechanics-statics
- https://www.edx.org/course/engineering-mechanics-2

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) - I Year (II Semester)

EEC 201: ELECTRONICS ENGINEERING

Objective: The objective of the course is to familiarize the students with concepts of semiconductor and its working along with their applications in real life.

UNIT – I **(08Sessions)**

Theory of Semiconductor material: Energy band Theory of crystals, Insulators, Semiconductors and Metals, classification of semiconductors, Mobility and Conductivity, Donor and Acceptor Impurities, Mass- Action law, Variation in semiconductor parameters with Temperature, Hall – Effect.

UNIT – II **(08Sessions)**

Semiconductor Diodes and Applications: p-n junction, depletion layer, V-I characteristics, diode resistance, capacitance, p-n junction as rectifiers, filter (Shunt capacitor filter), clipping circuits, clamping circuits, breakdown mechanism, breakdown characteristics, zener resistance, zener diode application as shunt regulator. Introduction of LED, and Photo diode.

UNIT– III **(08Sessions)**

Bipolar Junction Transistor (BJT): construction, transistor action, CB, CE and CC configurations, concept of voltage gain, current gain. Field Effect Transistor (FET): JFET: construction, principle of working, concept of pinch-off, drain saturation current, characteristics, characteristic equation, CG, CS and CD configurations, MOSFET: depletion and enhancement type, construction.

UNIT – IV **(08Sessions)**

Number system: conversion of bases (decimal, binary, octal and hexadecimal numbers) addition and subtraction, BCD numbers, Boolean algebra, logic gates, concept of universal gates. Canonical forms, minimization using K-map (Upto four variable, don't care conditions also)

UNIT – V **(08Sessions)**

Operational Amplifier (Op-Amp): concept of ideal operational amplifier, parameters. Inverting, non-inverting and unity gain configurations, Op-amp as adder, subtractor, Block diagram of Communication Systems, Introduction to Modulation, Need for modulation, Definition of AM and FM.

Course Outcome:

- Understand the basic of semiconductor technology
- Define the purpose of different diodes used in several applications
- Develop understanding and impact of resistance regions
- Discuss how basic communication occurs over wireless medium
- Discuss the benefits of transistors over conventional vacuum tubes

Suggested readings:

1. S. Salivahanan, N Suresh Kumar, "Electronic Devices and circuits" 2nd Edition, TMH
2. Robert L. Boylestad/ Louis Nashelsky "Electronic Devices and Circuit Theory", 9th Edition, Pearson Education
3. Jacob Millman, Christos C. Halkias, "Integrated Electronics", TMH
4. Morris Mano "Digital Computer Design", PHI 2003
5. Kennedy, Davis, "Electronics Communication System" 4th Edition, TMH.

Website sources:

- www.sanfoundary.co.in
- Grade up online course on transistors (www.gradeup.org)
- www.nptel.ac.in
- en.wikipedia.org

Note: Adhere to latest edition of the suggested readings.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -I Year (II Semester)

ECS-201: Computer Fundamentals and Programming

Objective:

- This course introduces the concepts of computer basics & programming with particular attention to Engineering examples.
- The C programming language is used but the course will stress on fundamental parts of programming language, so that the students will have a basic concept for understanding and using other programming language.
- C is the easiest language to understand so basic constructs of C will be cleared.

Unit-I **(08 Sessions)**

Introduction: Introduction to Computer Systems, Generation of Computers, BIOS, Various types of memories, CPU organization, ALU, registers.Introduction to various operating Systems.Number systems: Binary, hexadecimal, octal and their inter conversions. Computer Languages and Software & hardware: High Level Languages and Low Level Language, Various types of software. Firmware, Compiler, Interpreter and Assembler. File Allocation Table, Hardware.

Unit –II **(08 Sessions)**

Input, Output and storage Units: Introduction to various Input and output DevicesPrinters: Various type of Impact and Non-Impact Printers.

Introduction to algorithm and Flow chart: Representation of an algorithm, flowchart symbols and levels of flow chart, advantage and limitations of flowchart and pseudo code. Basics of programming: Introduction to the design and implementation of correct, efficient and maintainable programs. Use of high level programming languages for the development of programs.

Unit-III **(08 Sessions)**

Standard I/O in "C", Fundamental Data Types and Storage Classes: Character types, Integer, short, long, unsigned, single and double-precision floating point, storage classes, automatic, register, static and external, Operators and Expressions: Using numeric and relational operators, mixed operands and type conversion, Logical operators, Bit operations, Operator precedence and associatively.

Unit-IV **(08 Sessions)**

Conditional Program Execution: Applying if and switch statements, nesting if and else, restrictions on switch values, use of break and default with switch, Program Loops and Iteration: Uses of while, do and for loops, multiple loop variables, assignment operators, using break and continue.

Unit-V **(08 Sessions)**

Modular Programming: Passing arguments by value, scope rules and global variables, separate compilation, and linkage, building your own modules.

Arrays: Array notation and representation, manipulating array elements, using multidimensional arrays, arrays of unknown or varying size, Structure, union, enumerated data types, Functions: Introduction, types of functions, functions with array, recursive functions, Introduction to pointers, Introduction to file handling, standard C preprocessors, defining and calling macros, conditional compilation, passing values to the compiler.

Course Outcome: On completion of the course students will be able to:

- Understanding the concept of input and output devices of Computers and how it works and recognize the basic terminology used in computer programming
- Write, compile and debug programs in C language and use different data types for writing the programs.
- Design programs connecting decision structures, loops and functions.
- Explain the difference between call by value and call by address.
- Understand the dynamic behavior of memory by the use of pointers.
- Use different data structures and create or manipulate basic data files and developing applications for real world problems.

Suggested Readings:

- "Let us C", Yashvant Kanitkar.
- "Programming with C", Byron Gottfried
- "Computer Fundamentals", Anita Goel, Pearson Education
- "Computer Concepts and Programming in C", E Balaguruswami, McGraw Hill
- "C programming", Kernighan and Ritchie, PHI
- "Computer Fundamentals and Programming in C", Reema Thareja, Oxford Publication

Website Sources:

- www.nptel.ac.in
- www.toptal.com/c/the-ultimate-list-of-resources-to-learn-c-and-c-plus-plus
- www.learn-c.org

Note: Adhere to latest edition of the suggested readings.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -I Year (II Semester)

ECH 251: CHEMISTRY LAB

OBJECTIVE:

- Practical implementation of fundamental concepts of qualitative and quantitative analysis.
- To gain the knowledge on existing future upcoming devices, materials and methodology used in chemistry practicals.
- To rely on elementary treatment and qualitative analysis and makes use of concepts involved.
- To provide an overview of preparation and identification of organic compounds

List of Experiments: (Minimum 08 experiments are required to be performed) (16 Sessions)

1. Determination of alkalinity of the given sample of water.
2. Determination of temporary and permanent hardness of water sample by Versinate method
3. Determination of available chlorine in bleaching powder.
4. Determination of quantity of dissolve oxygen in given sample of water.
5. Determination of iron content in the given water sample by Mohr's methods.
6. Determination of ion exchange capacity of given sample of ion-exchange material.
7. Determination of Equivalent weight of iron by the chemical displacement method. The equivalent weight of copper is 63.5.
8. Determination of viscosity of polystyrene by Ostwald Viscometer.
9. Preparation of Bakelite resin.
10. Element detection and functional group identification in organic

COURSE OUTCOME:

- Students are able to estimate the impurities present in water.
- Ability to prepare advanced polymer materials.
- Ability to know the strength of an acid present in secondary batteries.
- Ability to find the Fe^{+2}, Ca^{+2}& Cl^{-} present in unknown substances using titrimetric and instrumental methods.

SUGGESTED READINGS:

- Applied Chemistry by R. S. Katiyar & J.P. Chaudhary Publication B.B.P. & Co. Meerut
- March's Advanced Organic Chemistry: Reactions, Mechanisms and Structure Smith, Michael B./March, Jerry, John Willey & sons, 6th Edition, 2007.
- Elements of Physical Chemistry, Glasstonne, Samuel B. ELBS, 2005.
- Organic Chemistry, Finar, I.L.: Addision – Wesley Longman, Limited, 2004.
- Principles of Physical Chemistry, by Puri B.R., Sharma L.R., S. Nagin & Company, Delhi

WEBSITE SOURCES:

- https://www.gopracticals.com/basic-engineering/
- https://edu.rsc.org/resources/practical
- https://play.google.com/store/apps/details?id=com.softwareindiavinod.chemistrypracticals&hl=en&gl=US

Note: Adhere to latest edition of the suggested readings.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -I Year (II Semester)

ECS-251: Computer Lab

Objective: The following student learning outcomes, goals, assessment methods and core competencies have been identified for the Learning Center computer lab:

- To provide students with an open access computer lab using up-to-date technology to complete their studies.
- To increase retention in reading, study skills, English, foreign language, nursing, psychology and other academic classes by providing a lab where students can make use of software products to supplement instruction.

List of Experiments: (Minimum 10 experiments are required to be performed) (20 Sessions)

1. Object: Apply basic operations in windows on a folder.
2. Object: Design front page of your practical file
3. Object: Prepare a PERSONAL LETTER.
4. Object: Create your resume using given Templates.
5. Object: Create a report containing the pay details of the employee.
6. Object: Create a student result sheet
7. Object: create a pie chart for a sample data and give legends.
8. Object: Prepare a Time Table in MS-Excel.
9. Object: Prepare a presentation in MS-Power point about "Fundamentals of Computer".
10. Object: Create your E-Mail ID on Gmail
11. Object: Search any topic related to your syllabi using any search.
12. Object: Write a program in C to print "I am a student of IFTM University".
13. Object: Write a program in C to take input from user using scanf.
14. Object: Write a program to add, subtract, multiplication and division of two numbers.
15. Object: Write a program in C to calculate Factorial of a Number
16. Object: Write a program in C to print a Table.
17. Object: Program to compute the compute the average.
18. Object: Write a program to check whether a number is even or odd.
19. Object: Write a program to check whether a number is prime number or not.
20. Object: Write a program to check whether a year is leap year or not.
21. Object: Write a program to find largest of three numbers. 28
22. Object: Program to compute the factorial of a given number.

Course Outcome: The end of this course:

- Students will be able to identify the Learning Center as a place for utilizing computers with specialized software as a resource for supplemental study.
- Students will find the Learning Center equipment, software, and facility adequate to meet their educational needs.
- The Learning Center will support or facilitate a positive learning or service environment for students.
- Each student should be able to choose appropriate data structures to represent data items in real world problems.
- Each student should be able to analyze the time and space complexities of algorithms .
- Each student should be able to design programs using a variety of data structures such as stacks, queues, hash tables, binary trees, search trees, heaps, graphs, and B-trees.
- Each student should be able to analyze and implement various kinds of searching and sorting techniques.

Suggested Readings:

- "Let us C", Yashvant Kanitkar.
- "Programming with C", Byron Gottfried
- "Computer Fundamentals", Anita Goel, Pearson Education
- "Computer Concepts and Programming in C", E Balaguruswami, McGraw Hill
- "C programming", Kernighan and Ritchie, PHI
- "Computer Fundamentals and Programming in C", Reema Thareja, Oxford Publication

Website Sources:

- www.nptel.ac.in
- www.toptal.com/c/the-ultimate-list-of-resources-to-learn-c-and-c-plus-plus
- www.learn-c.org

Note: Adhere to latest edition of the suggested readings.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -I Year (II Semester)

EEC251: ELECTRONICS ENGINEERING LAB

Objective: The objective of this lab is to familiarize the students with the basic working of diodes and also help them calculate voltage and currents through simple devices such as multimeter.

Experiments: **(20 Sessions)**

1. To study of Digital Multimeters (measurement of AC and DC voltage, measurement of current, measurement of resistance, capacitance), passive components (resistor, capacitor) and verify using color code.
2. To Study Cathode Ray Oscilloscope (To study of controls of CRO, to measure amplitude, time period and frequency of time varying signals), function generator, power supply & Bread Board.
3. To study the Characteristics of a P-N Junction diode in forward & reverse bias connection.
4. To draw wave shape of the electrical signal at input and output points of the half wave rectifier.
5. To draw wave shape of the electrical signal at input and output points of the full wave rectifiers.
6. To study the Zener diode characteristic graphical measurement of forward and reverse resistance.
7. To Plot input / output characteristics for common base transistor.
8. To verify the truth table of basic logic gates (AND, OR, NOT)
9. To build and test the clipper circuit using diode.
10. To build and test the clamper circuit using diode

Course Outcome:
Students taking this lab will be able to:
- Measure voltage ,current through multimeter.
- Understand the practical working of a diode
- Understand the graph transitions of a transistor
- Understand the concept of logic gates.

Suggested Readings:

1. S. Salivahanan, N Suresh Kumar, "Electronic Devices and circuits" 2nd Edition, TMH
2. Robert L. Boylestad/ Louis Nashelsky "Electronic Devices and Circuit Theory", 9th Edition, Pearson Education 2007
3. Jacob Millman, Christos C. Halkias, "Integrated Electronics", TMH
4. Morris Mano "Digital Computer Design", PHI

Website Sources:

- www.nptel.ac.in
- www.gradeup.in
- en.wikipedia.org
- www.electr_basic.in

Note: Adhere to the latest editions of the suggested readings.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -I Year (II Semester)

EME –251: Mechanical Engineering Lab

Objective: The objective of the course is to introduce students to different engineering material and create an understanding of different mechanical properties by using Destructive testing methods. Also the students will be familiar with the basic working of IC engines & boilers.

List of Experiments:(Minimum 08 experiments are required to be performed) (16 Sessions)

1. To conduct tensile test and determine the ultimate tensile strength, percentage elongation for a steel specimen using UTM Machine.
2. To conduct compression test and determine the ultimate compressive strength for a specimen using UTM Machine.
3. To conduct Impact-tests (Izod / Charpy) on Impact-testing machine to find the toughness.
4. To determine the hardness of the given specimen using Brinell/Rockwell hardness testing machine.
5. To study 2-stroke & 4-stroke I.C. Engine models.
6. To study Lancashire, Babcock Wilcox and Locomotive boiler models.
7. To study Steam Engine & Steam Turbine models.
8. To study vapor compression Refrigerator unit tutor / refrigerator.
9. To study window type Air conditioner.
10. To conduct torsion test on mild steel or cast iron specimens to find out modulus of rigidity.

Course outcome: Students completing this course will be able to:

- Describe the behavior of materials upon normal external loads.
- Predict the behavior of the material under impact conditions.
- Recognize the mechanical behavior of materials.
- Recognize parts of IC engines.
- Recognize components of boilers.

Suggested Readings:

- Engineering Mechanics by Irving H. Shames, Prentice-Hall
- Mechanics of Solids by Abdul Mubeen, Pearson Education Asia.
- Engineering Mechanics by R.K.Bansal, Laxmi Publications, New Delhi.
- Engineering Mechanics by SS Bhavi Katti, New age International Publisher, New Delhi.

Website Sources:

- https://www.sciencedirect.com/topics/engineering/izod-impact
- https://www.twi-global.com/technical-knowledge/faqs/faq-what-is-charpy-testing
- https://www.hardnesstesters.com/test-types/brinell-hardness-testing
- https://www.youtube.com/watch?v=liiopCScMck

Note: Adhere to the latest editions of the suggested readings.

IFTM UNIVERSITY, MORADABAD

STUDY & EVALUATION SCHEME

B. Tech. Electronics & Communication Engineering (EFFECTIVE FROM 2018 – 2019)

YEAR II, SEMESTER-III

S.N.	Course Code	Course Name	Periods			EVALUATION SCHEME				Course Total L	Credits T
						Internal Exam			End Sem Exam		
			L	T	P	Mid Sem Exam	AS +AT	Total			
THEORY											
1.	EMA-301	Engineering Mathematics -III	3	1	0	20	10	30	70	100	4
2.	EEC-301	Digital Integrated Circuit	3	1	0	20	10	30	70	100	4
3.	EEC-302	Signals and Systems	3	1	0	20	10	30	70	100	4
4.	EEC-303	Elementary Electronic Devices	3	1	0	20	10	30	70	100	4
5.	EEC-305	Network Analysis and Synthesis	3	1	0	20	10	30	70	100	4
6.	ECR-301	Professional Skill Development - II	3	1	0	20	10	30	70	100	4
7.	EHU-301	Disaster Management (Audit Paper)**	3	0	0	20	10	30	70*	100*	3*
PRACTICALS / PROJECT											
8.	EEC-351	Digital Integrated Circuit Lab	0	0	2	30	20	50	50	100	1
9.	EEC-352	Networks and Circuits Lab	0	0	2	30	20	50	50	100	1
10.	EEC-353	Electronic Devices Lab	0	0	2	30	20	50	50	100	1
11.	EEC-354	PCB lab	0	0	2	30	20	50	50	100	1
12.	EGP-301	General Proficiency	-	-	-	-	-	100	-	100	1
		TOTAL	**18**	**06**	**08**	**-**	**-**	**-**	**-**	**1100**	**29**

YEAR II, SEMESTER-IV

S.N.	Course Code	Course Name	Periods			EVALUATION SCHEME				Course Total L	Credits T
						Internal Exam			End Sem Exam		
			L	T	P	Mid Sem Exam	AS +AT	Total			
THEORY											
1.	EMA-401	Computer Based Numerical Analysis and Statistical Techniques	3	1	0	20	10	30	70	100	4
2.	EEC-401	Electronic Circuits	3	1	0	20	10	30	70	100	4
3.	EEC-402	Control Systems and Applications	3	1	0	20	10	30	70	100	4
4.	EEC-403	Microprocessor and Applications	3	1	0	20	10	30	70	100	4
5.	EEC-404	Electronics Instrumentation & Measurements	3	1	0	20	10	30	70	100	4
6.	EEC-405	Engineering Electromagnetic Theory	3	1	0	20	10	30	70	100	4
PRACTICALS / PROJECT											
7.	EEC-451	Electronic Circuits Lab	0	0	2	30	20	50	50	100	1
8.	EEC-452	Control System Lab	0	0	2	30	20	50	50	100	1
9.	EEC-453	Microprocessor Lab - I	0	0	2	30	20	50	50	100	1
10.	EEC-454	Measurement Lab	0	0	2	30	20	50	50	100	1
11.	EGP-401	General Proficiency	-	-	-	-	-	100	-	100	1
		TOTAL	**18**	**06**	**08**	**-**	**-**	**-**	**-**	**1100**	**29**

******The subject **(EHU301) Disasters Management** will be offered as a compulsory audit course and each student has to pass the subject at the minimum by getting 35 marks out of 100.

***Internal Assessment**

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -II Year (III Semester)

EMA – 301: ENGINEERING MATHEMATICS – III

Objective: - The main aims of this course are to exposing the students to learn the Laplace transform and Z-transform and introduce the fundamental ideas of the functions of complex variables and developing a clear understanding of the fundamental concepts of Complex Analysis such as analytic functions, complex integrals and a range of skills which will allow students to work effectively with the concepts in the field of engineering.

UNIT – 1 **(12 Sessions)**

Laplace Transform : Existence theorem, Laplace transform of derivatives & Integrals inverse Laplace transforms, Unit step functions delta functions , Laplace transform of periodic functions, Convolution theorem, Applications to solve simple linear and simultaneous differential equations.

UNIT – 2 **(08 Sessions)**

Integral Transform: Fourier integral, Fourier complex transform, Fourier sine and cosine transforms and applications to simple heat transfer equations. Z- transforms and its applications to solve difference equations.

UNIT – 3 **(10 Sessions)**

Functions of a complex variable – I : Analytic functions, C- R equations and harmonic functions, Line integral in the complex plane, Cauchy's integral theorem, Cauchy's integral formula for derivatives of analytic functions, Liouville's theorem, Fundamental theorem of algebra.

UNIT – 4 **(10 Sessions)**

Functions of a Complex Variable – II : Representation of a function by power series ,Taylor's series and Laurent's series, Singularities, Zeroes and poles, Residue theorem, Evaluation of real integrals of type $\int_0^{2\pi} f(cos\theta, sin\theta)d\theta$and $\int_{-\infty}^{+\infty} f(x)dx$, Conformal mapping and Bilinear transformations.

UNIT – 5 **(12 Sessions)**

Method of least squares and curve fitting of straight lines, Polynomials, Exponential curves etc., Solution of cubic and Bi-quadratic equations.

Course Outcomes:

The student is able to

- Know the use of Laplace transform solving Boundary Value Problems.
- Use Z-transform in development of scientific simulation algorithms.
- Apply the concept and consequences of analyticity and the Cauchy-Riemann equations to Analyze the results on harmonic and including the fundamental theorem of algebra.
- Evaluate complex contour integrals directly and by the fundamental theorem, apply the Cauchy integral theorem and theCauchy integral formulain its various versions.
- Represent functions as Taylor, power and Laurent series, classify singularities and poles, find residues and evaluate complex integrals using the residue theorem.
- Know the use and show the curve fitting of different functions.

Suggested Readings:

1. B. S .Grewal , Engineering Mathematics , Khanna Publishers, New Delhi.
2. B . S . Grewal , Higher Engineering Mathematics , Khanna Publishers,New Delhi.
3. E.Kreyszig, Advanced Engineering Mathematics , John Wiley & Sons
4. C.Ray Wylie & Louis C . Barrett , Advanced Engineering Mathematics ,Tata Mc Graw –Hill Publishing Company Ltd.
5. Chandrika Prasad ,Advanced Mathematics for Engineers, Prasad Mudranalaya.

Website Sources:

- www.pdfdrive.com
- www.dmi.gov.in
- www.yourarticlelibrary.com
- onlinecourses.nptel.ac.in
- en.wikipedia.org

Note: Adhere to the latest editions of the suggested readings.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -II Year (III Semester)

EEC-301: DIGITAL INTEGRATED CIRCUIT

Objective: The objective of this course is to familiarize the students with digital integrated circuits including fabrication, circuit design, implementation methodologies, testing, design methodologies and future trends in the fields of digital electronics.

UNIT – I **(08Sessions)**

Number Systems and Boolean Algebra: Review of binary, octal and hexadecimal number systems - conversion methods- number representations - signed, unsigned, fixed point, floating point numbers –Binary code BCD, Gray code - error detection and correction codes - parity codes- Boolean algebra – basic postulates, theorems – canonical forms-Simplification of Boolean function using Karnaugh map and Quine-McClusky method – Implementations of logic functions using gates, NAND –NOR implementations–Multi level gate implementations- Multi output gate implementations

UNIT – II **(08Sessions)**

Combinational Logic Design: Design Procedure, Implementation of combinational logic functions ,Half adder, full adder, Half subtraction, full subtract or parallel adder, Carry look ahead adder , binary adder , Magnitude comparator, encoder and decoders, multiplexers and De-multiplexers, code converters, parity generator/checker- implementation of combinational circuits using multiplexers.

UNIT – III **(08Sessions)**

Sequential Circuits: General model of sequential circuits- flip-flops- latches – level triggering, edge triggering- master slave configuration - concept of state, state diagram , state table, state reduction procedures , Design of synchronous sequential circuits, up/down, modulus counters, shift registers, Ring counter - Johnson counter - timing diagram – serial adder - parity checker - sequence detector.

UNIT – IV **(08Sessions)**

Memory and Programmable Logic Devices: Classification of memories, RAM, Memory decoding, Error Detection and correction, Read only Memory, Programmable Logic Array (PLA), Programmable Array Logic (PAL), Field Programmable Gate Arrays (FPGA), Sequential Programmable Devices.

UNIT – V **(08Sessions)**

Logic Families: Input characteristics and output characteristics of logic gates, Fan-in, Fan-out, Noise margin, circuit concept and comparison of various logic families: TTL, IIL, ECL, NMOS, CMOS Tri-state logic, open collector output.
Asynchronous Sequential Logic: Analysis Procedure, Circuits and Latches, Design Procedure, Reduction of state and flow tables, Race free State Assignments, Hazards.

Course Outcomes:
Students completing this course will be able to:

- To comprehend the different issues related to the development of digital integrated circuits including fabrication, circuit design, implementation methodologies, testing, design methodologies and tools and future trends.
- To use tools covering the back-end design stages of digital integrated circuits.
- To develop a basic knowledge which helps them to better understand the subjects like digital communication, VLSI Design and Chip manufacturing etc

Suggested Readings:

1. Floyd, "Digital Fundamentals", Universal Book Stall, New Delhi.
2. Albert Paul Malvino and Donald P Leach, "Digital Principles and Applications"McGraw Hill.
3. R P Jain, Modern Digital Electronics, TMH, New Delhi.
4. Morris Mano, "Digital Design", PHI Learning, fourth edition, 2008.

Website Sources:

- ndl.iitkgp.ac.in
- online courses.nptel.ac.in
- en.wikipedia.org
- www.tutorialspoint.com
- www.vlab.co.in

Note: Adhere to the latest editions of the suggested readings.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -II Year (III Semester)

EEC-302: SIGNALS AND SYSTEMS

Objective: The objective of this course understanding the mathematical and fundamental characteristics of signals and systems in terms of both the time and transform (frequency) domains.

UNIT – I **(08Sessions)**

Classification of Signals and Systems: Continuous time signals (CT signals), discrete time signals (DT signals) - Step, Ramp, Pulse, Impulse, Exponential, Classification of CT and DT signals - periodic and periodic, random signals, CT systems and DT systems, Basic properties of systems - Linear Time invariant Systems and properties.

UNIT – II **(08Sessions)**

Analysis of Continuous Time Signals: Fourier series analysis, Spectrum of C.T. signals, Fourier Transform and Laplace Transform in Signal Analysis.

UNIT – III **(08Sessions)**

Linear Time Invariant – Continuous Time Systems: Differential equation, Block diagram representation, Impulse response, Convolution integral, frequency response, Fourier and Laplace transforms in analysis, State variable equations and matrix representation of systems.

UNIT – IV **(08Sessions)**

Analysis of Discrete Time Signals: Sampling of CT signals and aliasing, DTFT and properties, Z-transform and properties of Z-transform.

UNIT – V **(08Sessions)**

Linear Time Invariant - Discrete Time Systems: Difference equations, Block diagram representation, Impulse response, Convolution sum, Basic definition of causal system, bounded input, bounded output system, time invariant system, LTI systems analysis using DTFT and Z-transforms, State variable equations and matrix representation of systems.

Course Outcomes:

Students completing this course will be able to:

- Understand mathematical and graphical representation/description of continuous and discrete time signals and systems
- Develop input output relationship for linear shift invariant system and understand the convolution operator for continuous and discrete time system.
- Analyze and understand the spectral characteristics of signals in frequency domain using Fourier series and Fourier
- Apply the Laplace transform and Z- transform for analyze of continuous-time and discrete-time signals and systems.
- Understand the process of sampling and the effects of under sampling.

Suggested readings:

1. Allan V.Oppenheim, S.Wilsky and S.H.Nawab, Signals and Systems, Pearson Education, 2007.
2. Edward W Kamen & Bonnie's Heck, "Fundamentals of Signals and Systems", Pearson Education, 2007.
3. H P Hsu, Rakesh Ranjan"Signals and Systems", Schaum's Outlines, Tata McGraw\ Hill, Indian Reprint, 2007
4. S.Salivahanan, A. Vallavaraj, C. Gnanapriya, Digital Signal Processing, McGraw Hill International/TMH, 2007.
5. Simon Haykins and Barry Van Veen, Signals and Systems John Wiley &sons, Inc, 2004.

Website sources:

- https://www.edx.org/course/signals-and-systems-part-1
- www.nptel.ac.in
- en.wikipedia.org

Note: Adhere to latest edition of the suggested readings.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -II Year (III Semester)

EEC-303: ELEMENTARY ELECTRONIC DEVICES

Objective: The objective of this course is to familiarize the students with the Crystal Properties of Semiconductors Elemental and compound semiconductors, Excess Carriers in Semiconductors and diffusion of carriers, Junction Properties, Metal semiconductor junctions, Fundamentals of BJT operation and characteristics of MOSFET and HEMT.

UNIT I **(10 Sessions)**

Crystal Properties and charge Carriers in Semiconductors: Elemental and compound semiconductor materials, crystal lattice structure, Bonding forces and energy bands in solids, charge carriers in semiconductors, carrier concentrations, drift of carriers in electric and magnetic fields, Hall effect.

UNIT II **(8 Sessions)**

Excess Carriers in Semiconductors: Optical absorption, luminescence, carrier life time and photo conductivity, diffusion of carriers, diffusion processes, Einstein relation.

UNIT III **(10 Sessions)**

Junction Properties: Equilibrium conditions, biased junctions, steady state conditions, reverse bias break down, transient and AC conditions. Metal semiconductor junctions.

UNIT IV **(12 Sessions)**

Transistors: Bipolar junction transistors: Fundamentals of BJT operation, amplification with BJTs, Ebers-Moll Model, and Metal oxide semiconductor field effect transistor (MOSFET): Construction Metal-semiconductor-field-effect-transistors (MESFET), Metal-insulator-semiconductor-field-effect-transistors (MISFET), High Electron Mobility Transistor (HEMT), Operation and characteristics of above devices.

UNIT V **(10 Sessions)**

Some special devices: Photodiodes, photo detectors, solar cell, light emitting diodes, semiconductor lasers, light emitting materials.

Course Outcomes:

Students completing this course will be able to:

- Analysis of atomic structure.
- Applications of modern solid state physics results into solid state electronics.
- Metal-semiconductor and pn junction.
- Fundamentals of BJT operation
- Photodiode. photo detectors and solar cell.

Suggested Readings:

1. B. G. Streetman and S. Banerjee “Solid state electronics devices”, 5th Edition, PHI.
2. Alok Dutta, “Semiconductor Devices and circuits”, Oxford University Press.
3. Donald A Neaman, “Semiconductor Physics and Devices Basic Principles” 3rd Ed TMH India.
4. Millman Halkias, “Integrated Electronics” TMH India.

Website sources:

- www.nptel.ac.in
- en.wikipedia.org
- www.sanfoundary.co.in
- Grade up online course on transistors (www.gradeup.org)

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -II Year (III Semester)

EEC-305: NETWORK ANALYSIS AND SYNTHESIS

Objective: The objective of this course is to develop problem solving skills and understanding of circuit theory through the application of techniques and principles of electrical circuit analysis to common circuit problems.

UNIT I **(11Sessions)**

Basic of Circuits and Network: Mesh analysis, node analysis, Y-Δ (Star-delta). Transformation, Source transformation technique, Graph Theory: Definitions (tree, co-tree, link, basic loop, link currents), Incidence Matrix, Tie set matrix, Cut-set matrix.

UNIT II **(10Sessions)**

Network Theorems: Thevenin's and Norton's theorems, maximum power transfer theorem, Superposition theorem, Complex impedance, Steady state and Transient response of RL,RC,RLC circuit (having DC Excitation and Sinusoidal Excitation), Resonance: Series and Parallel Resonance, Bandwidth of RLC circuit, the Q-factor and effect on bandwidth.

UNIT III **(10Sessions)**

Two Port networks: Characterization of LTI two port networks, Z, Y, ABCD, T and h parameters, Image parameters reciprocity and symmetry, Inter-relationships between the parameters, inter-connections of two port networks, ladder and lattice networks, Transfer function of two port networks, poles and zeros, Necessary condition for driving point function and transfer function.

UNIT IV **(07Sessions)**

Network synthesis: Positive real functions, Hurwitz polynomials, Properties of real immittance functions, synthesis of LC driving point immittance, properties of RC driving point impedances, synthesis of RC impedances or RL admittances, properties of RL impedances and RC admittances.

UNIT V **(06Sessions)**

Filters: Introduction, Classification of filters, Introduction of windows, Butterworth filter, Equation of Ideal filters, Image parameters, and characteristics impedance, Passive and Active Filters, Low Pass, High pass, Constant K-type, M derived filters and their design.

Course Outcomes:

After the successful completion of this course, the students will be able to:

1. Understanding the various laws and theorems related to electric networks.
2. Understanding the concept of two port networks.
3. Familiarize with network synthesis.

Suggested Reading:

1. Robert L. Boylsted, "Introductory Circuit Analysis", Pearson Education.
2. A Sudhakar, Shyammohan S P, "Circuits and Network-Analysis and synthesis" 3rd Edition, TMH Education,
3. Franklin F. Kuo, "Network Analysis and synthesis", 2nd Edition, Wiley India Pvt Ltd.
4. Behrouz Peikari, "Fundamentals of Network Analysis & synthesis", Jaico Publishing House, 2006.
5. M. E. Van Valkenberg, "Network Analysis", 2nd Edition, Prentice Hall of India Ltd.
6. Roy Chowdhuary, D., Networks and Systems, New Age International (P) Limited, Publishers (2007).

Website Sources:

1. en.wikipedia.org
2. www.studynama.com
3. onlinecourses.nptel.ac.in
4. www.gupshupstudy.com
5. www.tutorialspoint.com

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -II Year (III Semester)

ECR-301: PROFESSIONAL SKILL DEVELOPMENT-II

Objectives: The objectives of Professional Skill Development-II are:

- To Develop critical thinking, creativity and effective communication.
- To provide the essential foundational elements for leadership skill-building and student success.
- To Explore self-awareness that involves identification and articulation of various facets – cultural, social, and familial that contribute to the formation of one's identity.
- To develop mutually beneficial relationships through communication and cooperation with others, collaborate to achieve group goals, practice living and leading with integrity, and learn about issues of local and global significance in order to become active members of their communities.

Unit I: Communicative Skills **(Session-05)**

Communication: Concept, Classification, Purpose, Process, Importance, Flow & Level of Communication, Barriers & Gateways in Communication, 7 C's of Communication, Types of Communication & communication without words

Unit II: Intrapersonal Relationship Skills **(Session-07)**

Personality: Characteristics of Healthy & Sick Personality
Self Awareness
Self Esteem
Self Confidence
Assertiveness V/S Aggressiveness
Values: Types & Importance

Unit III: Interpersonal Relationship Skills **(Session-08)**

Group: Concepts, Types, Stages
Team: Concepts, Elements, Types, Stages
Presentation Skills& strategies
Interview: Concepts, Types, Process, Interview Preparation Checklist, Interview Handling Skills, Common Interview mistakes

Unit IV: Argumentative Skills **(Session-10)**

Debate
Role Play
Speeches
Elocution
Group Discussion

Unit V: Campus to Company Skills **(Session-08)**

The corporate Fit: Dressing and Grooming
Basic Etiquette: Office (Do's and Don'ts for men and women), Telephone, Email
Dealing with People in Corporate

Course Outcomes:

Students completing this course will be able to:

- Apply the comprehensive set of skills and knowledge for life success.
- understand the communication process, its benefits and challenges
- Learn to effectively lead others on a project or in an organization
- Develop and articulate respect for the diversity of talents, ways of knowing and learning.

Suggested Readings:

1- M.K. Sehgal & V. Khetrapal's Business Communication published by Excel Books.
2- Rajendra Pal's Business Communication published by Sultan Chand & Sons Publication.
3- P. D. Chaturvedi's Busines Communication published by Pearson Education, Delhi.
4- Elizabeth B. Hurlock's Personality Development by Tata McGraw Hills, Delhi.

Website Sources:

- www.wikipedia.com
- www.fluentu.com
- www.mindstool.com
- www.digitalcommons.pace.edu

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -II Year (III Semester)

EHU-301: Disaster Management

Objectives:

- To provide students an understanding to the concepts and aspects of disaster and its relationship with development.
- To ensure awareness of Disaster Risk Reduction (DRR) approaches among students.
- To assist students develop ability to respond to their environment with potential response to disaster.

UNIT I: Introduction to Disasters (12 Sessions)

- Definition: Disaster, Hazard, Vulnerability, Resilience, Risks
- Types of disasters – Earthquake, Landslide, Flood, Drought, Fire, campus shooting, bomb threat, terrorist incidence and financial emergency etc.
- Causes and Impacts including social, economic, political, environmental, health, psychosocial, etc. Differential impacts- in terms of caste, class, gender, age, location, disability.
- Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters.

UNIT II: Approaches to Disaster Risk Reduction (10 Sessions)

- Disaster life cycle – its analysis, phases, culture of safety, prevention, mitigation and preparedness
- Community based DRR (Disaster Risk Reduction), Structural-nonstructural measures,
- Roles and responsibilities of community: Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stakeholders

UNIT III: Inter-Relationship between Disasters and Development (08 Sessions)

- Factors affecting Vulnerabilities, impact of Development projects such as dams, embankments, changes in Land-use etc.
- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India – Relevance of indigenous knowledge, appropriate technology and local resources.
- Role of international cooperations in Disaster Management

UNIT IV: Disaster Risk Management in India (08 Sessions)

- Hazard and Vulnerability profile of India. Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management
- Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy – Other related policies, plans, programs and legislation
- Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V: Disaster Management: Applications, Case Studies and Field Works (07 Sessions)

The project /fieldwork is meant for students to understand vulnerabilities and to work on reducing disaster risks and to build a culture of safety. Projects must be conceived creatively based on the geographic location and hazard profile of the region where the college is located. A few ideas or suggestions are discussed below. Several governmental initiatives require Urban Local Bodies (ULBs) and Panchayati Raj Institutions (PRIs) to be proactive in preparing DM plans and community based disaster preparedness plans. Information on these would be available with the district collector or Municipal corporations. Teachers could ask students to explore and map disaster prone areas, vulnerable sites, vulnerability of people (specific groups) and resources. The students along with teacher could work on ways of addressing these vulnerabilities, preparing plans and consultation with local administration or NGOs. Students could conduct mock drills in schools, colleges or hospitals. They could also work on school safety, safety of college buildings, training in first aid. Other examples could be- identifying how a large dam, road/ highway or an embankment or the location of an industry affects local environment and resources or how displacement of large sections of people creates severe vulnerabilities may be mapped by student project work.

- The suggested topics for Project work for student could be as follows: Monitoring and evaluation plan for disaster response, Low cost Home based water purification methods, Planning Nutrition intervention programs, Safety tips before during and after earthquake, cyclone, floods and fire accidents, Mock Drills, Major disasters in India, Disaster Management in , Flood affected areas and damages in India, Heat waves in India, Earth quakes in India, Historical Tsunamis in India, Nuclear emergence, Traffic accidents in India, Train Accidents, Major disease outbreak, Disaster management structure in India, Precaution, mitigation of disaster in India, Warning system in India to prevent disaster, Bhopal gas tragedy, Kutch earth quake, Tsunami (2004), Kosi Calamity 2008, Mayapuri radiation exposure Delhi (2010), Mock exercises.

Any field works related to disaster management.

Course Outcomes: The students will be able to identify the nature and causes of disaster. Also the students will be able to apply the disaster risk reduction mechanism.

Suggested Readings:

- Satish Modh, Introduction to Disaster Management, Macmillan Publisher India Ltd
- Alexander David, Introduction in 'Confronting Catastrophe', Oxford University Press
- Blaikie, P, Cannon T, Davis I, Wisner B 1997. At Risk Natural Hazards, Peoples' Vulnerability and Disasters, Routledge.
- Govt. of India: Disaster Management Act 2005, Government of India, New Delhi. Government of India, 2009.

Website Sources:

- https://publichealthdisasters.eu
- https://www.researchgate.net

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -II Year (III Semester)

EEC-351: DIGITAL INTEGRATED CIRCUITS LAB

Objective: The objective of this course is to familiarize the students with both combinational and sequential digital integrated circuits including circuit design, implementation, testing and future trends in the fields of digital electronics.

List of Experiments **(10Sessions)**

a. Introduction to digital electronics lab- nomenclature of digital ICs, specifications, study of the data sheet, concept of V_{cc} and ground.
b. To simplify the given expression and to realize it using Basic gates and Universal gates
c. Implementation and verification of Half Adder and Full Adder using logic gates
d. Implementation and verification of Decoder and Encoder using logic gates.
e. Implementation of 4x1 multiplexer using logic gates.
f. Implementation of 1x4 de-multiplexer using logic gates.
g. To realize Adder (Half & Full) and Subtractor (Half & Full) Circuits using MUX and DeMUX.
h. Implementation of 4-bit parallel adder using 7483 IC.
i. Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.
j. Mini Project.

Course Outcomes:
Students completing this course will be able to:

- To develop a basic knowledge which helps them to better understand combinational and sequential circuits.
- To comprehend the different issues related to designing of digital integrated circuits including circuit design, implementation, testing and design methodologies and tools for future trends.
- To use tools covering the back-end design stages of digital integrated circuits.

Suggested Readings:

1. Floyd, "Digital Fundamentals", Universal Book Stall, New Delhi.
2. Albert Paul Malvino and Donald P Leach, "Digital Principles and Applications", McGraw Hill.
3. R P Jain, Modern Digital Electronics, TMH, New Delhi.
4. Morris Mano, "Digital Design", PHI Learning, fourth edition, 2008.

Website Sources:

- ndl.iitkgp.ac.in
- online courses.nptel.ac.in
- en.wikipedia.org
- www.vlab.co.in

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -II Year (III Semester)

EEC-352: NETWORKS AND CIRCUITS LAB

Objectives
The objectives are to study:
1. Fundamentals of Ohm's law, Kirchhoff's current and voltage laws and its practical implementation
2. Measurement of voltage, current, power and impedance of any circuit
3. Analysis of a given circuit depending on types of elements - DC analysis, Transient analysis and Frequency analysis

List of Experiments **(10Sessions)**

1. Verification of principle of superposition with dc and ac sources.
2. Verification of Thevenin & Norton theorem in ac circuits.
3. Verification of Maximum power transfer theorems in ac circuits.
4. Determination of transient response of current in RL and RC circuits with step voltage input.
5. Determination of frequency response of current in RLC circuit with sinusoidal ac input.
6. Determination of z and h parameters (dc only) for a network and computation of Y and ABCD Parameters
7. Determination of driving point and transfer functions of a two port ladder network and verify with theoretical values.
8. To determine attenuation characteristics of a low pass / high pass active filters.

Course Outcomes

After studying this course the students would gain enough knowledge on:

1. Practical implications of the fundamentals of Ohm's law, Kirchhoff's current and voltage laws.
2. Accurate measurement of voltage, current, power and impedance of any circuit.
3. DC analysis, Transient analysis and Frequency analysis of a given circuit depending on types of elements.

Suggested Reading:
1. Robert L. Boylsted, "Introductory Circuit Analysis", Pearson Education.
2. A Sudhakar, Shyammohan S P, "Circuits and Network-Analysis and synthesis" 3rd Edition, TMH Education,
3. Franklin F. Kuo, "Network Analysis and synthesis", 2nd Edition, Wiley India Pvt Ltd.
4. Behrouz Peikari, "Fundamentals of Network Analysis & synthesis", Jaico Publishing House, 2006.
5. M. E. Van Valkenberg, "Network Analysis", 2nd Edition, Prentice Hall of India Ltd.
6. Roy Chowdhuary, D., Networks and Systems, New Age International (P) Limited, Publishers (2007).

Website Sources:
1. en.wikipedia.org
2. https://www.vlab.co.in/
3. onlinecourses.nptel.ac.in

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B. Tech) Electronics & Communication Engineering
B. Tech (EC) -II YEAR (III Semester)

EEC-353: ELECTRONIC DEVICES LAB

Objective: The objective of this lab is to familiarize the students with the application of PN junction diode characteristics of BJT, operation of single-stage and multi-stage RC–Coupled amplifier, characteristics of JFET and SCR.

List of Experiments **(10Sessions)**

1. Application of PN Junction Diode:-full wave rectifier-Measurement of V_{rms}, V_{dc}, ripple factor-use of filter-ripple reduction.
2. Characteristics of BJT: BJT in CE configuration-Graphical measurement of h parameters from input and output Characteristics.
3. To study the operation of single-stage and multi-stage RC–Coupled Amplifier
4. To calculate A_v , A_I , R_o and R_i of CE RC-Coupled amplifier with potential divider biasing.
5. To calculate the current gain and input impedance of Darlington pair and β of a transistor.
6. Study of the characteristics of JFET (Junction Field Effect Transistor) in common source configuration .Graphical measurement of its parameters gm, rd& μ from input and output characteristics.
7. To study the Characteristics of SCR.
8. To study the VI Characteristic of DIAC.
9. To study the VI Characteristic of TRIAC for different gate values of gate current.

Course Outcomes:
Students completing this course will be able to:

- Understand the application of PN Junction Diode
- Understand the characteristics of BJT: BJT in CE configuration-Graphical measurement of h parameters from input and output Characteristics
- Able to calculate A_v , A_I , R_o and R_i of CE RC-Coupled amplifier with potential divider biasing.

Suggested Readings:

1. B. G. Streetman and S. Banerjee "Solid state electronics devices", 5th Edition, PHI.
2. Alok Dutta, "Semiconductor Devices and circuits", Oxford University Press.
3. Donald A Neaman, "Semiconductor Physics and Devices Basic Principles" 3rd Ed TMH India.
4. Millman Halkias, "Integrated Electronics" TMH India.

Website sources:

- www.nptel.ac.in
- en.wikipedia.org
- www.sanfoundary.co.in
- Grade up online course on transistors (www.gradeup.org)

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -II Year (III Semester)

EEC-354: PRINTED CIRCUIT BOARD (PCB) LAB

Objective: The objective of this course is to familiarize the students with printed circuit board for designing various digital and analog circuits. This lab helps them to implement the various circuits clearly on PCB board.

List of Experiments **(13Sessions)**

1. Study of chemicals used in PCB lab.
2. Study of PCB curing machine and photo contact printer used for developer of negative
3. Study of PCB shearing machine.
4. Study of photo resist dip coating and photo U.V (Double Side) machine used for developing PCB.
5. Study of etching machine (Proto Etch) used for developing PCB.
6. Study of roller tinning machine and precision drilling machine
7. To study the fabrication of general PCB.
8. To make negative of bridge rectifier circuit.
9. To fabricate PCB from the negative of bridge rectifier circuit.
10. To solder the component on PCB of dc unregulated power supply.

Course Outcomes:
Students completing this course will be able to:

- To develop a basic knowledge about various chemicals used for developing Printed Circuit Board.
- To develop knowledge about various machines and tools related for PCB manufacturing.
- To have knowledge about soldering and verifying the circuit.

Suggested Readings:

1. R.S Khandpur, "Printed Circuit Boards: Design – Fabrication", McGraw Hill
2. Mr.Elanjeliyan "PCB Designing and Fabrication Training Book", Chipsystem.
3. Johnson" High speed Digital Design",Pearson Education

Website Sources:

- ndl.iitkgp.ac.in
- online courses.nptel.ac.in
- en.wikipedia.org
- www.vlab.co.in

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -II Year (IV Semester)

EMA – 401: COMPUTER BASED NUMERICAL & STATISTICAL TECHNIQUES

Objective: - The main aims of this course are to provide suitable and effective methods by numerical analysis, for obtaining approximate representative numerical results of the problems. To have a proper understanding of Statistical applications in different areas.

UNIT – 1 **(12 Sessions)**

Introduction: Numbers and their accuracy , Computer Arithmetic, Mathematical preliminaries, Errors and their Computation, General error formula, Error in a series approximation**Solution of Algebraic and Transcendental Equations:** Bisection Method, Iteration method, Method of false position, Newton- Raphson method, Methods of finding complex roots, Muller's method, Rate of Convergence, Polynomial equations.

UNIT – 2 **(10 Sessions)**

Solution system of linear equations:Gauss-Seidal method, LU decomposition method.
Interpolation: Finite differences, Differences tables
Polynomial Interpolation: Newton's forward and backward formula**.**
Interpolation with unequal intervals: Lagrange's interpolation, Newton divided difference formula.

UNIT – 3 **(10 Sessions)**

Numerical Integration and Differentiation: Introduction to numerical differentiation, Numerical integration: Trapezoidal rule, Simpson's one-third rule, Simpson's three-eighth rule, Boole's rule, Waddle's rule.
Solution of differential equations: Picard's method, Euler's method, Taylor's method, Runga- Kutta methods, Predictor-Corrector methods.

UNIT – 4 **(10 Sessions)**

Statistical Techniques –I: Moments, Moment generating functions, Skewness, Kurtosis, Linear, non- Linear and multiple regression analysis, Probability theory, Correlation, Binomial, Poisson and Normal distributions.

UNIT – 5 **(10 Sessions)**

Statistical Techniques –II: Sampling theory (small and large), Test of significances:Chi-square test, t- test, Analysis of variance (one way), Application to engineering, medicine, agriculture etc.Time series and forecasting (moving and semi-averages), Statistical quality control methods, Control charts, X, R, p, np, and c charts.

Course Outcomes:

The student is able to

- Apply Numerical analysis which has enormous application in the field of Science and Engineering.
- Understand numerical integration and differentiation, numerical solution of ordinary differential equations.
- Compare and analyze the methods statistical analysis and the omnipresent role of variability.
- Predict and evaluate the efficient design of studies and construction of effective sampling plans.
- Exploratory data analysis and formal inference process.

Suggested Readings:

1. V. Raja Raman: "Computer Oriented Numerical Methods", PHI.
2. P.P. Gupta & G. S. Malik: "Numerical Analysis", Krishna Prakashan media, Meerut.
3. B. S. Grewal: "Numerical methods in Engineering and Science", Khanna Publishers, Delhi.
4. Pradip Niyogi: "Numerical Analysis and Algorithms", TMH.
5. S. C. Gupta & V.K. Kapoor: "Fundamentals of Mathematical Statistics", Sultan Chand& Sons, Delhi.

Website Sources:

- www.pdfdrive.com
- www.dmi.gov.in
- www.yourarticlelibrary.com
- onlinecourses.nptel.ac.in
- en.wikipedia.org

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -II Year (IV Semester)

EEC-401: ELECTRONIC CIRCUITS

Objective: The objective of this course is to familiarize the students with to the advanced concepts of electronics device structure operation. The primary objective of this course is to understand and implement the advanced electronic circuits such as amplifiers etc with the help of theoretical and practical problem solving.

UNIT-I **(10 Sessions)**

BJT: Review of device structure operation and V-I characteristics, BJT circuits at DC, BJT as amplifier and switch, biasing in BJT amplifier circuit, small-signal operation and models, single stage BJT amplifier, BJT internal capacitances and high frequency model, Hybrid-pi (π) CE transistor model, frequency response of CE amplifier.

UNIT – II **(12 Sessions)**

MOSFET: Review of device structure operation and V-I characteristics. Circuits at DC, MOSFET as Amplifier and switch, Biasing in MOS amplifier circuits, small-signal operation and models, single stage MOS amplifier, MOSFET internal capacitances and high frequency model, frequency response of CS amplifier. Differential Amplifier: MOS differential pair, small signal operation of the MOS differential pair, BJT differential pair.

UNIT – III **(8 Sessions)**

Large Signal Amplifiers: Classification of power amplifiers - Class A power amplifier direct and transformer coupled amplifiers; - Class B - Push-pull arrangements and complementary symmetry amplifiers; conversion efficiency calculations, cross over distortion – class AB amplifier - amplifier distortion – power transistor heat sinking – Class C and D amplifiers.

Unit-IV **(10 Sessions)**

Feedback Amplifiers: Concept of feedback- topological classification-voltage series, voltage shunt, current series, current shunt - effect of feedback on gain, stability, distortion, band width, input and output impedances – practical feedback amplifier circuits and their analysis –multistage feedback amplifier.

Unit – V **(10 Session)**

Oscillators: Barkhausen criterion for sustained oscillations - RC oscillators – RC phase shift oscillator and Wein bridge oscillator- resonant circuit oscillators – tuned drain and tuned collector oscillator - LC oscillators- Hartley and Colpitts oscillators – crystal oscillators and frequency stability.

Course Outcomes:

Students completing this course will be able to:

- Determine quiescent point, gain, input and output impedance of common emitter and common collector amplifiers.
- Determine the concept of feedback amplifiers
- Explain performance of basic class-A and class-B power amplifiers.
- Explain principal of operation of various basic oscillators.

Suggested Readings:

1. David A. Bell, “Electronic Devices and Circuits”, PHI Learning Private Ltd, Fourth Edition, 2007
2. R. L. Boylestad and L. Nashelsky,“Electronic Devices and Circuit Theory”, PHI Learning Pvt Ltd, Ninth Edition, 2008.
3. Millman and Halkias, “Integrated Electronics”, Tata McGraw Hill International Edition, 2002.
4. David A. Bell, “Solid State Pulse circuits”, PHI Learning Private Ltd, Fourth Edition, 2007.
5. Sedra and K. C. Smith, “Microelectronic Circuits”, Oxford University Press, 5th Ed.

Website sources:

- www.nptel.ac.in
- en.wikipedia.org
- Grade up online course on transistors (www.gradeup.org)

Note: Latest editions of all the suggested readings must be used.

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IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -II Year (IV Semester)

EEC-402: CONTROL SYSTEMS AND APPLICATIONS

Objective: The objective of this course is to understand concepts of the mathematical modeling, feedback control and stability analysis in Time and Frequency domains.

UNIT I **(10Sessions)**

System Modeling: Introduction to control system, Basic elements in control system, Open and closed loop control systems, Feedback and its effect, types of feedback control systems. Differential equation representation of physical systems, Transfer function, Mathematical modeling of electrical and mechanical systems (Translational and Rotational), Analogous system, Block diagram representation of systems, Block diagram reduction techniques, Signal flow graph.

UNIT II **(08Sessions)**

Time Domain Analysis: Standard test signals- First order system - step, ramp and impulse response analysis-Second order system – step response analysis- steady state error –generalized error co-efficient –Effect of adding a zero to system- Principle of PI, PD and PID compensation-stability analysis.

UNIT III **(08Sessions)**

Stability of Linear Control Systems: Bounded-input bounded-output stability continuous data systems, zero-input and asymptotic stability of continuous data systems, methods of determining stability, Routh Hurwitz criterion. Root locus method (Example problems & solutions), Lead compensation, and Lag-Lead compensation.

UNIT IV **(10Sessions)**

Frequency Domain Analysis: Frequency response , M_r (resonant peak) and ω_r (resonant frequency) and bandwidth of the prototype Second order system Frequency domain specifications, Correlation between time domain and frequency domain specifications, Bode plot, Stability analysis using Bode plot, gain margin and phase margin, transfer function from bode plot.

UNIT V **(09Sessions)**

State Space Analysis: Introduction – Concepts of state, state variables and state model–State model of linear systems– system realization-State space representation using physical, phase and canonical variables –diagonal canonical form-Jordan canonical form diagonalization-Time domain solution of state equation-State transition matrix-Laplace transform solution of state equations- Derivation of transfer function from the state model-Controllability and observability- State space representation of discrete time systems.

Course Outcomes:

After the successful completion of the course, the students will be able to:
1. Develop the mathematical model of the physical systems.
2. Analyze the response of the closed and open loop systems.
3. Develop and analyze state space models.

Suggested Reading:

1. Benjamin C. Kuo, “Automatic Control Systems”, Seventh Edition, PHI Learning New Delhi, 1997.
2. Katsuhiko Ogata, “Discrete Time Control Systems”, Second Edition, PHI Learning New Delhi, 2006.
3. I. J. Nagrath, M. Gopal, “Control Systems Engineering”, Fifth Edition, New Age International, New Delhi, 2007.
4. R. Anandanatarajan, P. Ramesh Babu, “Control Systems Engineering”, Second edition, Scitech Publications Pvt. (India) Ltd, 2008.

Website Sources:

1. en.wikipedia.org
2. www.studynama.com
3. onlinecourses.nptel.ac.in
4. www.gupshupstudy.com
5. www.tutorialspoint.com

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -II Year (IV Semester)

EEC 403: MICROPROCESSOR AND APPLICATIONS

Objective: The objective of this course is to understand the basic concepts related to functioning of a microprocessor which yields several applications like adder /subtractor circuits etc.

UNIT I **(08Sessions)**

Introduction: Microprocessor evolution and types, Microprocessor architecture and operation of its components, Memory, Input & output devices, interrupts, data transfer schemes, data flow, timer and timing diagram Logic devices for interfacing, Architectural advancement of microprocessor, Typical microprocessor schemes.

UNIT II **(08Sessions)**

8-Bit Microprocessors: Pin diagram, Signals and internal architecture of 8085 Microprocessor, registers, ALU, Control & status, 8085 machine cycles: Opcode Fetch, Memory Read, Memory write, I/O read, I/O write, Interrupt Acknowledge, Bus idle. The 8085 Interrupts: Vector and non-vector, Hardware and Software interrupts, Triggering interrupts.

UNIT III **(08Sessions)**

Interfacing and 8085 Instructions: Interfacing data converters: D/A converters, R/2R Ladder network. Interfacing input/output devices, Memory mapped input/output with examples. Instruction classification: Data Transfer operations, Arithmetic operations, Logic Operations, Branch operation. Instruction formats: one byte, two byte, three byte. Addressing modes: immediate, register, direct, indirect and implied. Assembler directives.

Unit – IV **(08Sessions)**

Programming: Assembly language programming based on intel 8085. Flow chart symbols, writing assembly language programs, Programming techniques: looping, counting and indexing, time delays, counters, time delays, stacks and subroutines, conditional call and return instructions.Program: BCD Addition, BCD Subtraction, Subtraction with carry, Multiplication, division, square of a given number, square root of a given number, to find largest and smallest number from given array, arrange in ascending and descending order of given array, BCD-to-Binary conversion, Binary-to-BCD conversion.

Unit – V **(08Sessions)**

Peripheral Interfacing: Peripheral Devices: 8237 DMA controller, 8255 Programmable peripheral interface, interfacing keyboard and seven segment display, 8253/8254 programmable timer/counter, 8259A programmable interrupt controller, USART and RS232C.

Course Outcome:

The students completing this course will be able to:

- Understand the basics of computer architecture.
- Understand the basic problems of programming.
- Understand the internal working of memory.
- Understand the working of computer chips.

Suggested Readings:

1. Ramesh Gaonkar, "Microprocessor Architecture, Programming, and Applications with the 8085", 5th Edition, Penram International Publication (India) Pvt. Ltd.
2. Lyla B. Das, "The x86 Microprocessors, Architecture, Programming, and Interfacing (8086 to Pentium), Pearson Education.
3. Douglas V. Hall, "Microprocessors and Interfacing", 2nd Edition, TMH, 2006.

Website Sources:

- en.wikipedia.org
- www.processorseries.in
- www.nptel.ac.in
- www.gradeup.in

Note: Latest editions of all suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -II Year (IV Semester)

EEC-404: ELECTRONICS INSTRUMENTATION & MEASUREMENTS

Objective: The objective of this course is to familiarize the students with electronic instruments and their measurement providing an in-depth understanding of Measurement errors, Bridge measurements, Digital Storage Oscilloscope, Function Generator and Analyzer, Display devices, Data acquisition systems and transducers with practical knowledge.

UNIT I **(08Sessions)**

Unit, dimensions and standards: Scientific notations and metric prefixes. SI electrical units, SI temperature scales, other unit systems, dimension and standards. Measurement Errors: Gross error, systematic error, absolute error and relative error, accuracy, precision, resolution and significant figures, Measurement error combination, Statistical analysis (Deviation, Average Deviation, Variance, Gaussian Curve of Error). Permanent Magnet Moving Coil (PMMC) instrument, galvanometer, DC ammeter, DC voltmeter, series ohm meter,

UNIT II **(08Sessions)**

Transistor voltmeter circuits, AC electronic voltmeter, current measurement with electronic instruments, multimeter probes Digital voltmeter systems, digital multimeters, digital frequency meter System, Introduction to Measurement of temperature by Thermistor, Thermocouple, and Resistance Temperature Detector.

UNIT III **(08Sessions)**

Voltmeter and ammeter methods, Wheatstone bridge, low resistance measurements, low resistance measuring instruments AC bridge theory, capacitance bridges, Inductance bridges, Q meter

UNIT IV **(08Sessions)**

Cathode Ray Oscilloscope (CRO): Cathode Ray Tube, wave form display, time base, dual trace oscilloscope, measurement of voltage, frequency and phase by CRO, Oscilloscope probes, Oscilloscope specifications and performance. Delay time based Oscilloscopes, Sampling Oscilloscope, Digital Storage Oscilloscope (DSO), DSO applications

UNIT V **(08Sessions)**

Instrument calibration: Comparison method, digital multimeters as standard instrument, calibration instrument Recorders: X-Y recorders, plotters

Course Outcomes:

Students completing this course will be able to:

- To understand the fundamentals of Electronics Instruments and Measurement providing an in-depth understanding of Measurement errors, Bridge measurements, Digital Storage Oscilloscope, Function Generator and Analyzer, Display devices, Data acquisition systems and transducers.
- To address the underlying concepts and methods behind Electronics measurements.

Suggested Readings:

1. A. K. Sawhney,"Electrical & Electronic Measurement & Instrument", DhanpatRai& Sons.
2. David A. Bell, "Electronic Instrumentation and Measurements", 2nd Ed., PHI, New Delhi 2008.
3. E.W. Golding & F.C. Widdis, "Electrical Measurement & Measuring Instrument", A.W. Wheeler& Co. Pvt. Ltd. India.
4. Oliver and Cage, "Electronic Measurements and Instrumentation", TMH, 2009.
5. Alan S. Morris, "Measurement and Instrumentation Principles", Elsevier (ButerworthHeinmann), 2008.

Website Sources:

- ndl.iitkgp.ac.in
- online courses.nptel.ac.in
- en.wikipedia.org
- www.tutorialspoint.com
- www.vlab.co.in

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -II Year (IV Semester)

EEC-405: ENGINEERING ELECTROMAGNETIC THEORY

Objective: The objective of this course is to familiarize the students with fundamental antenna engineering parameters and terminology including basic concepts of electromagnetic wave radiation, reception and propagation.

UNIT-I **(08Sessions)**

Coordinate systems and transformation: Cartesian coordinates, circular cylindrical coordinates, spherical coordinates Vector calculus: Differential length, area and volume, line surface and volume integrals, Del operator, gradient of a scalar, divergence of a vector and divergence theorem, curl of a vector and Stoke's theorem, Laplacian of a scalar.

UNIT-II **(08Sessions)**

Electrostatics: Electrostatic fields, Coulombs law and field intensity, Electric field due to charge distribution, Electric flux density, Gausses's Law – Maxwell's equation, Electric dipole and flux lines, energy density in electrostatic fields. Electric field in material space: Properties of materials, convection and conduction currents, conductors, polarization in dielectrics, dielectric constants, continuity equation and relaxation time, boundary condition. Electrostatic boundary value problems: Poission's and Laplace's equations.

UNIT-III **(08Sessions)**

Magnetostatics: Magneto-static fields, Biot-Savart's Law, Ampere's circuit law, Maxwell's equation, application of ampere's law, magnetic flux density- Maxwell's equation, Maxwell's equation for static fields, magnetic scalar and vector potential. Magnetic forces, materials and devices: Forces due to magnetic field, magnetic torque and moment, a magnetic dipole, magnetization in materials, magnetic boundary conditions, inductors and inductances, magnetic energy.

UNIT-IV **(08Sessions)**

Waves and applications: Maxwell's equation, Faraday's Law, transformer and motional electromotive forces, displacement current, Maxwell's equation in final form. Electromagnetic wave propagation: Wave propagation in lossy dielectrics, plane waves in lossless dielectrics, plane wave in free space, plain waves in good conductors, power and the pointing vector, reflection of a plain wave in a normal incidence.

UNIT-V **(08Sessions)**

Transmission lines: Transmission line parameters, Transmission line equations, input impedance, standing wave ratio and power. Characteristic impedance, General wave equation, Loss less propagation, Propagation constant, Voltage standing wave ratio, Introduction to Smith Chart.

Course Outcomes:

Students completing this course will be able to:

- To understand important and fundamental antenna engineering parameters and terminology.
- To Learn the basic concepts of electromagnetic wave radiation and reception.
- To develop the basic skills necessary for designing a wide variety of practical antennas and antenna arrays.

Suggested Readings:

1. M. N. O. Sadiku, "Elements of Electromagnetics", 4th Ed, Oxford University Press.
2. W. H. Hayt and J. A. Buck, "Electromagnetic field theory", 7th Ed., TMH.
3. Joseph A. Edminister, Theory and Problems and Electromagnetics, Schaum's Outline Series, TMH.
4. John D Kraus and Daniel A Fleisch, "Electromagnetics with Applications", Mc Graw Hill Book Co.
5. E.C.Jordan, K.G. Balmain: "E.M.Waves & Radiating Systems", Pearson Education, 2006.

Website Sources:

- ndl.iitkgp.ac.in
- online courses.nptel.ac.in
- en.wikipedia.org
- www.tutorialspoint.com

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B. Tech) Electronics & Communication Engineering
B. Tech (EC) - II YEAR (IV Semester)

EEC-451: ELECTRONIC CIRCUITS LAB

Objective: The objective of this lab is to familiarize the students with the basic working of Common Collector Amplifier, Class B Amplifier, and differential Amplifier and also help them calculate voltage and currents through simple devices.

List of Experiments **(12Sessions)**

1. Study the Common Collector Amplifier and to evaluate –Operating Point, Voltage gain (A_V), input and output impedance, current gain of amplifier.
2. To study the operation of RC – Coupled amplifier.
3. To study the Frequency Response of RC – Coupled amplifier.
4. Study of the operation of Class B Amplifier
5. Study of differential Amplifier
6. Study of effect of negative feedback on gain of RC–Coupled Amplifier
7. Study of Phase Shift Oscillator with and without buffer between RC sections.
8. Study of the Wien Bridge Oscillator and effect on output frequency with variation in RC combination

Course Outcomes
Students completing this course will be able to:

- Evaluate the Operating Point, Voltage gain (A_V), input and output impedance, current gain of Common Collector Amplifier.
- operation of RC – Coupled amplifier.
- operation of Class B Amplifier.
- Study of the Wien Bridge Oscillator and effect on output frequency with variation in RC combination.

Suggested Readings:

1. B. G. Streetman and S. Banerjee "Solid state electronics devices", 5th Edition, PHI.
2. Alok Dutta, "Semiconductor Devices and circuits", Oxford University Press.
3. Donald A Neaman, "Semiconductor Physics and Devices Basic Principles" 3rd Ed TMH India.
4. Millman Halkias, "Integrated Electronics" TMH India.

Website sources:

- www.nptel.ac.in
- en.wikipedia.org
- www.sanfoundary.co.in
- Grade up online course on transistors (www.gradeup.org)

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -II Year (IV Semester)

EEC-452: CONTROL SYSTEM LAB

Objectives

- Will have a strong knowledge on MATLAB software.
- To study the concept of time response and frequency response of the system
- Students get the basic knowledge on practical control system applications on machines & electronic devices.
- This course aims to familiarize with the modeling of dynamical systems, to simulate and analyze the stability of the system using MATLAB.

List of Experiments **(15Sessions)**

PART – I

1. To study of effect of loading on the speed of the Motor in the open loop(Eddy Current Brake)
2. To study effect of loading on the speed of the Motor in the closed loop.
3. To study the speed control of a DC Motor
4. Study of stepper motor in full step, single phase, step and free running mode.
5. Study of stepper motor in full step, two phase, step and free running mode.
6. Study of stepper motor in half step, step and free running mode.
7. PID CONTROLLER: To observe open loop performance of building block and calibration of PID controls

a) To study P, PI and PID controller with type 0 system with delay

b) To study P, PI and PID controller with type 1 system.

8. LEAD LAG COMPENSATOR:

(a) **S**tudy of Lead compensator
(b) Study of Lag Compensator.
(c) Study of Lead Lag Compensator.

PART - II

Introduction to MATLAB (Control System Toolbox), Implement at least any four experiment in MATLAB.

1. Program for finding the transfer function of the system using Matlab.
2. Program for finding the transfer function of the system when poles, zeros and gain are given using Matlab.
3. Program for finding the root locus of the transfer function using Matlab.
4. Program to determine the poles of a transfer function in order to determine stability of the system using Matlab.
5. Plot unit step response and to find rise time and delay time.
6. Plot bode plot of given transfer function and find gain and phase margins.

Course Outcomes

At the end of the course, a student will be able to:

1. Discuss the need of software tools (MATLAB, PSPICE) to illustrate modeling and simulation of any system.
2. Classify and evaluate the performance parameters of a system and then with simulation prepare an advance tool to modify the values of the parameter of the system in order to meet the desired need.
3. Prepare professionals in laboratory to compute or to predict the characteristics of a system by visualizing experimental data and its graphical representation.

Suggested Readings:

1. Benjamin C. Kuo, “Automatic Control Systems”, Seventh Edition, PHI Learning New Delhi, 1997.
2. Katsuhiko Ogata, “Discrete Time Control Systems”, Second Edition, PHI Learning New Delhi, 2006.
3. R. Anandanatarajan, P. Ramesh Babu, “Control Systems Engineering”, Second edition, Scitech Publications Pvt. (India) Ltd, 2008
4. I. J. Nagrath, M. Gopal, “Control Systems Engineering”, Fifth Edition, New Age International, New Delhi, 2007.

Website Sources:

1. en.wikipedia.org
2. https://www.vlab.co.in/
3. onlinecourses.nptel.ac.in

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -II Year (IV Semester)

EEC 453: MICROPROCESSOR LAB - I

Objective: The objective of this lab is to provide hands-on experience to students of working on a microprocessor kit and develop basic programs of calculation.

Introductory: Familiarization of 8085 kits. **(13Sessions)**

1. To study the 8085 microprocessor training kit.

2. (a) Add two given 8-bit numbers with carry by using 8085 instruction set.
   (b) Subtract two 8-bit numbers with borrow using 8085 instruction set.

3. (a) To find the largest number in an array of data using 8085 instruction set.
   (b) To find the smallest number in an array of data using 8085 instruction set.

4. (a) To write a program to arrange an array of data in ascending order.
   (b) To write a program to sort the numbers in descending order.

5. To prepare an assembly language program to multiply two 8- bit numbers for 8085 microprocessor.

6. To prepare an assembly language program to divide 8- bit numbers for 8085 microprocessor.

7. To prepare an assembly language program to find the square root of an 8 bit number for 8085 microprocessor.

8. To prepare an assembly language program to find the square of an 8 bit number for 8085 microprocessor.

9. To convert given Hexadecimal number into its equivalent ASCII number and vice versa using 8085 instruction set.

10. To convert given Binary number into its hexadecimal number and vice versa using 8085 instruction set.

Course Outcome:
Students taking this lab will be able to:
- Understand the basics of microprocessor operation.
- Analyse through output how the circuit functions.
- Understand the conversion of decimal to hexadecimal system.

Suggested Readings:

1. "Microprocessor Architecture, Programming and Applications with 8085" by R S Gaonkar
2. "Computer Architecture: A Quantitative Approach" by J H Hennessy and D A Patterson
3. "The 8051 Micro controller, Architecture, Programming and Applications" by Kenneth J Ayala'
4. "Fundamentals of microprocessor and micro controller by B Ram"

Website Sources:
- www.microprocessorlib.in
- www.nptel.ac.in
- www.gradeup.in

Note: Adhere to latest edition of the suggested readings.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -II Year (IV Semester)

EEC-454: MEASUREMENT LAB

Objective: The objective of this course is to familiarize the students with electronic instruments and their measurement providing an in-depth understanding of Measurement errors, Bridge measurements, Digital Storage Oscilloscope, RTD, Function Generator and Analyzer, Display devices, Data acquisition systems and transducers with lab practical.

List of Experiments **(09Sessions)**

1. Study of semiconductor diode voltmeter and its use as DC average responding ac voltmeter.
2. Study of radio receiver measurements.
3. Study of Resistance Temperature Detector (RTD) and calculating various parameters.
4. Study of Thermocouple and calculating its various parameters.
5. Study of Thermistor and calculating its various parameters.
6. Study of low resistance by using Kelvin's double bridge.
7. Study of different dc and ac bridges and determine the value of given components.
8. Study of unknown inductance by using Hay's bridge.
9. Measurement of phase difference and frequency using CRO (lissajous figure).

Course Outcomes:
Students completing this course will be able to:

- To understand the fundamentals of Electronics Instruments and Measurement providing an in-depth understanding of Measurement errors, Bridge measurements, Digital Storage Oscilloscope, Function Generator and Analyzer, Display devices, Data acquisition systems, RTD and transducers.
- To address the underlying concepts and methods behind Electronic measurements.

Suggested Readings:

1. A. K. Sawhney, "Electrical & Electronic Measurement & Instrument", DhanpatRai& Sons.
2. David A. Bell, "Electronic Instrumentation and Measurements", 2nd Ed., PHI, New Delhi 2008.
3. E.W. Golding & F.C. Widdis, "Electrical Measurement & Measuring Instrument", A.W. Wheeler& Co. Pvt. Ltd. India.
4. Oliver and Cage, "Electronic Measurements and Instrumentation", TMH, 2009.
5. Alan S. Morris, "Measurement and Instrumentation Principles", Elsevier (ButerworthHeinmann), 2008.

Website Sources:

- ndl.iitkgp.ac.in
- online courses.nptel.ac.in
- en.wikipedia.org
- www.vlab.co.in

Note: Adhere to latest edition of the suggested readings.

IFTM UNIVERSITY, MORADABAD

STUDY & EVALUATION SCHEME

B. Tech. Electronics & Communication Engineering (EFFECTIVE FROM 2018 – 2019)

YEAR III, SEMESTER-V

S.N.	Course Code	Course Name	Periods			EVALUATION SCHEME				Course Total L	Credits T
						Internal Exam			End Sem Exam		
			L	T	P	Mid Sem Exam	AS +AT	Total			
THEORY											
1.	EEC-501	Linear Integrated Circuits	3	1	0	20	10	30	70	100	4
2.	EEC-502	Analog Communication System	3	1	0	20	10	30	70	100	4
3.	EEC-503	Advanced Microprocessor and Microcontroller	3	1	0	20	10	30	70	100	4
4.	EEC-505	Power Electronics	3	1	0	20	10	30	70	100	4
5.	EEC-052	Transducers, Sensors, and Display Systems	3	1	0	20	10	30	70	100	4
6.	EHU501	Human Values and Professional Ethics	3	1	0	20	10	30	70	100	4
PRACTICALS / PROJECT											
7.	EEC-551	Linear Integrated Circuits Lab	0	0	2	30	20	50	50	100	1
8.	EEC-552	Communication Lab- I	0	0	2	30	20	50	50	100	1
9.	EEC-553	Microprocessor Lab-II	0	0	2	30	20	50	50	100	1
10.	EEC-554	Power Electronics Lab	0	0	2	30	20	50	50	100	1
11.	EGP-501	General Proficiency	-	-	-	-	-	100	-	100	1
		TOTAL	**18**	**06**	**08**	**-**	**-**	**-**	**-**	**1100**	**29**

YEAR III, SEMESTER-VI

S.N.	Course Code	Course Name	Periods			EVALUATION SCHEME				Course Total L	Credits T
						Internal Exam			End Sem Exam		
			L	T	P	Mid Sem Exam	AS +AT	Total			
THEORY											
1.	EEC-601	Digital Communication	3	1	0	20	10	30	70	100	4
2.	EEC-602	Digital Signal Processing	3	1	0	20	10	30	70	100	4
3.	EEC-603	Microwave Engineering	3	1	0	20	10	30	70	100	4
4.	EEC-604	VLSI Technology	3	1	0	20	10	30	70	100	4
5.	EEC-605	Antenna Theory and Wave Propagation	3	1	0	20	10	30	70	100	4
6.	EEC-064	Satellite Communications	3	1	0	20	10	30	70	100	4
PRACTICALS / PROJECT											
7.	EEC-651	Communication Lab –II	0	0	2	30	20	50	50	100	1
8.	EEC-652	DSP Lab	0	0	2	30	20	50	50	100	1
9.	EEC-653	Microwave Lab	0	0	2	30	20	50	50	100	1
10.	EEC-654	Seminar	0	0	2	50	50	100	-	100	1
11.	EGP-601	General Proficiency	-	-	-	-	-	100	-	100	1
		TOTAL	**18**	**06**	**08**	**-**	**-**	**-**	**-**	**1100**	**29**

Note: ***Industrial Training of 4 – 6 Weeks after VI Semester which will be evaluated in VII Semester.***

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -III Year (V Semester)

EEC – 501: LINEAR INTEGRATED CIRCUITS

Objective: The objective of this course is to familiarize the students with linear integrated circuits practically and to perform mathematical operations in many linear, non-linear and frequency-dependent circuits by designing circuits for summing, subtraction, integrator, differential etc.

UNIT I **(08Sessions)**

Introduction to Operational Amplifiers: Introduction, block diagram representation of a Typical Op-amp, Pin diagram 741, Analysis of Typical Op-amp Equivalent Circuit, Integrated circuit, Types of integrated circuit, development of integrated circuit. Ideal op-amp, ideal voltage transfer curve, open loop op-amp configuration, Op-amp with negative feedback, Virtual ground.
The Op-amp With Negative Feedback: Block diagram representation of feedback configurations, Voltage series feedback amplifiers, Voltage shunt feedback amplifier, Differential Amplifier.

UNIT II **(08Sessions)**

Practical Op-amp and Frequency Response of an Op-amp: Basic Op-amp parameters, introduction of frequency response, compensating networks, frequency response of internally compensated op-amps, non-compensated op-amps, High frequency op-amp equivalent circuit, closed loop frequency response, slew rate, CMRR.

UNIT III **(08Sessions)**

Linear Applications of Op-amps: An Overview of ideal Op-Amp (Inverting/Non-inverting), Op-Amp based circuits i.e. Voltage Follower, Adder, Subtractor, Integrator (both ideal & practical), Differentiator (both ideal & practical), V-I & I-V Converter & its applications, Instrumentation amplifier. Generalized Impedance Converter, Simulation of Inductors and Capacitors.
Active Filters: First and Second Order LP, HP, BP BS and All Pass Filters and State Variable filter, Sinusoidal oscillators:-Wien bridge, Phase shift oscillator.

UNIT IV **(08Sessions)**

Non-Linear Applications of Op-amps: Log–Anti Log Amplifiers, Precision Rectifiers, Peak Detectors, Sample and Hold Circuits, Analog Multipliers and their applications. Op-amp as a comparator, Zero crossing detector, Schmitt Trigger circuit, Astablemultivibrator, Monostablemultivibrator. Generation of Triangular Waveforms. Voltage controlled Oscillator. Voltage regulators using Op-amp.

UNIT V **(08Sessions)**

Specialized IC Applications: The 555 pin diagram, Equivalent circuit of 555 timers. Implementing a MonostableMultivibrator Using the 555 IC, AstableMultivibrator Using the 555 IC.
Phase locked loops (PLL): Block Diagram of IC PLL, Working Principle of PLL and Applications of PLL

Course Outcomes:
Students completing this course will be able to:

- To understand about different Integrated Circuit working practically.
- To analyze and design linear circuits and verify their circuits.
- To understand various mathematical operations in many linear, non-linear and frequency-dependent circuits by designing circuits for summing, subtraction, integrator, differential etc.

Suggested Readings:

1. Sedra and Smith, "Microelectronic Circuits", 4th Edition, Oxford University Press.
2. Michael Jacob, `Applications and Design with Analog Integrated Circuits', PHI, 2nd Edition, 2006
3. Jacob Milliman and Arvin Grabel, "Microelectronics", 2nd Edition, TMH, 2008.
4. OP-Amps and Linear Integrated Circuits- Ramakant A. Gayakwad (PHI Publication). (Selected portion from Chapter 7, 8 and 9)
5. Pulse & Digital Circuits by K.Venkata Rao, K Rama Sudha& G Manmadha Rao, Pearson Education, 2010. (Selected portions).

Website Sources:

- ndl.iitkgp.ac.in
- online courses.nptel.ac.in
- en.wikipedia.org
- www.tutorialspoint.com
- www.vlab.co.in

Note: Adhere to latest edition of the suggested readings.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -III Year (V Semester)

EEC-502: ANALOG COMMUNICATION SYSTEMS

Objective: To develop a fundamental understanding on Communication Systems with emphasis on analog, frequency, phase modulation techniques and noise performance.

Unit – I **(08Sessions)**

Transmission of Signals: Introduction to signals: Real & Complex signals, Communication system Model, Need for modulation, Mode of Communication : Sky wave , Ground Wave, Baseband and Pass band signals, Base band representation of Band Pass signals: Pre-envelope, Post envelope & Complex envelope, , Amplitude Modulation: Double side band with Carrier (DSB-C), Double side band without Carrier, Hilbert Transform, Single Side Band Modulation, DSB-SC, DSB-C, SSB Modulators and Demodulators, Vestigial Side Band (VSB), Super-heterodyne Receiver.

Unit – II **(08Sessions)**

Angle Modulation: FM & PM signal, Relationship between FM & PM signal, Single Tone Modulated FM Signal, Arbitrary Modulated FM Signal, FM Modulators and Demodulators, Approximately Compatible SSB Systems, Stereophonic FM Broadcasting.

Unit – III **(08Sessions)**

Pulse Modulation Digital Transmission of Analog Signals: Sampling Theorem and its applications, Digital Representation of Analog Signals, Pulse Code Modulation (PCM), PCM System, Pulse Amplitude Modulation (PAM), Pulse Width Modulation, Pulse Position Modulation, Introduction to digital issues: Concept of Probability, Random variable, Statistical averages, Correlation, Sum of Random Variables, Central Limit Theorem, Random Process, Power spectral density.

Unit – IV **(08Sessions)**

Differential Pulse Code Modulation, Delta Modulation. Adaptive Delta Modulation (CVSDM), DPCM, Voice Coders, Sources of Noises, Frequency domain representation of Noise, Super position of Noises, Linear filtering of Noises ,Mathematical Representation of Noise,

Unit – V **(08Sessions)**

Noise in Amplitude Modulation & Frequency Modulation, Signal to Noise Ratio, Figure of Merit, Noise in Frequency Modulation: Pre emphasis, De Emphasis and SNR Improvement, Phase Locked Loops Analog and Digital

Course Outcomes:

Students completing this course will be able to:

- Understand and identify the fundamental concepts and various components of analog communication systems.
- Describe analog pulse modulation, frequency modulation techniques and digital modulation technique.
- Apply the basic knowledge of electronic circuits and understand the effect of Noisein communication system and noise performance of AM system
- Understand the effect of noise performance of FM system.
- Understand TDM and Pulse Modulation techniques.

Suggested readings:

1. H. Taub, D L Schilling, GoutomSaha, "Principles of Communication", 3rd Edition, Tata McGraw-Hill Publishing Company Ltd.
2. B.P. Lathi, "Modern Digital and Analog communication Systems", 3rd Edition, Oxford University Press, 2009.
3. Simon Haykin, "Communication Systems", 4th Edition, Wiley India.
4. H. P. HSU & D. Mitra, "Analog and Digital Communications", 2nd Edition, Tata McGraw-Hill Publishing Company Ltd.

Website sources:

- www.nptel.ac.in
- https://en.wikipedia.org/wiki/Communications_system

Note: Adhere to latest edition of the suggested readings

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -III Year (V Semester)

EEC -503: ADVANCED MICROPROCESSOR AND MICROCONTROLLER

Objective: The objective of this course is to understand the basic concepts related to functioning of a 8086 microprocessor, Microcontroller 8051 architecture and programming model.

UNIT – I **(10 Sessions)**

Advanced Micro Processors Architecture of 8086 microprocessor: register organization, bus interface unit, execution unit, memory addressing, and memory segmentation. Operating modes, Instruction sets, instruction format, Types of instructions. Interrupts: hardware and software interrupts. Hardware of 186, 286, 386, 486 & Pentium processors.

UNIT – II **(12 Sessions)**

Microprocessor Instructions & Communication Instruction Set, Mnemonics, 8086 Addressing modes, Microprocessor I/O connecting I/O put to Microprocessor, Polling and Interrupts, Interrupt and OM. Controllers. Motorola 68 XXX family of microprocessor, 68 XXX addressing modes, instruction set, hardware. Program (Based on 8086µp): Addition, Subtraction with carry, Multiplication, division, square of a given number, square root of a given number, Convert F0 to C0, BCD-to-Binary conversion, Binary-to-BCD conversion.

UNIT–III **(12 Sessions)**

Microcontroller Introduction 8051 architecture and programming model. Internal RAM and registers, I/O ports, Interrupt system &Instruction set. Program (Based on 8051): Addition, Subtraction with carry, Multiplication, Data Transfer between two PCs using RS.232 C Serial Port, Programs on Data Transfer Instructions using 8051 Microcontroller, Programs on Arithmetic and Logical Instructions using 8051 Microcontroller.

UNIT – IV **(8 Sessions)**

Microprocessor & Microcontroller Interfacing Data Communication, parallel I/O serial communication, Serial interface and UART, modems, I/O devices, D/A, A/D interface, special I/O devices.

UNIT – V **(8 Sessions)**

Introductuon16-bit microcontrollers INTEL 8096: Architectural description, memory Organization and interfacing, I/O addressing, Interrupts, instruction set and programming.

Course Outcomes:

Students completing this course will be able to:

- Demonstrate the detail architecture of 8086 microprocessor
- Demonstrate the internal architecture of different microprocessor 8086 and compute assembly language programs
- Describe the architecture of 8051 microcontroller and apply the knowledge of microcontroller later in the real life problems.

Reference Books:

1. C.M. Gilmore, "Microprocessors Principals and Application", MGH
2. Rajkamal, "Embedded System, Architecture & Programming "TMH
3. Berry B. Berry, “Inter Series of microprocessors", PHI
4. D. V. Hall, "Microprocessor &Interfacing", TMH
5. Liu and Gibson GA, “Microcomputer System: The 8086/8088 family”, PHI.

Website sources:

- www.nptel.ac.in
- en.wikipedia.org
- www.sanfoundary.co.in
- Grade up online course on transistors (www.gradeup.org)

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -III Year (V Semester)

EEC-505: Power Electronics

Objective: The Objective of this course is to nurturing and developing students with the engineering concepts and practices and develop their knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide in the aforesaid field.

Unit – I **(7 Sessions)**
Characteristics of Selected device: Fast recovery diode, Schottky diode, SCR gate trigger and communication circuit, heat sinks, protection circuit, series & parallel connection of SCR, Diac, Triac, UJT, Power Mosfet.

Unit – II (**11Sessions)**
Controlled Rectifier
Half wave & Full wave with resistive & R-L-E and resistive inductive loads. Free-wheeling diode, three phase rectifier, Bridge rectifier-half controlled and fully controlled.

Unit – III **(8 Sessions)**
Inverter, Chopper and Cyclo-converter: Single phase & three phase inverters, introduction to series & parallel inverters. Mc-Murray Bedford inverters, principle of chopper operation, control strategies, types of chopper, Jones & Morgan chopper, Cyclo converter and its advantages & disadvantage.

Unit – IV **(8 Sessions)**
Motor control: D.C and A.C motor control, reversible drives, closed loop control, commutator less d.c motor control.

Unit – V **(7 Sessions)**
A.C voltage controllers: Types of ac voltage controller, Integral cycle control, single phase voltage controller, Sequence control of Ac voltage (Transformer tap changer)

Course Outcomes:
Students completing this course will be able to:

- To understand the basics of Power Electronics
- To learn the details of power semiconductor switches (Construction, Characteristics and operation).
- Describe the working of various types of converters.
- Ability design AC voltage controller and Cyclo Converter.
- Express the design and control of rectifiers, inverters.

Suggested Readings:

1 P.C Sen," Power Electronics", Tata McGraw-Hill Publication Co., Ltd
2. S.K. Dutta, "Power Electronics" & Control' Prentice Hall of India Pvt. Ltd
3. P.S Bimbra, "Power Electronics" Khanna publishers
4. Mohammed h Rashid,""Power electronics" circuit device & application", PHI, New Delhi
5. S. B. Dewan, "Power electronics"thyristor-based convertersWiley India Pvt. Ltd

Website Sources:

- http://www.smpstech.com/websites.htm. ...
- http://www.electronics-tutorials.ws/ ...
- http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-334-power-electronics-spring-2007/ ...
- http://www.cpes.vt.edu/areas/ ...
- http://www.ni.com/white-paper/14677/en/ ...
- https://www.coursera.org/course/powerelectronics

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -III Year (V Semester)

EEC-052: TRANSDUCERS, SENSORS AND DISPLAY SYSTEMS

Objective: The objective of this course is to make students familiar with the constructions and working principle of different types of sensors and transducers as well as different type of display systems.

UNIT I **(08Sessions)**

Introduction of Transducers: Active & Passive Transducers, Electric Transducers, Advantages of Electric Transducers, Classification of Transducers, Primary & Secondary Transducers, Analog & Digital Transducers, Inverse Transducers, Input, Output and Transfer Characteristics of Transducers.

UNIT II **(07Sessions)**

Resistive Transducers, Potentiometers, Helipots, Materials used for potentiometers, Advantages and Disadvantages of resistance potentiometers, Strain Gauges, Types of Strain Gauges, Resistance Thermometers, Thermistors, Applications of Thermistors, Thermocouples, Advantages & Disadvantages of Thermocouples.

UNIT III **(07Sessions)**

LVDT, Advantages, Disadvantages and Uses of LVDT, RVDT, Capacitive Transducers, Advantages of Capacitive Transducers, Piezo-electric Transducers, Hall effect Transducers, Applications of Hall Effect Transducers, Optoelectronic Transducers.

UNIT IV **(07Sessions)**

Sensor Characteristics: Span, Full Scale output, Accuracy, Calibration, Non linearity, Saturation, Repeatability, Dead Zone, Resolution, Dynamic Characteristics, Environmental Factors, Reliability, Application Characteristics. Sensor Materials and Technologies: Silicon as Sensing Material, Plastics, Metals, Ceramics, Glasses, Surface Processing: Deposition of Thin and Thick Films, Spin Casting, Vacuum Deposition, Sputtering, Chemical Vapor Deposition, Photolithography.

UNIT V **(07Sessions)**

Display Device & Systems: Classification of displays, CRT, LED, LCD, Gas Discharge Display, Incandescent Display, Electrophoretic Image Display (EPID), Liquid Vapor Display (LVD).

Course Outcomes:

Upon completion of this course, the students will be able to:

1. Use concepts in common methods for converting a physical parameter into an electrical quantity.
2. Design and develop appropriate signal conditioning circuits for different types of sensors.
3. Outline the basics of smart sensors in different applications.
4. Familiarize with different type of display systems.
5. Recognize and define electrical & electromechanical sensors according to applications.

Suggested Reading:

1. Instrument Engineers Hand Book (process measurement), LIPTAK .
2. Electronic Instrumentation – by H S Kalsi TMH 2ndEd 2004
3. Handbook of Modern Sensors Physics, Designs and Applications by Jacob Fraden, Springer, AIP Press, III Edn.
4. Measurement systems application and design, ERNEST DOEBELIN, IV Edn.
5. A Course in Electrical and Electronic Instrumentation and Measurement by A.K Sawhney and Puneet Sawhney, Dhanpat Rai Publications.

Website Sources:

1. en.wikipedia.org
2. www.studynama.com
3. onlinecourses.nptel.ac.in
4. www.tutorialspoint.com
5. www.gupshupstudy.com

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -III Year (V Semester)

EHU– 501: Human Values and Professional Ethics

Objective: The objective of this course is to familiarize the students with awareness on Engineering Ethics and Human Values and also to become social responsible as an engineer**.**

UNIT I **(08Sessions)**

Human Values: Morals, Values and Ethics – Integrity – Work Ethic – Service – Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing - Honesty – Courage –Valuing Time – Co-operation – Commitment - Empathy – Self-Confidence – Character - Spirituality.

UNIT II **(08Sessions)**

Engineering Ethics: Senses of 'Engineering Ethics' - variety of moral issues - types of inquiry - Moral dilemmas - Moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest - custom and religion - uses of ethical theories. Valuing Time – Co-operation – Commitment.

UNIT III **(08Sessions)**

Engineering as Social Experimentation: Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study.

UNIT IV **(08Sessions)**

Safety, Responsibilities, and Rights: Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the three mile island and chernobyl case studies. Collegiality and loyalty – Respect for authority – Collective bargaining – Confidentiality – Conflicts of interest – Occupational crime – Professional rights – Employee rights – Intellectual Property rights (IPR) – Discrimination.

UNIT V **(08Sessions)**

Global Issues: Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers and engineers as expert witness and advisors -moral leadership – Sample code of Ethics like ASME, ASCE, IEEE, IETE etc.

Course Outcomes:

Students completing this course will be able to:

- To create an awareness on Engineering Ethics and Human Values.
- To understand social responsibility as an engineer.
- To appreciate ethical dilemma while discharging duties in professional life.

Suggested Readings:

1. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw-Hill, New York 1996.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.
3. Jayshree Suresh and B.S.Raghavan, “Human values and Professional Ethics”, S.Chand& Company Ltd., New Delhi.

Website Sources:

- ndl.iitkgp.ac.in
- online courses.nptel.ac.in
- en.wikipedia.org
- www.tutorialspoint.com

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -III Year (V Semester)

EEC–551: LINEAR INTEGRATED CIRCUITS LAB

Objective: The objective of this course is to familiarize the students to explore and learn various concepts regarding analog electrical signals, networks and measurement of various electrical components. Each experiments are designed in such a way that, the student first get to learn the theories well and then perform the experiment to enhance their knowledge.

List of Experiments **(15Sessions)**

1. To study Simulation software (Matlab).
2. To design an inverting amplifier using Op-Amp IC 741 Kit / Simulation software.
3. To design non-inverting amplifier using Op-Amp IC 741 Kit / Simulation software.
4. To demonstrate the use of op-amp as Summing Kit / Simulation software.
5. To design a Subtractor on Kit / Simulation software
6. To study Op-amp as a differentiator using Op-Amp IC 741 Kit / Simulation software.
7. To study Op-amp as an integrator using Op-Amp IC 741 Kit / Simulation software.
8. To study half wave and full wave rectifier circuit using Op-amp IC 741 and simulate using Simulation software.
9. To design and simulate a wein-bridge oscillator using kit/Simulation software.
10. To design and simulate a phase shift oscillator using Kit /Simulation software.
11. To design monostablemultivibrator using IC555 on Kit /Simulation software.
12. To design astablemultivibrator using IC555 on Kit /Simulation software.
13. To study and design 1 st order Low Pass, High pass and Band pass Filter and obtain the desired frequency response using Kit /Simulation software.
14. Design of Clippers and Clampers Circuits using Op-Amp Kit /simulate using Simulation software.

Course Outcomes:
Students completing this course will be able to:

- To understand about different Integrated Circuit working practically.
- To analyze and design linear circuits and verify their circuits.
- To understand various mathematical operations in many linear, non-linear and frequency-dependent circuits by designing circuits for summing, subtraction, integrator, differential etc.
- To understand IC 555 and its uses in different circuits.

Suggested Readings:

1. Sedra and Smith, "Microelectronic Circuits", 4th Edition, Oxford University Press.
2. Michael Jacob, `Applications and Design with Analog Integrated Circuits', PHI, 2nd Edition, 2006
3. Jacob Milliman and Arvin Grabel, "Microelectronics", 2nd Edition, TMH, 2008.
4. OP-Amps and Linear Integrated Circuits- Ramakant A. Gayakwad (PHI Publication). (Selected portion from Chapter 7, 8 and 9)
5. Pulse & Digital Circuits by K.Venkata Rao, K Rama Sudha& G Manmadha Rao, Pearson Education, 2010. (Selected portions).

Website Sources:

- ndl.iitkgp.ac.in
- online courses.nptel.ac.in
- en.wikipedia.org
- www.vlab.co.in

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -III Year (V Semester)

EEC-552: COMMUNICATION LAB- I

Objective: Familiarize the students with basic analog communication systems. Integrate theory with experiments so that the students appreciate the knowledge gained from the theory course, e.g., amplitude and frequency modulation, pulse modulation.

List of Experiments **(14Sessions)**

1. To study DSB/ SSB amplitude modulation & determine its modulation factor & power in side bands.
2. To study amplitude demodulation by linear diode detector.
3. To study the working of AM radio receiver and the effect of Image Frequency.
4. To study the tuning of actual AM radio receiver.
5. To study frequency modulation/demodulation and determine its modulation factor.
6. To study the working of FM radio receiver and tuning of actual FM radio receiver
7. To study sampling and multiplexing techniques and reconstruction
8. To study Pulse Amplitude Modulation, Pulse Width Modulation and Pulse Position Modulation.
9. To study the Sensitivity, Selectivity, and Fidelity characteristics of super heterodyne receiver.
10. To demodulate the obtained PAM signal by 2nd order LPF.
11. To construct a Square wave with the help of Fundamental Frequency and its Harmonic component (To Study of Square Waveform Synthesis)
12. To construct a triangular wave with the help of Fundamental Frequency and its Harmonic component (To Study of Triangular Waveform Synthesis)
13. To Study Synthesis of Saw-Tooth Waveform.
14. To Study the Synthesis of Amplitude Modulated Signal

Course Outcomes:
Students completing this course will be able to:
1. Design analog modulation circuits as amplitude and frequency modulation.
2. Design various pulse modulation techniques as PAM, PPM, PWM.
3.Design the circuit to sample an analog signal.
4. Understand the fundamental frequency and its harmonic component.

Suggested readings:
1. H. Taub, D L Schilling, Goutom Saha, “Principles of Communication”, 3rd Edition, Tata McGraw-Hill Publishing Company Ltd.
2. B.P. Lathi, “Modern Digital and Analog communication Systems”, 3rd Edition, Oxford University Press, 2009.
3. Simon Haykin, “Communication Systems”, 4th Edition, Wiley India.
4. H. P. HSU & D. Mitra, “Analog and Digital Communications”, 2nd Edition, Tata McGraw-Hill Publishing Company Ltd.

Website sources:

- https://www.vlab.co.in/broad-area-electronics-and-communications
- www.nptel.ac.in
- https://en.wikipedia.org/wiki/Communications-system

Note: Adhere to latest edition of the suggested readings.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -III Year (V Semester)

EEC-553: MICROPROCESSOR LAB - II

Objective: The objective of this lab is to provide hands-on experience to students of working on advance microprocessor kit and develop complex programs of calculation.

Introductory: Familiarization of 8086/8051 kits. **(12Sessions)**

1. Study of microprocessor 8086 training kit.

2. Add and subtract two given 16-bit numbers by using 8086 instruction set.

3. Write a program to multiply two 16- bit numbers for 8086 microprocessor.

4. Write a Program for comparing two strings by using 8086 instruction sets.

5. Write a program for division of two 32- bit numbers for 8086 microprocessor.

6. To find the smallest number in an array of data using 8086 instruction set

7. To find LCM and HCF of Two Numbers using 8051 Micro controller.

8. To calculate Factorial of 0-5 decimal number using 8051 Micro controller.

9. To perform logical operation (AND, OR, EX-OR and NOT operation) using 8051 Micro controller.

10. Write a program to Split bytes into two nibbles and display on LCD using 8051 Micro controller

Course Outcome:
Students taking this lab will be able to:
- Understand the basics of microprocessor operation.
- Analyze through output how the circuit functions.
- Understand the conversion of decimal to hexadecimal system.
- Understand the difference between microprocessor and micro controller.

Suggested Readings:

1. "Microprocessor Architecture, Programming and Applications with 8085" by R S Gaonkar
2. "Computer Architecture: A Quantitative Approach" by J H Hennessy and D A Patterson
3. "The 8051 Micro controller, Architecture, Programming and Applications" by Kenneth J Ayala'
4. "Fundamentals of microprocessor and micro controller by B Ram"

Website Sources:
- www.microprocessorlib.in
- www.nptel.ac.in
- www.gradeup.in
- en.wikipedia.org

Note: Adhere to latest edition of the suggested readings.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -III Year (V Semester)

EEC– 554: POWER ELECTRONICS LAB

Course Objective:
1) To expose students to operation and characteristics of power semiconductor devices and passive components, their practical application in power electronics.
2) To provide a practical exposure to operating principles, design and synthesis of different power electronic converters.
3) To introduce students to industrial control of power electronic circuits as well as safe electrical connection and measurement practices.

List of Experiments **(12Sessions)**

1. Measurement of the following basic diode characteristics of SCR
(a) Forward blocking current V/S Voltage.
(b) Reverse blocking current V/S Voltage.
(c) Reverse gate current V/S Voltage.
2. To determine the following Turn on characteristics of SCR
(a) Gate trigger current (Firing current).
(b) Gate trigger voltage.
(c) Latching current.
(d) Holding current.
3. Study of SCR triggering circuits and to check the performance of one type of triggering circuits.
4. Study of SCR commutation circuits and to check the performance of one type of commutation circuits.
5. Harmonic analysis of a complex voltage Wave form by harmonic analysis.
6. Study of chopper circuits to check performance of one type of chopper circuits.
7. Study of inverter circuits and to check the performance of one type of inverter circuits.
8. Speed control of DC motor by solid state devices.
9. Speed control of induction motor using thyristors.
10. Basic triac characteristics.
11. Study of excitation system of a synchronous generator using thyristors and to find excitation response.

Course Outcomes

The expected outcomes of the Course/Subject are:
1. Articulate the basics of power electronic devices
2. Express the design and control of rectifiers, inverters.
3. Design of power electronic converters in power control applications 4. Ability to express characteristics of SCR, BJT, MOSFET and IGBT.

Suggested Readings:
1 P.C Sen," Power Electronics", Tata McGraw-Hill Publication Co., Ltd
2. S.K. Dutta, "Power Electronics" & Control' Prentice Hall of India Pvt. Ltd
3. P.S Bimbra, "Power Electronics" Khanna publishers
4. Mohammed h Rashid,""Power electronics" circuit device & application", PHI, New Delhi
5.S. B. Dewan, "Power electronics"thyristor-based convertersWiley India Pvt. Ltd

Website Sources:
1. en.wikipedia.org
2. https://www.vlab.co.in/
3. onlinecourses.nptel.ac.in

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -III Year (VI Semester)

EEC-601: DIGITAL COMMUNICATIONS

Objective: To understand the key modules of digital communication systems with emphasis on digital modulation techniques and to get introduced to the basics of source and channel coding/decoding and Spread Spectrum Modulation.

Unit – I **(08Sessions)**

Digital Transmission: Introduction, Advantages of Digital Transmission, Line coding review, Pulse shaping, Scrambling, Digital receivers, Eye diagram, Digital carrier system, Method of generation and detection of coherent & non-coherent binary ASK, FSK & PSK, Differential phase shift keying, quadrature modulation techniques. (QPSK, QAM and MSK), M-ary Digital carrier Modulation.

Unit – II **(08Sessions)**

Digital representation of Analog Signals, Pulse Code Modulation (PCM), PCM System, Issues in digital transmission: Frequency Division Multiplexing, Time Division Multiplexing, Line Coding and their Power Spectral density, T1 digital System, TDM Hierarchy.

Unit – III **(08Sessions)**

Performance Analysis of Digital communication system: Optimum linear Detector for Binary polar signaling, General Binary Signaling, Coherent Receivers for Digital Carrier Modulations, Signal Space Analysis of Optimum Detection, Vector Decomposition of White Noise Random processes, General Expression for Error Probability of optimum receivers,

Unit – IV **(08Sessions)**

Spread spectrum Communications: Frequency Hopping Spread Spectrum (FHSS) systems, Direct Sequence Spread Spectrum, Code Division Multiple Access of DSSS, Multiuser Detection, OFDM Communications

Unit – V **(08Sessions)**

Measure of Information, Self-information, Entropy, Conditional Entropy, Mutual information, Divergence, Channel capacity, Shanon's theorem, Channel capacity, FEC coding: Linear block codes, Convolutional codes.

Course Outcomes:

Students completing this course will be able to:

- Understand and apply the knowledge of signals and system and explain the conventionaldigital communication system.
- Understand and apply the knowledge of statistical theory of communication and evaluate theperformance of digital communication system in the presence of noise.
- Describe and analyze the performance of advance modulation techniques.
- Apply the knowledge of digital electronics and describe the error control codeslike block code, cyclic code.
- Describe and analyze the digital communication system with spread spectrummodulation.

Suggested readings:

1. B.P. Lathi, "Modern Digital and Analog communication Systems", 4th Edition, Oxford University Press, 2010.
2. H. Taub, D L Schilling, GoutomSaha, "Principles of Communication", 3rd Edition, Tata McGraw-Hill Publishing Company Ltd.
3. John G. Proakis, "Digital Communications", 4th Edition, McGraw-Hill International.
4. Simon Haykin, "Communication Systems",4th Edition, Wiley India.
5. H P HSU & D Mitra, "Analog and Digital Communications", 2nd Edition, Tata McGraw-Hill Publishing Company Ltd.

Website sources:

- https://en.wikipedia.org/wiki/Communications_system
- https://www.guru99.com/
- www.nptel.ac.in

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IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -III Year (VI Semester)

EEC-602: DIGITAL SIGNAL PROCESSING

Objective: The primary objective of this course is to provide a thorough understanding and working knowledge of design, implementation and analysis DSP systems.

UNIT I **(10Sessions)**

The Discrete Fourier Transform: Its Properties and Applications: Definitions, Relationship of the DFT to other Transforms; Properties of the DFT: Periodicity, Linearity, and Symmetry Properties, Multiplication of Two DFTs and Circular Convolution, Additional DFT Properties; Linear Filtering Methods Based on the DFT: Use of the DFT in Linear Filtering, Filtering of Long Data Sequences.

UNIT II **(08Sessions)**

Efficient Computation of the DFT: Fast Fourier Transform Algorithm: Efficient Computation of the DFT: FFT Algorithms: Direct Computation of the DFT, Radix-2 FFT Algorithms: Decimation-In-Time (DIT), Decimation-In-Time (DIF); IDFT using DIT and DIF Algorithms. Applications of FFT Algorithms.

UNIT III **(08Sessions)**

Implementation of Discrete-Time Systems: Structure for the Realization of Discrete-Time Systems, direct form realization of IIR systems, cascade realization of an IIR systems, parallel form realization of an IIR systems, Ladder structures: continued fraction expansion of H(z), example of continued fraction, realization of a ladder structure, example of a ladder realization.

UNIT IV **(06Sessions)**

Design of FIR Filters: Introduction to Filters, Impulse Invariant Transformation, Bi-Linear Transformation, All- Pole Analog Filters: Butterworth and Chebyshev, Design of Digital Butterworth and Chebyshev Filters.

UNIT V **(08Sessions)**

General Considerations: Causality and Its Implications, Design of FIR Filters: Symmetric and Anti-symmetric FIR Filters, Design of Linear-Phase FIR Filters by using Windowing techniques, the Rectangular Window, Other Commonly Used Windows, Examples of Filter Designs Using Windows, The Kaiser Window, Finite word length effect, Limit cycle, Data representation format.

Course Outcomes:

Upon successful completion of this course the students will have developed following skills/abilities:

1. Interpret, represent and process discrete/digital signals and systems.
2. Thorough understanding of frequency domain analysis of discrete time signals.
3. Ability to design & analyze DSP systems like FIR and IIR Filter etc.
4. Understanding of spectral analysis of the signals.

Suggested Reading:

1. Digital Signal Processing – S. Salivahan, A. Vallavraj and C. Gnanapriya, TMH.
2. Digital Signal Processing: a Computer-Based Approach – Sanjit K. Mitra, TMH.
3. Digital Signal Processing – Manson H. Hayes (Schaum's Outlines) Adapted by Subrata Bhattacharya, TMH.
4. Digital Signal Processing: A Modern Introduction – Ashok Ambardar, Cengage Learning.
5. Fundamentals of Digital Signal Processing using MATLAB – Robert J. Schilling and Sandra L.
6. Digital Signal Processing – A practical approach - Ifeacher, Jervis, Pearson Education Asia, 2003.

Website Sources:

1. en.wikipedia.org
2. www.studynama.com
3. onlinecourses.nptel.ac.in
4. www.gupshupstudy.com
5. www.tutorialspoint.com

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -III Year (VI Semester)

EEC603: MICROWAVE ENGINEERING

Objective: The objective of this course is to familiarize the students with the basics of waveguide technology that plays a significant part in communication systems.

Unit – I **(08Sessions)**

Rectangular Wave Guide: Field Components, TE, TM Modes, Dominant TE10 mode, Field Distribution, Power, Attenuation. Circular Waveguides: TE, TM modes. Wave Velocities, Micro strip Transmission line (TL), Coupled TL, Strip TL, Coupled Strip Line, Coplanar TL, Microwave Cavities.

Unit – II **(08Sessions)**

Scattering Matrix: Passive microwave devices: Microwave Hybrid Circuits. , Terminations, Attenuators, Phase Shifters, Directional Couplers: Two Hole directional couplers, S Matrix of a Directional coupler, Hybrid Couplers, Microwave Propagation in ferrite, Faraday Rotation, Isolators, Circulators. S parameter analysis of all components.

Unit – III **(08Sessions)**

Microwave Tubes: Limitation of Conventional Active Devices at Microwave frequency, Two Cavity Klystron, Reflex Klystron, Magnetron, Traveling Wave Tube, Backward Wave Oscillators: Their Schematic, Principle of Operation, Performance Characteristic and their applications.

Unit – IV **(08Sessions)**

Solid state amplifiers and oscillators: Microwave Bipolar Transistor, Microwave tunnel diode, Microwave Field- effect Transistor, Transferred electron devices, Avalanche Transit –time devices: IMPATT Diode, TRAPPAT Diode

Unit – V **(08Sessions)**

Microwave Measurements: General set up of a microwave test bench, Slotted line carriage, VSWR Meter, microwave power measurements techniques, Crystal Detector, frequency measurement, wavelength measurements, Impedance and Refection coefficient, VSWR, Insertion and attenuation loss measurements, measurement of antenna characteristics, microwave link design.

Course outcome:

The students completing this course will be able to:

- Analyze the concept of waveguides.
- Understand the concept of high frequency operation of waves.
- Understand the concept of fields and cross fields.
- Understand the concept of transistor technology.
- Analyze the purpose and application of diode.

Suggested reading:

1. Samuel Y. Liao, "Microwave Devices and Circuits", 3rd Ed, Pearson Education.
2. A. Das and S. K. Das, "Microwave Engineering", TMH.
3. R.E Collin, "Foundation for Microwave Engineering ", 2nd Ed., John Wiley India.
4. David M. Pozar, "Microwave Engineering" 3rd Ed, John Wiley & Sons, 2009.
5. J. Ryder "Network Lines and Fields" 2nd Ed, Prentice-Hall India Ltd.

Website sources:

- en.wikipedia.org
- www.nptel.ac.in
- www.gradeup.in

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IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -III Year (VI Semester)

EEC– 604: VLSI TECHNOLOGY

Objective: The objective of this course is to familiarize the students with the VLSI Technology processes and industrial manufacturing of Integrated circuits. This course also helps them to understand the basic concepts of diffusion, Ion- implantation, packaging design and various technologies involved in fabrication.

UNIT I **(08Sessions)**

Introduction to IC Technology: SSI, MSI, LSI, VLSI Integrated Circuits Crystal Growth and Wafer Preparation: Electronic Grade Silicon, Czochralski Crystal Growth, Silicon Shaping, Processing Considerations. Epitaxy: Vapor –Phase Epitaxy, Molecular Beam Epitaxy, Silicon on Insulators, Epitaxial Evaluation.

UNIT II **(08Sessions)**

Oxidation: Growth Kinetics, Thin Oxides, Oxidation Techniques and Systems, Oxides Properties. Lithography: Optical Lithography. Photo masks, Wet Chemical Etching. Dielectric and Polysilicon Film Deposition: Deposition Processes, Polysilicon , Silicon Dioxide, Silicon Nitride.

UNIT III **(08Sessions)**

Diffusion: Diffusion of Impurities in Silicon and Silicon Dioxide, Diffusion Equations, Diffusion Profiles, Diffusion Furnace, Solid, Liquid and Gaseous Sources, Sheet Resistance and its Measurement. Ion-Implantation: Ion-Implantation Technique, Range Theory, Implantation Equipment.

UNIT IV **(08Sessions)**

Metallization: Metallization Application, Metallization Choices, Physical Vapor Deposition, Vacuum Deposition, Sputtering Apparatus. Packaging of VLSI devices: Package Types, Packaging Design Consideration, VLSI Assembly Technologies, Package Fabrication Technologies.

UNIT V **(08Sessions)**

VLSI Process Integration: Fundamental Considerations for IC Processing, NMOS IC Technology, CMOS IC Technology, Bipolar IC Technology, Monolithic and Hybrid Integrated Circuits, IC Fabrication.

Course Outcomes:

Students completing this course will be able to:

- To understand the basic of IC Technology such as SSI, MSI, LSI, VLSI etc.
- To understand Oxidation and Diffusion techniques.
- To learn various types and design of packaging.
- To learn basic NMOS, PMOS, CMOS Technology and Fabrication.

Suggested Readings:

1. S. M. Sze, "VLSI Technology", 2nd Edition, McGraw –Hill Publication.
2. S.K. Ghandhi, "VLSI Fabrication Principles", 2nd Edition,. Willy-India Pvt. Ltd.
3. J. D. Plummer, M. D. Deal and Peter B. Griffin, "Silicon VLSI Technology: Fundamentals, practice and modelling", Pearson Education.
4. Stephen A. Campbell, "Fabrication Engineering at the micro and nano scale", Oxford Univ Press.

Website Sources:

- ndl.iitkgp.ac.in
- online courses.nptel.ac.in
- en.wikipedia.org
- www.tutorialspoint.com
- www.vlab.co.in

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IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -III Year (VI Semester)

EEC – 605 ANTENNA THEORY AND WAVE PROPAGATION

Objective: The objective of this course is to familiarize the students with fundamental antenna engineering parameters and terminology. This course also helps to understand wide variety of practical antennas and antenna arrays. It also helps to understand the propagation of waves on various surfaces.

UNIT I **(08Sessions)**

Antennas Basics: Introduction, Basic Antenna Parameters, Patterns, Beam Area (or Beam Solid Angle), Radiation Intensity, Beam Efficiency, Directivity and Gain, Directivity and Resolution, Antenna Apertures, Effective Height, The radio Communication link, Fields from Oscillating Dipole, Single-to-Noise Ratio, Antenna Temperature, Antenna Impedance, Retarded Potential, Far Field due to an alternating current element, Power radiated by a current element, Field variation due to sinusoidal current distribution.

UNIT II **(08Sessions)**

Point Sources and Their Arrays: Introduction, Point Source, Power Theorem and its Application to an Isotropic Source, Radiation Intensity, Arrays of Two Isotropic Point Sources, Nonisotropic but Similar Point Sources and the Principle of Pattern Multiplication, Pattern Synthesis by Pattern Multiplication, Linear Arrays of n Isotropic Point Sources of Equal Amplitude and Spacing, Linear Broadside Arrays with Nonuniform Amplitude Distributions. General Considerations.

Electric Dipoles, Thin Liner Antennas and Arrays of Dipoles and Apertures: The Short Electric Dipole, The Fields of a Short Dipole, Radiation Resistance of Short Electric Dipole, Thin Linear Antenna, Radiation Resistance of λ/2 Antenna, Array of Two Driven λ/2 Elements: Broadside Case and End-Fire Case, Horizontal Antennas Above a Plane Ground, Vertical Antennas Above a Plane Ground, Yagi-Uda Antenna Design, Long-Wire Antennas, folded Dipole Antennas.

UNIT III **(08Sessions)**

The Loop Antenna. Design and its Characteristic Properties, Application of Loop Antennas, Far Field Patterns of Circular Loop Antennas with Uniform Current, Slot Antennas, Horn Antennas, Helical Antennas, The Log-Periodic Antenna, Microstrip Antennas.

UNIT IV **(08Sessions)**

Reflector Antennas Flat Sheet Reflectors, Corner Reflectors, The Parabola-General Properties, A comparison Between Parabolic and Corner Reflectors, The Paraboloidal Reflector, Patterns of Large Circular Apertures with Uniform Illumination, Reflector Types (summarized), Feed Methods for Parabolic Reflectors, Antenna Measurements Introduction, Antenna Measurement ranges, Radiation pattern Measurements, Gain and Directivity Measurements, Spectrum Analyzer.

UNIT V **(08Sessions)**

Ground Wave Propagation Plane Earth Reflection, Space Wave and Surface Wave, Space Wave Propagation Introduction, Field Strength Relation, Effects of Imperfect Earth, Effects of Curvature of Earth, Sky wave Propagation Introduction structural Details of the ionosphere, Wave Propagation Mechanism, Refraction and Reflection of Sky Waves by ionosphere, Ray Path, Critical Frequency, MUF, LUF, OF, Virtual Height and Skip Distance, Relation Between MUF and the Skip Distance, Multi-Hop Propagation, Wave Characteristics.

Course Outcomes:

Students completing this course will be able to:

- To understand important and fundamental antenna engineering parameters and terminology.
- To learn the basic concepts of electromagnetic wave radiation and reception.
- To develop the basic skills necessary for designing a wide variety of practical antennas and antenna arrays.
-

Suggested Readings:

1. John D Krauss, Ronald J Marhefka and Ahmad S. Khan,"Antennas and Wave Propagation", Fourth Edition, Tata McGraw Hill, 2010 Special Indian Edition.
2. A .R. Harish, M. Sachidananda, "Antennas and Wave Propagation", Oxford University Press, 2009.
3. Jordan Edwards C. and Balmain, Keith G."Electromagnetic Waves and Radiating Systems", PHI.
4. A. Das, Sisir K. Das, "Microwave Engineering", Tata McGraw Hill.

Website Sources:

- ndl.iitkgp.ac.in
- online courses.nptel.ac.in
- en.wikipedia.org
- www.tutorialspoint.com
- www.vlab.co.in

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IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -III Year (VI Semester)

EEC 064: SATELLITE COMMUNICATION

Objective: The objective of this course is to familiarize students with concept of wireless and remote communication which is a part of day to day life communication systems.

Unit – I **(08Sessions)**

Elements of Satellite Communication: Orbital mechanics look angle and orbit determination, launches & launch vehicle, orbital effects, Geostationary Orbit.

Unit – II **(08Sessions)**

Satellite subsystems: attitude and orbit control systems, TTC&M, communication subsystem, satellite antenna, Satellite link design: basic transmission theory, system noise temperature and G/T ratio, downlink design, uplink design, satellite systems using small earth station, design for specified C/N.

Unit – III **(08Sessions)**

Propagation effects and their impact on satellite-earth links: attenuation and depolarisation, atmospheric absorption, rain, cloud and ice effects etc. Introduction of various satellite systems: VSAT, low earth orbit and non geostationary.

Unit – IV **(08Sessions)**

Direct broadcast satellite television and radio: satellite navigation and the global positioning systems, GPS position location principle, GPS Receivers and Codes, Satellite Signal Acquisition, GPS Navigation Message, GPS Signal Levels, Timing accuracy, GPS Receiver Operation.

Unit – V **(08Sessions)**

Global Mobile Satellite Systems: Antenna System for mobile satellite applications, Evolution, Antenna Requirement and Technical Characteristics, Classification of Mobile Satellite Antenna(MSA), Low gain omni directional Antenna, Medium gain Directional Antenna, High gain Directional Aperture Antenna, Wire Quadrifilar Helix Antenna(WQHA) for Hand held Terminals, Antenna Systems for Mobile Satellite Broadcasting.

Course Outcome:

Students completing this course will be able to:

- Understand the concept of connecting remote assets.
- Understand how communication works independent of location
- Understand installation and maintenance of ground station
- Understand how it brings about weather forecasting and other important services.

Suggested Readings:

1. B. Pratt, A. Bostian, "Satellite Communications", Wiley India.
2. D. Roddy, "Satellite Communications", TMH, 4th Ed.
3. S. D. Ilcev, "Global Mobile Satellite Communication", Springer
4. R. Pandya, "Mobile and Personal Communication Systems and Services", PHI.

Website Sources:

- www.nptel.ac.in
- en.wikipedia.org
- www.satcom.in
- www.gradeup.in
- www.ies_satcom.in

Note: Adhere to the latest editions of the suggested readings.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -III Year (VI Semester)

EEC-651: COMMUNICATION LAB- II

Objective: To understand the steps involved in the analysis of digital communication systems and to synthesize a digital communication module with the given specifications.

List of Experiments **(12Sessions)**

1. Study of Pulse code modulation (PCM) and its demodulation using Bread Board.
2. Study of delta modulation and demodulation and observe effect of slope overload.
3. To Study data conditioning and reconditioning techniques for non-return to zero format (NRZ-L, NRZ-M, NRZ-S, unipolar to bipolar, bipolar to unipolar).
4. To study data conditioning and reconditioning techniques for phase encoded format [Biphase -Level (Manchester Coding), Biphase – Mark, Biphase – Space]
5. To study data conditioning and reconditioning techniques for return to zero format and multilevel binary format (URZ, RZ-AMI)
6. Study of Amplitude shift keying modulator and demodulator.
7. Study of Frequency shift keying modulator and demodulator.
8. Study of Phase shift keying modulator and demodulator
9. Study of error control coding techniques (Odd Parity Coding, Even Parity Coding, Hamming Coding).
10. Study of convolution encoding and hard decision Viterbi decoding for K= 7 and rate =1/2.
11. Study of convolution encoding using puncturing for K = 7 and rate = ¾.
12. Study of convolution encoding using puncturing and soft decision Viterbi decoding using depuncturing for K= 7 and rate = 3/4

Course Outcomes:
Students completing this course will be able to:
1. The ability of visualization and practical implementation of baseband modulation techniques
2. The skill to analyze and implement analogue to digital converters like PCM, DM.
3. The ability to design pass band digital modulation systems and techniques with desiredspecifications
4. Generate digital modulation signals for ASK, PSK and FSK and perform theirdetection.
5. Simulate MSK, DPSK, QPSK and DEPSK schemes and estimate their BER
6. Able to analyze digital modulation techniques by using MATLAB tools.

Suggested readings:
1. B.P. Lathi, “Modern Digital and Analog communication Systems”, 4th Edition, Oxford University Press, 2010.
2. H. Taub, D L Schilling, Goutom Saha, “Principles of Communication”, 3rd Edition, Tata McGraw-Hill Publishing Company Ltd.
3. John G. Proakis, “Digital Communications”, 4th Edition, McGraw-Hill International.
4. Simon Haykin, “Communication Systems”,4th Edition, Wiley India.
5. H P HSU & D Mitra, “Analog and Digital Communications”, 2nd Edition, Tata McGraw-Hill Publishing Company Ltd.

Website sources:

- https://www.vlab.co.in/broad-area-electronics-and-communications
- www.nptel.ac.in
- https://www.guru99.com/
- https://en.wikipedia.org/wiki/Communications-system

Note: Adhere to latest edition of the suggested readings.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -III Year (VI Semester)

EEC-652: DIGITAL SIGNAL PROCESSING LAB

Objective: The objective of this course is to make students familiar with the most important methods in DSP, including various waveforms, DFT, IDFT, digital filter design, transform-domain processing and importance of Signal Processors. To make students aware about the meaning and implications of the properties of systems and signals.

The following experiments have to be performed using DSP kits and also verify any five experiments using MATLAB.

List of Experiments (10Sessions)

1. Familiarization with the architecture of a standard DSP kit (Preferably TMS 320C6XXX DSP kit of Texas Instruments)
2. Generation of various types of waveforms (sine, cosine, square, triangular etc.).
3. To study and verify linear convolution of two sequences (without using the inbuilt conv. function in MATLAB).
4. Finding the DFT and IDFT of a periodic sequence in DSP kit.
5. To study Circular convolution of two sequences and comparison of the result with the result obtained from linear convolution.
6. With the help of Fourier series, make a square wave from sine wave and cosine waves. Find out coefficient values.
7. Design and implementation of IIR (low pass and high pass) Filters (Butterworth).
8. Design and implementation of FIR (low pass and high pass) Filters using windowing techniques (rectangular window, triangular window and Kaiser Window).
9. Generate an Amplitude Modulation having side low frequencies 1200 Hz and 800 Hz. Observe and verify the theoretical FFT characteristics with the observed ones.
10. Generate Frequency Modulation having carrier frequencies 1 KHz and modulating frequency 200 Hz with the modulation index of 0.7. Observe and verify the theoretical FFT characteristics with the observed ones.

Course Outcomes:
Students completing this course will be able to:

- To understand about different waveforms and architecture of DSP kit.
- To analyze and design DFT, IDFT, digital filter, transform-domain processes etc.
- To understand various modulation techniques such as Amplitude and Frequency modulation.

Suggested Readings:

1. Digital Signal Processing – S. Salivahan, A. Vallavraj and C. Gnanapriya, TMH.
2. Digital Signal Processing: a Computer-Based Approach – Sanjit K. Mitra, TMH
3. Digital Signal Processing – Introduction to Digital Signal Processing - J. G. Proakis and D. G. Manolakis, 4th Edition, Pearson.
4. Digital Signal Processing – Manson H. Hayes (Schaum's Outlines) Adapted by Subrata Bhattacharya, TMH.
5. Digital Signal Processing: A Modern Introduction – Ashok Ambardar, Cengage Learning.
6. Modern Digital Signal Processing – Roberto Cristi, Cengage Learning.
7. Digital Signal Processing: Fundamentals and Applications – Li Tan, Academic Press, Elsevier.
8. Digital Signal Processing: A MATLAB-Based Approach – Vinay K. Ingle and John G. Proakis, Cengage Learning.
9. Fundamentals of Digital Signal Processing using MATLAB – Robert J. Schilling and Sandra L.
10. Digital Signal Processing – A practical approach - Ifeacher, Jervis, Pearson Education Asia, 2003.

Website Sources:

- ndl.iitkgp.ac.in
- online courses.nptel.ac.in
- en.wikipedia.org
- www.vlab.co.in

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IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -III Year (VI Semester)

EEC 653: MICROWAVE LAB

Objective: The objective of this lab is to familiarize the students with the concept of guided communication technology and help them analyze the working of microwaves through experiment.

List of Experiments **(10Sessions)**

1. To study the microwave test bench.
2. To study the characteristics of the reflex Klystron tube and to determine its electronic tuning range.
3. To measure the polar pattern and the gain of a waveguide horn antenna
4. To determine the standing-wave-ration and reflection coefficient
5. To study the magic tee.
6. Study of transmission of Analog Modulated wave using microwave test bench.
7. To determine the frequency & wavelength in a rectangular wave-guide working on TE10 mode.
8. To Study of Attenuation loss for transmission through a wave guide.
9. Study of different types of Antenna

Course Outcome:
Students taking this lab will be able to:
- Understand the concept of wavelength based propagation.
- Learn to measure polar pattern of horn antenna.
- Get a practical view on working of klystron.
- Understand the concept of attenuation loss during transmission.

Suggested Readings:

1. Microwave and RF design by Michael steel
2. Microwave engineering by Roger Kaul
3. RF Electronics Design and Simulation by Kikkert
4. Reflection-less filters by Matt Morgan.

Website Sources:
- www.intechopen.com
- www.nptel.ac.in
- en.wikipedia.org
- www.gradeup.in
- www.rftechnology.in

Note: Adhere to latest edition of the suggested readings.

IFTM UNIVERSITY, MORADABAD

STUDY & EVALUATION SCHEME

B. Tech. Electronics & Communication Engineering (EFFECTIVE FROM 2018 – 2019)

YEAR IV, SEMESTER-VII

S.No.	Course Code	Course Name	Periods			EVALUATION SCHEME				Course Total L	Credits T
						Internal Exam			End Sem Exam		
			L	T	P	Mid Sem Exam	AS +AT	Total			
THEORY											
1.	EEC-701	Wireless Communication	3	1	0	20	10	30	70	100	4
2.	EEC-702	Data Communication Networks	3	1	0	20	10	30	70	100	4
3.	EEC-703	Optical Fiber Communication	3	1	0	20	10	30	70	100	4
4.	EEC-704	VLSI Design	3	1	0	20	10	30	70	100	4
5.	EEC-072	Optical Networks	3	1	0	20	10	30	70	100	4
6.	EHU701	Industrial Management	3	1	0	20	10	30	70	100	4
PRACTICALS / PROJECT											
7.	EEC-751	CAD of Electronics Lab	0	0	2	30	20	50	50	100	1
8.	EEC-752	Optical Fiber Communication Lab	0	0	2	30	20	50	50	100	1
9.	EEC-753	Communication Network Simulation Lab	0	0	2	30	20	50	50	100	1
10.	EEC-754	Industrial Training (Evaluation & Viva)	0	0	2	-	100	100	-	100	1
11.	EGP-701	General Proficiency	-	-	-	-	-	100	-	100	1
		TOTAL	**18**	**06**	**08**	**-**	**-**	**-**	**-**	**1100**	**29**

YEAR IV, SEMESTER-VIII

S.No.	Course Code	Course Name	Periods			EVALUATION SCHEME				Course Total L	Credits T
						Internal Exam			End Sem Exam		
			L	T	P	Mid Sem Exam	AS +AT	Total			
THEORY											
1.	EEC-801	Introduction to Radar System	3	1	0	20	10	30	70	100	4
2.	EEC-802	Electronics Switching	3	1	0	20	10	30	70	100	4
3.	EEC-081	Biomedical Instrumentation	3	1	0	20	10	30	70	100	4
PRACTICALS / PROJECT											
	EEC-851	Project	0	0	20	-	300	300	400	700	10
4.	EGP-801	General Proficiency	-	-	-	-	-	100	-	100	1
		TOTAL	**09**	**03**	**20**	**-**	**-**	**-**	**-**	**1100**	**23**

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -IV Year (VII Semester)

EEC-701: WIRELESS COMMUNICATION

Objective: To get an understanding of mobile radio communication principles, types and to study the recent trends adopted in cellular and wireless systems and standards.

Unit I **(08Sessions)**

Evolution of mobile radio communication fundamentals. Large scale path loss: propagation models, reflection, diffraction, scattering, practical link budget design using path loss model. Small scale fading & multipath propagation and measurements, impulse response model and parameters of multipath channels. Small scale Multipath Measurements, Parameters of Mobile Multipath. Channels types of small scale fading.

Unit II **(08Sessions)**

Cellular concepts, Frequency reuse, channel assignment strategies, handoff strategies, interference and system capacity, improving coverage and capacity in cellular systems.

Unit III: **(08Sessions)**

Fundamentals of equalisation, Equalisers in communication receiver, Survey of equalisation techniques, linear equaliser, Algorithms for Adaptive Equalization, Diversity techniques, RAKE receiver. Characteristics of speech signals, quantisation techniques, vocoder, linear predictive coders, Multiple Access techniques for Wireless Communications.

Unit IV: **(08Sessions)**

GSM system for mobile: Services and features, System Architecture, Radio Sub system Channel types, Frame Structure. CDMA Digital Cellular Standard (IS 95): Frequency and Channel specifications, Forward CDMA channel and reverse CDMA channel, Introduction to advanced wireless communication standards (LTE, WiMax)

Unit V: **(08Sessions)**

Introduction to Mobile Adhoc Networks, Mobile data networks, wireless standards IMT2000, Introduction to 4G and concept of NGN.

Course Outcomes:
Students completing this course will be able to:

- Apply the knowledge of basic communication systems and its principles.
- Describe the cellular concept and analyze capacity improvement Techniques.
- Mathematically analyze mobile radio propagation mechanisms and diversity reception techniques.
- Design Base Station (BS) parameters and analyze the fundamentals of equalization.
- Analyze and examine the multiple access techniques and its application.
- Assess the latest wireless technologies.

Suggested readings:

1. T.S. Rappaport, "Wireless Communication-Principles and practice", Pearson, Second Edition.
2. T L Singal ,"Wireless Communications ",McGraw Hill Publications.
3. R. Pandya, "Mobile and personal communication system", PHI.
4. Andrea Goldsmith, "Wireless Communications", Cambridge University press.
5. Andreas F. Molisch, "Wireless Communications", Wiley Student Edition.
6. S. Haykin& M. Moher, "Modern wireless communication", Pearson, 2005.
7. A. F. Moliseh, "Wireless Communication", John Wiley and Sons, 2010.
8. David Tse Lee, "Wireless Communication Systems," TMH, 2013

Website sources:

- https://en.wikipedia.org/wiki/Wireless
- www.nptel.ac.in
- https://www.electronicshub.org/wireless-communication/

Note: Adhere to latest edition of the suggested readings.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -IV Year (VII Semester)

EEC-702: DATA COMMUNICATION NETWORKS

Objective: To get an understanding on the fundamentals of networks and issues involved and to acquire an understanding on the set of rules and procedures that mediates the exchange of information between communicating devices.

Unit-I **(08Sessions)**

Introduction to Networks & Data Communications the Internet, Protocols & Standards, Layered Tasks, OSI Model, TCP / IP, Addressing, Line Coding Review, Transmission Media: Guided and unguided Media Review.

Unit-II **(08Sessions)**

Switching: Datagram Networks, Virtual Circuit Networks, Structure of a switch, Ethernet Physical Layer, Data Link Layer: Error detection and Correction Data Link Control: Framing, Flow and Error Control Protocols, Noiseless Channel and Noisy Channel Protocol, HDLC, Point-to-Point Protocol

Unit-III **(08Sessions)**

Multiple Access: RANDOH, CDMA, CSMA/CD, CSMA/CA, Controlled Access, Channelization Wired LANs: IEEE Standards, Standard Ethernet, Fast Ethernet, Gigabit Ethernet, and Wireless LAN IEEE 802.11, Bluetooth IEEE 802.16

Unit-IV **(08Sessions)**

Network Layer: Design Issues. Routing Algorithms. Congestion control Algorithms.IPV4 Addresses, Connecting Devices, Virtual LAN IPV6 Addresses, Internet Protocol, Hardware Addressing versus IP Addressing, IP Data Gram

Unit-V **(08Sessions)**

Transport Layer Protocol: UDP and TCP, ATM ATM, Cryptography, Network Security

Course Outcomes:
Students completing this course will be able to:

- Compare and examine, OSI and TCP/IP protocol stacks
- Categorize services offered by all layers in TCP/IP protocol stack
- Analyze a network under congestion and propose solutions for reliable data transfer
- Examine the protocols operating at different layers of TCP/IPmodel
- Assess the cryptographic techniques.
- Manage a network and propose solutions under network security threats

Suggested readings:

1. B. A. Forouzan, “Data Communications and Networking”, MGH, 4th ed. 2007.
2. A. S. Tanenbaum, “Computer Networks”, PHI, 5th ed., 2013
3. W. Stallings, “Data and Computer Communication”, PHI, 10th ed., 2014.

Website sources:

- https://en.wikipedia.org/wiki/Computer_network
- https://www.guru99.com/data-communication-computer-network-tutorial.html
- www.nptel.ac.in

Note: Adhere to latest edition of the suggested readings.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -IV Year (VII Semester)

EEC-703: OPTICAL FIBER COMMUNICATION

Objective: The objective of this course is to expose the students to the basics of signal propagation through optical fibers, fiber impairments, components and devices and system design.

UNIT I **(8Sessions)**

Overview of Optical Fiber Communication: Optical fiber communication system, advantages and disadvantages of optical fiber communications, applications of optical fiber communication system. Optical fiber wave guides- introduction, Ray theory transmission, Optical fiber Modes and configuration: single mode and multimode fiber, Mode theory for circular Waveguides, Step Index fibers, Graded Index fibers. Single mode fibers: Numerical Aperture Cut off wavelength, Mode Field Diameter and spot size, Effective Refractive Index.

UNIT II **(10Sessions)**

Signal Distortion in Optical Fibers: Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses. Information capacity determination, Group delay, Attenuation Measurements Techniques. Dispersion: Material dispersion, Wave-guide dispersion, Polarization mode dispersion, Intermodal dispersion and intramodal dispersion. Pulse broadening. Nonlinear effects. Birefringence, Normalized frequency parameter.

UNIT III **(8Sessions)**

Fiber Material and its Fabrication Techniques, Optical fiber Connectors: Joints, Couplers and Isolators. Optical sources: LEDs, Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product. Laser Diodes: Basic concepts, Classifications, Semiconductor injection Laser: Modes, Threshold conditions, Laser diode rate equations, resonant frequencies, reliability of LED.

UNIT IV **(7Sessions)**

Source to fiber power launching: Output patterns, Power coupling, Power launching, Laser diode to fiber coupling. Optical detectors- Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photo detectors.

Optical receiver operation: Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of error, Quantum limit, Analog receivers.

UNIT V **(5Sessions)**

Link Design: Point to Point Links, Power Penalities, Error control, Multichannel Transmission Techniques, WDM concepts and component overview, OTDR and optical Power meter, Measurement techniques of Numerical aperture, attenuation and dispersion.

Course Outcomes:

After completion of this course Students are able to

1. Recognize and classify the structures of Optical fiber and types.
2. Classify the Optical sources and detectors and to discuss their principle.
3. Familiar with Design considerations of fiber optic systems.

Suggested Reading:

1. John M. Senior, “Optical Fiber Communications”, PEARSON, 3rd Edition, 2010.
2. Gerd Keiser, “Optical Fiber Communications”, TMH, 4th Edition, 2008.
3. Govind P. Agrawal, “Fiber Optic Communication Systems”, John Wiley, 3rd Edition, 2004.
4. Joseph C. Plais, “Fiber Optic Communication”, Pearson Education, 4th Ed, 2004.
5. “Fiber Optics and Optoelectronics”, Oxford University Press, 2004**.**

Website Sources:

1. en.wikipedia.org
2. www.studynama.com
3. onlinecourses.nptel.ac.in
4. www.tutorialspoint.com

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -IV Year (VII Semester)

EEC-704: VLSI Design

Objective: The objective of this course is to familiarize the students with the advanced VLSI Design processes and industrial manufacturing of Integrated circuits. This course also helps them to understand the advanced concepts of CMOS, BiMOS implantation, packaging design and various technologies involved in fabrication. This course helps student to learn software language like HDL and VHDL for research in the field of VLSI.

Unit-I **(8Sessions)**

Introduction: Overview of VLSI Design Methodologies, VLSI Design Flow, Design Hierarchy, Concepts of Regularity, Modularity and Locality. MOSFET Fabrication: Fabrication process flow, NMOS and CMOS fabrication, layout design rules, stick diagram and mask layout design. MOS Transistor: MOS Structure, The MOS System under external bias, Operation of MOSFET, MOSFET - Current /Voltage Characteristics, Scaling and Small geometry effects and capacitances

Unit-II **(8Sessions)**

MOS Inverters: Introduction, Resistive Load Inverter, Inverters with n-type MOSFET load, CMOS Inverter. MOS Inverters - Switching Characteristics: Introduction, Delay – Time Definitions, Calculation of Delay Times, and Inverter Design with Delay Constraints.

Unit-III **(8Sessions)**

Combinational MOS Logic Circuits: Introduction, MOS logic circuits with depletion NMOS Loads, CMOS logic circuits, complex logic circuits, CMOS transmission gates (pass gates) Sequential MOS Logic Circuits: Introduction, behaviour bistable elements, SR latch circuits, clocked latch and FF circuits, CMOS D latch and edge triggered FF.

Unit-IV **(8Sessions)**

Dynamic logic circuits: Introduction, basic principle of pass transistor circuits, synchronous dynamic circuit techniques, dynamic CMOS circuit techniques, domino CMOS logic. Semiconductor memories: Introduction, DRAM, SRAM, ROM, flash memory.

Unit-V **(8Sessions)**

Low – Power CMOS Logic Circuits: Introduction, Overview of Power Consumption, Low – Power Design through voltage scaling, Estimation and Optimization of switching activity, Reduction of Switched Capacitance and Adiabatic Logic Circuits. Design for Testability: Introduction, Fault Types and Models, Controllability and Observability, Ad Hoc Testable Design Techniques, Scan Based and BIST Techniques

Course Outcomes:

Students completing this course will be able to:

- To identify the various IC fabrication methods.
- To express the Layout of advance MOS circuit using Lambda based design rules.
- To differentiate various latest FPGA architectures.
- To Design an application using software's.
- To develop concepts of modeling a digital system using Hardware Description Language

Suggested Readings:

1. Basic VLSI design, Dougles A. Pucknel, K. Eshriaghian, PHI.
2. Principles of CMOS VLSI Design- A system Perpective, by Niel H.E Weste, K. Eshriaghian, Pearson Education.
3. CMOS Digital Integrated Circuit Analysis and Design, Sung.mo Kang and Yusuf Leblebici, Tata McGraw-Hill

Website Sources:

- ndl.iitkgp.ac.in
- online courses.nptel.ac.in
- en.wikipedia.org
- www.tutorialspoint.com
- www.vlab.co.in

Note: Latest editions of all the suggested readings must be used.

IFTM UNIVERSITY, MORADABAD
Bachelor of Technology (B. Tech) Electronics & Communication Engineering
B. Tech (EC) -IV Year (VII Semester)

EEC-072: OPTICAL NETWORKS

Objectives: The objective of this course is to gain an understanding of various issues in designing an optical network. This course gives you in-depth knowledge on the elements of optical networks and how they work together to support high capacity data transfer.

UNIT-I **(10 Sessions)**

Introduction to Optical Networks: Principles and Challenges and its Generation, Characteristics of Optical Fiber in non linear region ,Optical Packet Switching, Transmission Basics, Multiplexers & Filters,

UNIT-II **(8 Sessions)**

Optical Amplifiers: Tunable Lasers, Switches, Wavelength Converters. Sub-Carrier Modulation and Multiplexing, Spectral efficiency, Crosstalk, Introduction of Soliton systems.

UNIT-III **(10 Sessions)**

SONET/SDH: Multiplexing, SONET/ SDH Layers, Frame Structure, Physical Layer, Elements of a SONET/SDH Infrastructure ,Ethernet. Optical Transport Network, Generic framing Procedure, IP routing and forwarding and QOS. WDM Network Elements Optical Line Terminals, Optical Line Amplifiers, Optical Add/ Drop Multiplexers, Optical Cross Connects.

UNIT-IV **(12 Sessions)**

WDM Network Design: Cost Trade-offs, Light path Topology Design, and Routing and wavelength assignment problems, Dimensioning Wavelength Routing Networks, Network Survivability Basic Concepts, Protection in SONET/SDH, Protection in client layer, Optical Layer Protection, Different Schemes, Interworking between Layers Access Networks Network Architecture Overview, Enhanced HFC, FTTC, PON evolution

UNIT-V **(10 Sessions)**

Optical Switching OTDM, Synchronization, Header Processing, Buffering, Burst Switching Deployment Considerations-SONET/SDH core Network

Course Outcomes:

Students completing this course will be able to:

- Formulate **optical** communication **networks.**
- Solve **optical** communication **networks** related problems using efficient technical approaches.
- Applications of modern solid state physics results into solid state electronics**.**
- Design **optical networks** as well as to interpret statistical and physical data.

Suggested Readings:

1. R. Ramaswami, & K. N. Sivarajan, "Optical Networks a Practical perspective", Morgan Kaufmann Publishers, 3rd Ed.
2. U. Black, "Optical Networks: Third Generation Transport Systems"/ Pearson Educations
3. Biswanath Mukherjee "Optical WDM Networks" Springer Pub 2006.

Website sources:

- www.nptel.ac.in
- en.wikipedia.org
- www.sanfoundary.co.in
- Grade up online course on transistors (www.gradeup.org)

Note: Latest editions of all the suggested readings must be used.

IFTM UNIVERSITY, MORADABAD
Bachelor of Technology (B. Tech) Electronics & Communication Engineering
B. Tech (EC) -IV Year (VII Semester)

EHU- 701: INDUSTRIAL MANAGEMENT

Objective: The objective of this course is to familiarize the students with working concept of management that are applied in the industry for larger gain.

UNIT I **(8 Sessions)**

Introduction: Concept, Objectives, scope and application of Industrial Management,Development of Industrial Management,Production System and Types of Production system,Productivity : Definition, measurement, Productivity index ,Industrial Ownership.

UNIT II **(8 Sessions)**

Management: Definition, Principle and Functions,Management tools: Work Study, Process charts and diagrams Motion study, Time Study,Production planning Specification of production requirement.

UNIT III **(8 Sessions)**

Inventory: Types of Inventory, functions of inventories, advantage of inventory control Inventory cost, Deterministic model, numerical problems,Inventory control, Introduction to supply Chain Management.

UNIT IV **(8 Sessions)**

Introduction of Quality: quality control, statistical quality control Control charts: introduction, types,Numerical problems on control charts,Single, double and sequential sampling, numerical problems,Introduction to Total Quality Management(TQM)

UNIT V **(8 Sessions)**

Environmental Pollution: Introduction, Sources, Effects,Types of Pollution, sources, effect, measurement technique to control pollution,Various acts for Air, Water, Solid waste and noise pollution.

Course Outcomes:

Students completing this course will be able to:

- To develop, design, implement, and improve integrated systems that include people, materials, information, equipment, and environments.
- Develop an ability to contribute to the success of companies through effective problem solving.a
- Continue to develop the personal, professional and ethical responsibility and skills necessary to adapt to our changing societal, technological, and global environments.

Suggested Readings:

1. Industrial Engineering - O.P.Khanna
2. Industrial Engineering & Management- T.R. Banga
3. Environmental an Pollution Awareness- Sharma B.R
4. Industrial Management – R.K.Singhal
5. Industrial Management- Onkar N. Pandey

Website Sources:

- www.gradeup.in
- Online courses.nptel.ac.in
- en.wikipedia.org

Note: Adhere to the latest editions of suggested readings.

IFTM UNIVERSITY, MORADABAD
Bachelor of Technology (B. Tech) Electronics & Communication Engineering
B. Tech (EC) -IV Year (VII Semester)

EEC-751: CAD OF ELECTRONICS LAB

Objective: To understand the steps involved hardware preparation, measuring of various parameter, simulation of circuits using software tools, synthesis and interpretation of data.

List of Experiments **(12Sessions)**

1. Transient Analysis of BJT inverter using step input.
2. DC Analysis (VTC) of BJT inverter with and without parameters.
3. Transient Analysis of NMOS inverter using step input.
4. Transient Analysis of NMOS inverter using pulse input.
5. DC Analysis (VTC) of NMOS inverter with and without parameters.
6. Analysis of CMOS inverter using step input.
7. Transient Analysis of CMOS inverter using step input with parameters.
8. Transient Analysis of CMOS inverter using pulse input.
9. Transient Analysis of CMOS inverter using pulse input with parameters.
10. DC Analysis (VTC) of CMOS inverter with and without parameters.
11. Transient & DC Analysis of NOR Gate inverter.
12. Transient & DC Analysis of NAND Gate.

Course Outcomes:
Students completing this course will be able to:
1. Familiarize with CAD tool capabilities and limitations
2. Use automatic synthesis, placement and routing tools to implement a design
3. Analyze the circuit design process and simulate the BJT transient analysis
4. Know the origin of failure of a circuit when it is in an application
5. Acquaint with the design and simulate the NMOS, CMOS circuits

Suggested readings:
1. 1. J. Millman and Halkias, Integrated Electronics, TMH, 2nd Edition, 2010.
2. J. Millman and A. Grabel, Micro Electronics, TMH, 2nd Edition, 2009.
3. A. S. Sedra and K. C. Smith, Micro Electronic Circuits, Oxford press, 4th Edition, 1998.
4. Neil H.E. Weste, David Money Harris, CMOS VLSI Design – A Circuits and SystemsPerspective, Addision – Wesley, 2011.
5. Michael John, Sebastian Smith, Application Specific Integrated Circuits, Addison Wesley
Publishing Company, 1997

Website sources:

- https://www.vlab.co.in/broad-area-electronics-and-communications
- www.nptel.ac.in

Note: Adhere to latest edition of the suggested readings.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -IV Year (VII Semester)

EEC- 752: OPTICAL FIBER COMMUNICATION LAB

OBJECTIVES
This lab covers fiber optic communication design, measurements and simulations. This includes numerical aperture, fiber attenuation, power distribution in single mode fibers, mode distribution in multimode fibers, fiber coupling efficiency and Connectors/ splices losses.

List of Experiments **(10Sessions)**

1. The study of setting up Fiber Optic Analog Link.
2. To study setting up Fiber Optic Digital Link.
3. Study of Propagation Loss in Optical Fiber.
4. To Measurement of Optical Power using Optical Power Meter.
5. To measure propagation loss in optical fiber using optical power meter.
6. Study and measurement of Numerical Aperture of optical fiber.
7. Study the characteristics of fiber optic LED's and photo detector.
8. Study of Intensity Modulation Technique using digital Input signal.
9. Study of framing in time division multiplexing.
10. Study of Manchester coding and decoding.

Course Outcomes

When a student completes this course, he/she should be able to:

- Understand the functionality of each of the components that comprise a fiber-optic communication system: transmitter, fiber, amplifier, and receiver.
- Understand the properties of optical fiber that affect the performance of a communication link.
- Understand to differentiate between direct modulation and external electro-optic modulation.
- Understand basic optical amplifier operation and its effect on signal power and noise in the system.
- Apply concepts listed above to the design of a basic communication link.

Suggested Reading:
1. John M. Senior, "Optical Fiber Communications", PEARSON, 3rd Edition, 2010.
2. Gerd Keiser, "Optical Fiber Communications", TMH, 4th Edition, 2008.
3. Govind P. Agrawal, "Fiber Optic Communication Systems", John Wiley, 3rd Edition, 2004.
4. Joseph C. Plais, "Fiber Optic Communication", Pearson Education, 4th Ed, 2004.
5. "Fiber Optics and Optoelectronics", Oxford University Press, 2004.

Website Sources:
1. en.wikipedia.org
2. https://www.vlab.co.in/
3. onlinecourses.nptel.ac.in
4. www.tutorialspoint.com

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -IV Year (VII Semester)

EEC-753: COMMUNICATION NETWORK SIMULATION LAB

Objective: The objective of this course is to make students familiar with the advanced simulation software such as NETSIM and HFSS (High Frequency Structural Software). This will help students to prepare themselves for advanced studies and research in the field of electronics.

List of Experiments **(10Sessions)**

Experiments based on Net Sim simulation software:

1. Introduce students to network simulation through the NetSim simulation package.
2. Simulate a three nodes point – to – point network with duplex links between them.
3. Simulate a four node point-to-point network with the links connected as follows: n0 – n2, n1 – n2 and n2– n3.
4. Simulate the different types of Internet traffic such as FTP and TELNET over a network and analyze the throughput.

Experiments based on HFSS simulation software

5. Analysis of Rectangular patch antenna.
6. Analysis of Circular Monopole antenna.
7. Analysis of Microstrip patch antenna with changes in ground plane.
8. Analysis of Horn Antenna.

Course Outcomes:

Students completing this course will be able to:

- To understand about different software's such as NETSIM and HFSS.
- To design and simulate various network points, Internet traffic such as FTP and TELNET over NETSIM.
- To design and simulate various microstrip patch antennas over HFSS.

Suggested Readings:

1. Lambert M. Surhone, Mariam T. Tennoe, Susan F. Henssonow, "OMNeT++: Network Simulation, Network Simulator, NetSim", VDM Publishing
2. C.A Balanis, "Antenna Theory: Analysis and Design", Willey
3. I.J Bahl and P.Bharatia, "Microstrip Antennas", Artech House Publishers.

Website Sources:

- ndl.iitkgp.ac.in
- online courses.nptel.ac.in
- en.wikipedia.org
- www.ansys.com

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -IV Year (VII Semester)

EEC-754: INDUSTRIAL TRAINING (EVALUATION AND VIVA)

Objective: The fundamental objective of Industrial Training is to prepare students for future employment in their chosen engineering discipline having interaction with industry to understand the practical implementation of the theoretical aspects and can enhance their employ ability skills and become job ready along with real corporate exposure.

Each student has to undergo industrial training for a minimum period of 4 weeks. This may be taken in a phased manner during the vacation starting from the end of third semester.
Student has to submit a training report to the Department in the prescribed format and also make a presentation of the same. The report should include the certificates issued by the industry.

Course Outcomes:
Students completing this course will be able to:
1. Get the opportunity to test their interest in a particular career before permanent commitments are made.
2. Develop skills in the application of theory to practical work situations.
3. Develop skills and techniques directly applicable to their careers.
4. Internships will increase a student's sense of responsibility and good work habits.
5. Get exposure to real work environment experience gain knowledge in writing report in technical works/projects.
6. Enhance the ability to improve student's creativity skills and sharing ideas.
7. Build a good communication skill with group of workers and learn to learn proper behavior of corporate life in industrial sector.

Suggested readings:

1. Albert George Beverstock, Industrial Training Practices, Classic, 1969.
2. Lokesh Choudhary, Industrial Training And Education, Mittal Publications, 2007

Website sources:

- https://www.srishtirobotics.com
- https://www.sofcontraining.com

Note: Adhere to latest edition of the suggested readings.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -IV Year (VIII Semester)

EEC-801: INTRODUCTION TO RADAR SYSTEMS

Objective: The objective of this course is to provide an understanding of the basic concepts, operation, and applications of modern radar systems. It is designed to develop the knowledge and techniques necessary to analyze the performance of radar systems.

UNIT I **(07Sessions)**

Introduction to Radar: Basic Radar, Simply Form of the Radar Equations, Radar Block Diagram, Radar Frequencies, applications of Radar. The Radar Equation: Detection of Signals in Noise, Receiver Noise and the Signal-to-Noise Ratio, Probabilities of Detection and False Alarm, Integration of Radar Pulses, Radar Cross Section of Targets, Radar Cross- Section of Targets, Radar Cross-Section Fluctuations, Transmitter Power, Pulse Repetition Frequency, Antenna Parameters, System Losses.

UNIT II **(08Sessions)**

MTI and Pulse Doppler Radar: Introduction to Doppler and MTI Radar, Delay-Line Cancellers, Staggered Pulse Repetition Frequencies, Doppler Filter Banks, Digital MTI Processing, Moving Target Detector, Limitations to MTI Performance.

UNIT III **(07Sessions)**

Tracking Radar: Tracking with Radar, Mono pulse Tracking, Conical Scan and Sequential Lobbing, Limitations to tracking Accuracy, Low- Angle Tracking, Tracking in Range, Other Tracking Radar Topics, Comparison of Trackers and Automatic Tracking with Surveillance Radars (ADT).

UNIT IV **(06Sessions)**

Detection of Signals in Noise: Introduction, Detection Criteria, Detectors, Automatic Detection, Integrators, Constant-False-Alarm Rate Receivers.

UNIT V **(08Sessions)**

Information from Radar Signals: Basic Radar Measurements, Theoretical Accuracy of Radar Measurements, Ambiguity Diagram, Pulse Compression, Target Recognition, Land Clutter, Sea Clutter, Weather Clutter.

Course Outcomes:

On completion of course, the student will be able to:

1. Compare working of different types of radars.
2. Analyze the statistical parameters of Noise and Radar cross section of targets.
3. Distinguish the fixed and moving targets using different types of radar systems.
4. Explain various techniques employed in radar receivers for detection of signals in noise.
5. Observe the variation in parameters of radar system by the estimation of noise figure & noise temperature.

Suggested Reading:

1. Merrill I. Skolnik "Introduction to Radar Systems" Third Edition.
2. J.C. Toomay, Paul J. Hannen "Principles of Radar" Third Edition.
3. Eugene F. Knott, John F. Shaeffer, Michael T. Tuley, "Radar Cross Section", SciTech Publishing.

Website Sources:

1. en.wikipedia.org
2. www.studynama.com
3. onlinecourses.nptel.ac.in
4. www.gupshupstudy.com
5. www.tutorialspoint.com

Note: Latest editions of all the suggested readings must be used.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -IV Year (VIII Semester)

EEC-802: ELECTRONICS SWITCHING

Objective: To understand the working principles of switching systems from manual and electromechanical systems to stored program control systems.

Unit I **(08Sessions)**

Evolution of Switching systems: Introduction: Message switching, circuits switching, functions of a switching system, register-translator-senders, distribution frames, crossbar switch, a general trunking, electronic switching, Reed electronic system, digital switching systems.

Unit II **(08Sessions)**

Digital switching: Switching functions, space division switching, Time division switching, two dimensional switching, Digital cross connect systems, digital switching in analog environment.

Unit III **(08Sessions)**

Telecom Traffic Engineering: Network traffic load and parameters, grade of service and blocking probability, modelling switching systems, incoming traffic and service time characterization, blocking models and loss estimates, Delay systems.

Unit IV **(08Sessions)**

Control of Switching Systems: Introduction, Call processing functions; common control, Reliability availability and security; Stored program control. Signalling: Introduction, Customer line signalling, AF junctions and trunk circuits, FDM carrier systems, PCM and inter register signalling, Common channel signalling principles, CCITT signalling system No. 6 and 7, Digital customer line signalling.

Unit V **(08Sessions)**

Packet Switching: Packets formats, statistical multiplexing, routing control, dynamic, virtual path circuit and fixed path routing, flow control, X.25 protocol, frame relay, TCP/IP, ATM cell, ATM service categories, ATM switching, ATM memory switch, space memory switch, memory-space, memory-space-memory switch, Banyan network switch.

Course Outcomes:
Students completing this course will be able to:

- Explain the working principle of switching systems involved in telecommunication switching
- Assess the need for voice digitization and T Carrier systems
- Compare and analyze Line coding techniques and examine its error performance
- Design multi stage switching structures involving time and space switching stages
- Analyze basic telecommunication traffic theory

Suggested readings:

1. Thiagarajan Viswanathan & Manav Bhatnagar, “Telecommunication switching System and networks”, @2nd Ed, PHI.
2. J.E. Flood, “Telecommunication switching, Traffic and Networks”, Pearson education.
3. J.C. Bellamy, “Digital Telephony”, John Wiley, 3rd Ed

Website sources:

- https://en.wikipedia.org/wiki/Communications_system
- https://www.guru99.com/
- www.nptel.ac.in

Note: Adhere to latest edition of the suggested readings.

IFTM University, Moradabad
Bachelor of Technology (B.Tech) Electronics & Communication Engineering
B.Tech (EC) -IV Year (VIII Semester)

EEC-081: Biomedical Instrumentation

Objective: The objective of the course is to familiarize the students with the biomedical engineering & develop their skills anticipate change, communicate and work with others effectively in a globally connected society.

Unit I **(07Sessions)**

Introduction: Specifications of bio-medical instrumentation system, Man-Instrumentation system Components, Problems encountered in measuring a living system. Basics of Anatomy and Physiology of the body. Bioelectric potentials: Resting and action potentials, propagation of action potential, The Physiological potentials – ECG, EEG, EMG, ERG, EOG and Evoked responses. Electrodes and Transducers: Electrode theory, Biopotential Electrodes – Surface electrodes, Needle electrodes, Microelectrodes, Biomedical Transducer.

Unit II **(08Sessions)**

Cardiovascular Measurements: Electrocardiography – ECG amplifiers, Electrodes and Leads, ECG –Single channel, three channel, Vector Cardiographs, ECG System for Stresses testing, Holter recording, Blood pressure measurement, Heart sound measurement. Pacemakers and Defibrillators. Patient Care & Monitoring: Elements of intensive care monitoring, displays, diagnosis, Calibration & Reparability of patient monitoring equipment.

Unit III **(06Sessions)**

Respiratory system Measurements: Physiology of Respiratory system. Measurement of breathing mechanism –Spirometer. Respiratory Therapy equipment's: Inhalators, Ventilators & Respirators, Humidifiers, and Nebulizers & Aspirators. Nervous System Measurements: Physiology of nervous system, Neuronal communication, Neuronal firing measurements.

Unit IV **(08Sessions)**

Ophthalmology Instruments: Electroretinogram, Electro-oculogram, Ophthalmoscope, Tonometer for eye pressure measurement. Diagnostic techniques: Ultrasonic diagnosis, Eco - cardiography, Eco-encephalography, Ophthalmic scans, X-ray & Radio-isotope diagnosis and therapy, CAT-Scan, Emission computerized tomography, MRI.

Unit V **(09Sessions)**

Bio-telemetry: The components of a Bio-telemetry system, Implantable units, Telemetry for ECG measurements during exercise, for Emergency patient monitoring. Prosthetic Devices and Therapies: Hearing Aides, Myoelectric Arm, Diathermy, Laser applications in medicine.

Course Outcomes:

Students completing this course will be able to:

- Define Biomedical engineering and its concept.
- Define continuous improvement in the field of biomedical engineering.
- Apply to solve critical design skills to identify and solve problems in biomedical engineering.
- Lead and manage biomedical engineering projects in industry, government, or academia that involve multidisciplinary team members.

Suggested Reading:

1. R. S. Khandpur, "Biomedical Instrumentation", Tata McGraw Hill
2. S. K. Venkata Ram, "Bio-Medical Electronics &Instrumentation (Revised)", Galgotia.
3. J. G. Webster (editor), "Medical Instrumentation Application & Design", 3rd Ed WILEY, India
4. Cromwell, "Biomedical Instrumentation and Measurements" PHI
5. J. G. Webster, "Bio- Instrumentation", Wiley
6. S. Ananthi, "A Text Book of Medical Instruments", New Age International
7. Carr& Brown, "Introduction to Biomedical Equipment Technology", Pearson joseph J. Carr, Marine Corps Systems Command

Website Sources:

- https://biomedical-engineering-online.biomedcentral.com/
- https://wne.libguides.com/bme/websites
- https://www.uml.edu/catalog/undergraduate/engineering

Note: Adhere to latest edition of the suggested readings.