ACAM-102 Engineering Mathematics-II

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Objective/s and Expected outcome: The learning objectives of core mathematics courses can be put into three categories:

Content Objectives: Students should learn fundamental mathematical concepts and how to apply them.

Skill Objectives: Students should learn critical thinking, modeling/problem solving and effective uses of technology. Communication Objectives: Students should learn how to read mathematics and use it to communicate knowledge. The students are expected to understand the fundamentals of the mathematics to apply while designing technology and creating innovations.

PART A

1. Ordinary Differential Equations of first order Exact Differential equations, Equations reducible to exact form by integrating factors; Equations of the first order and higher degree. Clairaut's equation. Leibniz's linear and Bernoulli's equation

2. Linear Ordinary Differential Equations of second & higher order Solution of linear Ordinary Differential Equations of second and higher order; methods of finding complementary functions and particular integrals. Special methods for finding particular integrals: Method of variation of parameters, Operator method. Cauchy's homogeneous and Legendre's linear equation, Simultaneous linear equations with constant coefficients.

3. Applications of Ordinary Differential Equations Applications to electric R-L-C circuits, Deflection of beams, Simple harmonic motion, Simple population model.

PART B

4. Linear Algebra Rank of a matrix, Elementary transfonnations, Linear independence and dependence of vectors, Gauss-Jordan method to find inverse of a matrix, reduction to normal form, Consistency and solution of linear algebraic equations, Linear transformations, Orthogonal transformations, Eigen values, Eigen vectors, Cayley-Hamilton Theorem, Reduction to diagonal form, orthogonal, unitary, Hermitian and similar matrices.

1. Infinite Series Convergence and divergence of series, Tests of convergence (without proofs): Comparison test, Integral test, Ratio test, Rabee's test, Logarithmic test, Cauchy's root test and Gauss test. Convergence and absolute convergence of alternating series

a. Complex Numbers and elementary functions of complex variable De-Moivre's theorem and its applications. Real and Imaginary parts of exponential, logarithmic,

circular, inverse circular, hyperbolic, inverse hyperbolic functions of complex variables. Summation of trigonometric series. (C+iS method) (7)

Suggested Readings / Books:

1. Kreyszig,E., Advanced Engineering Mathematics, Eighth edition, John W iley.

2. Michael D. Greenberg., Advanced Engineering Mathematics, Second Edition, Pearson Education.

3. Peter. V. O'Nil, Advanced Engineering Mathematics, Wadsworth- Publishing Company.

4. Jain, R.K. and Iyengar, S.R.K., Advanced Engineering Mathematics, Narosa Publishing House, New Delhi.

5. Grewal, B.S., Higher Engineering Mathematics, Khanna Publishers, Delhi.

6. Pipes, L.A. and Harvill, L.R., Applied Mathematics for Engineers and Physicists, McGraw Hill

7. Taneja, H. C., Engineering Mathematics, Volume-I & Volume-II, 1. K. Publisher.

8. Babu Ram, Advance Engineering Mathematics, Pearson Education.

9. Bindra, J. S., Applied Mathematics, Volume-II, Kataria Publications.

ACEE 101 Basic Electrical and Electronics Engineering

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Objective/s and Expected outcome:

This course is mandatory for all the branches for understanding the basic concepts of Electrical and Electronics Engineering. Students of all branches have to deal with the applications of Electrical Engineering and Electronics Engineering. This course gives a basic knowledge of circuits, transducers, semiconductor devices with which a building of innovative technology can be created. The students are expected to learn and understand the importance and applications of electric and electronics material. This knowledge give them a brief outline of the fundamentals that would be the foundations of today's and tomorrow's technology.

Part A (Electrical Engineering)

1. Direct Current (DC) Circuits:

Circuit elements and connected terminology, Kirchoff"s Laws- Statement and

Illustrations, Method of solving circuits by Kirchoff"s law, Star-Delta Conversion, Computation of resistance at constant temperature, resistance at different temperatures, Ohm's Law- Statement, Illustration and Limitation, Units- Work, Power and Energy (Electrical, Thermal and Mechanical

2. Alternating Current (AC) Fundamentals:

Peak, Root Mean Square and Average value of alternating current, Phasor representation of alternating quantities, Analysis of AC Circuit Representation of Alternating Quantities in Rectangular and polar forms. Introduction of Resistive,

Inductive & Capacitive circuits and their series and parallel combinations. Concept of resonance in series and parallel circuits, Analysis of balanced 03 phase system with star-delta connections.

3. Magnetic Circuits and Transformer:

Comparison between magnetic and electric circuits, Law of Electromagnetic Induction and its law, Self Inductance, Mutual Inductance, Single Phase Transformer: Construction, Working principle, Efficiency, Voltage regulation and applications

4. Rotating Electrical Machines:

D.C. machines (motors and generators), Three phase Induction motor, Synchronous machines (motors and generators): construction, working principle, and applications

Part B (Electronics Engineering)

5. Transducers:

Introduction, working and application of LVDT, Strain Gauge and Thermistor.

Introduction and application of Digital Multimeter.

6. Semiconductor Devices:

Principle of operation characteristic and application of PN Junction Diode, Rectifiers, Zener Diode, Principle of operation characteristic and application of Bipolar Junction Transistor, Regulated Power Supply

7. Digital Electronics:

Binary, Decimal, Octal and Hexadecimal number System, Logic gates, Introduction of R-S, J-K, D and T Flip Flops & its truth tables.

Suggested Readings/ Books

1. Basic Electrical and Electronics and Computer Engineering by R Muthusubramanian, S Salivahanan,K A Muraleedharan, Tata McgrawHill

2. A Textbook of Electrical Techology by B.L Theraja.& A.K Theraja, S Chand publishers.
3. Electrical Technology, Edward Hughes, Addisin Wesley Longman Limited.

4. A Course in electrical and electronic Measurements & Instumentation by A.K Sawhney, Dhanpat Rai & Co

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ACEE 102 Basic Electrical and Electronics Engineering Lab.

L	T	P
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List of Experiments to be performed

1. To verify Ohm"s Law and its limitations.
2. To verify Kirchoff"s Laws.
3. To measure the resistance and inductance of a coil by ammeter-voltmeter method.
4. To find voltage-current relationship in a R-L series circuit and to determine the power factor of the circuit.
5. To verify the voltage and current relations in star and delta connected systems.
6. To measure power and power factor in a single- phase AC circuit.
7. To verify series and parallel resonance in AC circuits.
8. To observe the B-H loop of ferromagnetic core material on CRO.
9. To use a bridge rectifier for full- wave rectification of AC supply and to determine the relationship between RMS and average values of the rectified voltage.
10. To measure the minimum operating voltage, current drawn, power consumed, and the power factor of a fluorescent tube light.
11. To verify the working of a). Thermocouple b). Strain Gauge c). LVDT.
12. To verify the rating of compact fluorescent lamp (CFL).
13. To obtain the characteristics of a P-N junction diode.

14. To verify the truth table of logic gates.

15. To connect the following ,measuring instruments to measure current, voltage and power in AC/DC circuits:

i. Moving Coil Instruments
ii. Moving Iron Instruments
iii. Dynamometer Instruments
iv. Multimeter- both Digital and Analog Type

16. To obtain the characteristics of a transistor under common base (CB) and common emitter (CE) configuration.

17. To perform open- and short circuit tests on a single phase transformer and calculate its efficiency

18. To start and reverse the direction of rotation of a

i. DC motor
ii. Induction motor

Note: Each student is required to perform at least ten experiments **Suggested Readings / Books**

1. S.K. Bhattacharya and R.K. Rastogi, Experiments in Electrical Engineering, New Age International Publishers Ltd., New Delhi.
2. D.R. Kohli and S.K. Jain, Experiments in Electrical Machines.

ACHU-103 Communicative English Lab

B.Tech 1st Semester

L	T	P
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Lab Exercises

Listening and Speaking

The audio CD accompanying S.P. Dhanavel"s book shall be played in the lab to get the students familiar with the standard spoken English. The students must develop a high degree of understanding of spoken material as used in academic and professional environment. The teacher shall help them in the following:

a) With the accent of the speaker if it is unfamiliar to them.

b) The Standard English sounds and pronunciation of words.

c) With the topical vocabulary and the idiomatic expressions which are generally part of colloquial speech.

d) With the implied relationships in larger texts, if they are not stated explicitly.

In addition to the above, extended listening sessions shall be arranged to promote speaking activities among students. The teachers shall play the CDs selectively in the lab and involve the students in the practice work based on them. While taking up lessons, the teacher must promote the use of dictionaries for correct pronunciation and give ample practice on word stress and weak forms. The students are also supposed to supplement their listening practice by regularly viewing news/knowledge channels on the TV or lecture videos on the internet.

At the end of a session, a good speaker must:

a) Be able to produce long turns without much hesitation in an accent that is understood all around.

b) Have ready access to a large lexis and conventional expressions to speak fluently on a variety of topics.

c) Have a knack for structured conversation or talk to make his transitions clear and natural to his listeners.

The teacher may use following different classroom techniques to give practice and monitor the progress of the students:

- **Self Introduction**
- **Telephonic Conversation / Interviews**
- **Role Play**
- **Group Discussion**

ACHU- 104 Communicative English Lab.

B.Tech 2nd Semester

L	T	P
0	0	2

Lab Exercises

Listening and Speaking

The audio CD accompanying S.P. Dhanavel"s book shall be played in the lab to get the students familiar with the standard spoken English. The students must develop a high degree of understanding of spoken material as used in academic and professional environment. The teacher shall help them in the following:

a) With the accent of the speaker if it is unfamiliar to them.

b) The Standard English sounds and pronunciation of words.

c) With the topical vocabulary and the idiomatic expressions which are generally part of colloquial speech.

d) With the implied relationships in larger texts, if they are not stated explicitly.

In addition to the above, extended listening sessions shall be arranged to promote speaking activities among students.

The teachers shall play the CDs selectively in the lab and involve the students in the practice work based on them. While taking up lessons, the teacher must promote the

use of dictionaries for correct pronunciation and give ample practice on word stress and weak forms.

The students are also supposed to supplement their listening practice by regularly viewing news/knowledge channels on the TV or lecture videos on the internet.

The teacher may use following different classroom techniques to give practice and monitor

the progress of the students:

- **Oral Presentation/PPT Presentation**
- **Extempore**
- **Story Telling**
- **Mock Dialogues**
- **Mock Interview**

ACHU- 101 Communicative English- I

B.Tech 1st Semester

L	T	P
3	0	0

Objective/s and Expected outcome:

The objective is to help the students to become independent users of English language. Students should be able to understand spoken and written English language of varied complexity on most including some abstract topics; particularly the language of their chosen technical field. They must show awareness of appropriate format and a capacity for explaining their views in a rational manner. The students should be able to converse fluently, without strain with international speakers of English in an accent and lexis that is widely understood across the globe. They will be able to produce on their own texts which are clear and coherent.

1. **Reading:** Reading texts of varied complexity; speed reading for global and detailed meaning; processing factual and implied meanings

2. **Vocabulary:** Building up and expansion of vocabulary; active use of the prescribed expressions in the appropriate context

3. **Grammar:** Revising and practicing a prescribed set of grammar items; using grammar actively while processing or producing language

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4. **Writing:** The qualities of good writing; Learning the prescribed written expressions of conventional use; writing business letters, Job Application Letter & Resume / CV and various forms of descriptive and argumentative Writing.

Syllabus Outline and Study Scheme (Theory Paper)

1. Comprehension of seen/unseen textual component as per S.P. Dhanavel's English and Communication Skills for Students of Science and Engineering.

2. Vocabulary: Especially given in 'Word Power' of the recommended text book. (Unit I to V)

   Revising and practicing a prescribed set of grammar items based

   -Parts of Speech -Prefix / Suffix -Tenses - Voice

   -Gerunds/Infinitives

-Collocations

-Homographs/Homonyms/Homophones

-Sentence Structure

-Subject Verb Agreement

3. Creative Writing: Writing or developing a paragraph about 250-300 words

4. Developing business letter, letters to the editor and other subjects as per S.P. Dhanavel's prescribed text and Anne Laws Writing Skills.

5. Report/Proposal writing as per formats discussed in the recommended text book.

Suggested Readings/ Books

1. Vandana R Singh, The Written Word, Oxford University Press, New Delhi

2. KK Ramchandran, et al Business Communication, Macmillan, New Delhi

3. Swati Samantaray, Busines Commnication and Commnicative English, Sultan Chand, New Delhi.

4. S.P. DhanavelEnglish and Communication Skills for Students of Science and Engineering (with audio CD)

ACHU-102 Communicative English-II

(B. Tech 2nd Semester)

L	T	P
3	0	0

Objective/s and Expected outcome:

The objective is to help the students to become independent users of English language. Students should be able to understand spoken and written English language of varied complexity on most including some abstract topics; particularly the language of their chosen technical field. They must show awareness of appropriate format and a capacity for explaining their views in a rational manner. The students should be able to converse fluently, without strain with international speakers of English in an accent and lexis that is widely understood across the globe. They will be able to produce on their own texts which are clear and coherent.

1. **Reading:** Reading texts of varied complexity; speed reading for global and detailed meaning; processing factual and implied meanings

2. **Vocabulary:** Building up and expansion of vocabulary; active use of the prescribed expressions in the appropriate context

3. **Grammar:** Revising and practicing a prescribed set of grammar items; using grammar actively while processing or producing language

4. **Writing:** The qualities of good writing; Learning the prescribed written expressions of conventional use; writing business letters, Job Application

Letter & Resume / CV and various forms of descriptive and argumentative Writing.

Syllabus Outline and Study Scheme (Theory Paper)

1. Comprehension/Interpretation of seen or unseen passage/summarizing/precise writing.

2. Vocabulary: Especially given in 'Word Power' of the recommended text book.

(Unit VI to X)

Grammar: Revising and Practising a prescribed set of grammar items based on:

-Narration (Direct/Indirect Speech)

-Modals

-Antonyms/Synonyms

-Conjunctions (Simple/Compound/Complex Sentences)

-One word substitution

-Combine pairs of sentences

-If clause

3. Topic of general interest; reproduction from business, daily life, travel, health, buying-selling, company structure, systems etc.

4. Detailed topic discussion and developing Job Application/Resume/Curriculum Vitae along with covering letter on a given situation.

5. Questions based on Textual Reading from the following prescribed articles from English Literature:

   i) The School for Sympathy – E.V. Lucas (Prose)

   ii) Beauty and the Beast - R.K. Narayan (Prose)

   iii) The Lament – Anton Pavlovich Chakhov (Short Story)

Suggested Readings/ Books

1. Vandana R Singh, The Written Word, Oxford University Press, New Delhi

2. KK Ramchandran, et al Business Communication, Macmillan, New Delhi

3. Swati Samantaray, Busines Commnication and Commnicative English, Sultan Chand, New Delhi.

4. S.P. DhanavelEnglish and Communication Skills for Students of Science and Engineering (with audio CD)

ACME-101 Elements of Mechanical Engineering

L	T	P
4	0	0

Objectives and Expected Outcome:- In the vast spectrum of Mech. Engg., this subject gives a very very primitive but general information finding vide application in day to day life with emphasis upon the principles and fundamentals involved in the inter-conversion of thermal energy into mechanical energy and vice versa, viz. all Automobile, Air-Craft, Generator and other stationary Heat Engines besides cooling machinery like Refrigerators, Air-Conditioners and water-coolers etc. The subject also offers a birds eye-view to all students about the common engineering materials finding vide application in Mech. Engg. Industry and about their strength and other related vital aspects. Since every student of engineering is already exposed to all afore-said machinery, he/she would feel very much self-satisfied and self-confident after learning the basic intricacies and whys and hows related with the fundamentals of the aforesaid machinery.

Part-A

1. **Basic concepts of thermodynamics-**Definition of thermodynamic: Need to study thermodynamics; Application areas of thermodynamic, Thermodynamic System : definition, types (Open, Closed and Isolated) and their examples; Thermodynamic System Boundary: definition, types and their examples; Surroundings; Control(fixed) mass and Control Volume concept and their example ; Thermodynamic State;Thermodynamic Property: definition, types citing their examples; condition for any quantity to be a property; Thermodynamic path, Thermodynamic process: definition, concept of reversible process, quasi-static (or, quasi-equilibrium) process, irreversible process, conditions for reversibility and how these are met with, non-flow processes and flow processes, method of representation of reversible and irreversible process on propertydiagrams; Cyclic process;Thermodynamic Cycle: definition and its concept; Energy transfer across system boundary i.e. transient energies (heat

and work) (Numerical);Difference between heat and work; Sign conventions for heat and work interactions;heat and work as path functions; Equality of Temperature and Zeroth law of Thermodynamics.

2. **First law of thermodynamics and its applications-**Definition, essence and corollaries or consequences of first law of Thermodynamics; Expressions for

First law of Thermodynamics for a control mass undergoing a Cycle and for process (Numerical),Concept of Enthalpy and total energy and differentiation between the two – a thermodynamic property; Compressible and incompressible substances, Specific heats,

Representation of first law of thermodynamics as rate equation; Analysis of non-flow/ flow process for a control mass undergoing constant volume, constant pressure (Derivation only), Constant temperature, adiabatic and polytropic processes (Derivation only).

3. **Second law of thermodynamics-**Limitations of first law of thermodynamics; and how 2nd law is fully able to explain away and thus overcome those shortcomings of Ist law; Thermal Reservoirs, source and sink (Low temperature and high temperatures);Heat Engine, Heat Pump and Refrigerator: definitions, working, efficiency/performance and their real life examples(Derivation only); Various statements of second law of thermodynamics and their equivalence.

Part- B

4. **Gas Power Cycle-** Introduction; Concept and philosophy of Air Standard Cycle along with associated assumptions and advantages; Air Standard Efficiency; Nomenclature of reciprocating piston-cylinder arrangement with basic definitions such as swept volume, clearance volume, compression ratio, mean effective pressure etc; Otto Cycle (or constant volume heat addition cycle) (Derivation only), Diesel cycle (or constant pressure heat addition cycle) and Dual cycle (Mixed or Composite or Limited Pressure cycle) with their representation on P-V and T-S charts (Derivation only).

5. **Centroid, Centre of gravity & moment of Inertia-** Difference betweencentre of gravity and centroid, Determination of position of centroid of plane geometric figures of I, U, H, L, T, C, Circular and Triangular Sections (Numerical only), Centroid of Composite Areas (Numerical only), Area moment of inertia & mass moment of inertia, Polar moment of inertia, Parallel axes Theorem (or transfer formula), Perpendicular axes Theorem, Radius of gyration.

Suggested Readings / Books

1. Nag P.K., Engineering Thermodynamics, Tata McGraw Hill.

2. Yadav R., Thermodynamics and Heat Engines, Central Publishing House, Allahabad

3. Rogers G. and Mayhew Y., Engineering Thermodynamics, Pearson Education.

4. Cengel Y.A. and Boles M.A., Thermodynamics - An Engineering Approach, Tata McGraw Hill.

5. Rao Y.V.C., An Introduction to Thermodynamics, New Age International (P) Limited Publishers.

6. Spalding D. B., Cole E. H., Engineering thermodynamics, ELBS series

7. Bedi D.S., Element of Mechanical Engineering, Khanna Publishers New Delhi

8. Donald R. Askeland, Pradeep P. Phule, Essentials of materials Science and Engineering, Cenage Learning

9. A.K.Tayal Engineering Mechanics, Umesh Publications.

ACCH-101 Engineering Chemistry and Environmental Sciences

L	T	P
3	1	0

Objective/s and Expected outcome:

The objective of the Engineering Chemistry is to acquaint the students with the basic phenomenon/concepts, and resolve their doubts which they face during course of their study in the industrial and engineering fields. Some new topics have been introduced to the syllabus for the development of the right attitudes in the engineering students so that they may be made abreast with the continuous flow of new technology. The students with the knowledge of the basic chemistry will understand and scientifically explain the problems related to chemistry in the industrial/engineering field. The students will be able to understand the new developments and breakthroughs efficiently in engineering. The introduction of the new topics will make the engineering students upgraded with the new technological innovations.

PART A

1. Water and its Treatment:

Introduction; Hardness of water- Types, units and estimation. Boiler feed water- Specification, Scales and sludge formation; Priming & foaming; Boiler Corrosion; Caustic Embrittlement; Treatment of Boiler Feed Water- External and Internal treatment; Different methods of the water softening- Lime soda process, Zeolite process and Ion exchange process; Desalination of water; Water for domestic use- Specification, Disinfection of water.

2. Polymers:

Introduction; Functionality; Types of polymerization; Specific features of polymers-Structure, regularity and irregularity; Tacticity of polymers; Average molecular weights and its determination by different methods; Effect of molecular weight on the properties of polymers; Organic conducting and Biodegradable Polymers (PMMA, Polystyrene, Teflon, Neoprene, Buna-S, Buna-N, Nylon 6, Nylon 6 6, Terylene); Vulcanization of rubber; Applications of polymers.

3. Corrosion and its Prevention:

Introduction; Different types of corrosion - Wet and Dry corrosion; Different types of surface films; Mechanisms of wet corrosion; Galvanic Series; Types of

Electrochemical Corrosion: Galvanic corrosion; Differential aeration corrosion; Pitting corrosion; waterline; stress corrosion; Crevices corrosion; Protective Measures against corrosion- Metallic coatings; Electrochemical Protection; Organic Coatings; Cathodic protection: Sacrificial anodic protection; Impressed current cathodic protection.

PART B

4. Engineering Materials, Nanomaterials and Applications:

Introduction to Engg. Materials; Cementing and Binding meterials; lime; Gypsum; Cement; Ceramics; Lubricants; Adhesives; Properties and Uses; Nanomaterials; Nanoscience and Nanotechnology and Applications.

5. Petroleum and Petrochemicals:

Introduction; Primary Raw Materials for Petrochemicals; First, second & third generation petrochemicals. Crude oil: Classification of crude oil; Physical separation processes; Natural gas: Properties; Applications; Benefits; Production of ethylene.

6. Natural Resources and Ecosystem:

Natural Resources and associated problems, use and over exploitation, case studies of forest resources and water resources. Concept of Ecosystem, Structure, interrelationship, producers, consumers and decomposers, ecological pyramids-biodiversity and importance. Hot spots of biodiversity.

7. Environmental Pollution:

Definition, Causes, effects and control measures of air pollution (Case study), Water pollution (Case study), Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards. Solid waste Management: Causes, effects and control measure of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies.

Suggested Readings / Books

1. William Kemp, Organic Spectroscopy, Palgrave Foundations, 1991.

2. Shashi Chawla Engg. Chemistry, Dhanpat Rai and Co. New Delhi.

3. Applied Chemistry by Dr. S.K. Bhasin, Ajay Publications.

4. C. P. Poole, Jr., F. J. Owens, Introduction to Nanotechnology, Wiley Interscience, 2003.

5. L.E.Foster, Nanotechnology, Science Innovation & Opportunity, Pearson Education, 2007.

6. M. Lancaster, Green Chemistry an Introductory Text, Royal Society of Chemistry, Cambridge, UK, 1st edition, 2010.

7. Sami Matar, Lewis F. Hatch, Chemistry of Petrochemical Processes, Second Edition, Gulf Publishing company, Houston, Texas, 2000.

8. Jones, Denny, Principles and Prevention of Corrosion, Upper Saddle River, New Jersey: Prentice Hall, 2nd edition, 1996.

9. Mohamed Belgacem, Alessandro Gandini, Monomers, Polymers and Composites from Renewable Resources, ELSEVIER, 2008.

10. Engg. Chemistry by B. Sivansankar, Mc Geaw Hill.

11. Spectroscopy by Pavia, Lampman.

12. Perspectives in Environmental Studies by Kaushik, A.

13. Essentials of Environment Science by Joseph.

ACCH-102 Engineering Chemistry and Environmental Sciences Lab.

L	T	P
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1. Analysis of water

- Determination of Hardness of water by EDTA method.
- Determination of dissolved oxygen in given water sample.
- Determination of Residual Chlorine in given water sample.
- Determination of turbidity of water by Nephelometer.

2. Analysis of Fuels and Lubricants

- Determination of Flash and Fire point by Abbe's Apparatus.
- Determination of Viscosity of given liquid using Redwood viscometer or Ostwald's viscometer.

- Determination of Acid value and Aniline point of oil.
- Determination of Moisture, Volatile and Ash content by proximate analysis.

3. Instrumental analysis

- Determination λ-max by Spectrophotometer and determination of unknown conc. of binary mixture of two liquids.

- Determination of the surface tension by using stalagmometer.
- Determination of the concentration of a solution conductometerically.
- Determination of the strength of a solution pH meterically.
- Distinction between acid, ester, ketone using IR spectrophotometer.

- Determination of bathochromic shifts, hypsochromic and hyperchromic, hypochromic shift of benzene and its derivatives.

4. Chromatography

- Determination of R_f value of amino acid by paper chromatography and identification of the amino acid present.

- Separation of metallic ions by paper chromatography.
- Separation of ions by using complexing agents

- Separation of plant pigments, Chlorophyll and Carotenoids by Column Chromatography.
- Determination of the ion exchange capacity of the given Ion Exchanger.
- Separation of ions by Ion-Exchange method.

5. Synthesis & Green Chemistry experiments

- Preparation of a polymer phenol/urea formaldehyde resin or hexamethylenediamine adipic acid polymer and determination of carbonyl value or acid value.
- Preparation of Aspirin.
- Preparation of ethyl-2-cyano-3-(4-methoxyphenyl) propenoate (Microwave

assisted reaction)

- Base catalyzed aldol condensation by Green Methodology: Acetylation of primary amines using ecofriendly method.

Note: Each student is required to perform two experiments from each of the 5 titles (presented bold) depending on his/her Branch and Aptitude.

(ACME 102) ENGINEERING DRAWING

L	T	P
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Objective and Expected Outcome:

Main objective of the Engineering Drawing is to introduce the students to visual science in the form of technical graphics. General instructions related to Theory of Orthographic Projection of points, lines, planes and solids as per the BIS codes prevalent to drawing practice will be introduced initially. Section of solids, intersection and development of surfaces, isometric projection and orthographic projection of simple solids/blocks will further upgrade the basic understanding and visualization of geometrical objects and to certain extent the machine parts.

PART-A

1. Introduction

Engineering Drawing/Engineering Graphics/Technical Drawing a Visual Science. Types of Engineering Drawing, Introduction to drawing equipment and use of instruments. Symbols and conventions in drawing Practice. Types of lines and their use, BIS codes for lines, Technical lettering as per BIS codes, Introduction to Dimensioning, Concepts of scale in drawing, Types of scales.

2. Theory of Projections

Relevance of projection, Type of projections, Perspective, Orthographic, Axonometric and their basic principles, System of orthographic projection: in reference to quadrants, illustration through simple problems of projection.

3. Projection of Points

Definition of point. Projection of points in quadrants.

4. **Projection of Lines**

Definition of line. Line Parallel to both H P and V P, Parallel to one and inclined to other, and inclined to both, contained in profile plane. True length and angle orientation of straight line: rotation method and auxiliary plane method. Distance between two nonintersecting lines, and trace of line.

5. **Projection of Planes**

Definition of planes and their types. Difference between plane and lamina. Projection of lamina Parallel to one and perpendicular to other, Perpendicular to one and inclined to other, Inclined to both reference planes, and Lamina oblique to three reference planes. Application of auxiliary planes, and trace of planes.

PART-B

6. **Projection of Solids**

Definition of solids, types of solids, and elements of solids. Projection of solids in first or third quadrant, with axis parallel to one and perpendicular to other, axis parallel to one inclined to other, axis inclined to both the principle plane, axis perpendicular to profile plane and parallel to both H P and V P. Visible and invisible details in the projection. Use rotation method to draw the projections.

7. **Section of Solids**

Definition of Sectioning and its purpose. Procedure of Sectioning, Types of sectional planes. Illustration through examples.

8. **Development of Surface**

Purpose of development, Parallel line, radial line and triangulation method. Development of prism, cylinder, cone and pyramid surface for both right angled and oblique solids, and development of surface of sphere.

9. **Isometric Projection**

Classification of pictorial views, Basic Principle of Isometric projection, Difference between isometric projection and isometric drawing. Isometric projection of solids such as cube, prism, pyramid and cylinder, and assignments on isometric projection of simple machine parts.

10. **Orthographic Projection**

Review of principle of Orthographic Projection, Sketch/drawing of blocks, and of simple machine parts. Orthographic projection from isometric views.

Suggested Readings / Books

1. Narayana K L and Kanaiah P, “Engineering Graphics”, Tata McGraw Hill Publishing Company Limited, New Delhi.

2. Gill P S, “Engineering Graphics and Drafting”, Katria and Sons, Delhi.

3. Bhat N D, “Elementary Engineering Drawing-Plane and solid Geometry”, Chartotar Publishing House, Anand.

4. Luzzadde Warren J, “Fundamentals of Engineering Drawing”, Prentice Hall of India Private Limited, New Delhi.

5. Bertoline G R , Wiebe E N, Miler G L L & Mother J L, “Technical Graphics Communication”, Irwin McGraw Hill, New York.

6. A Text Book of Engg Drawing by R. K. Dhawan, S. Chand and Co. Ltd

ACAM-101 Engineering. Mathematics – I

L	T	P
4	1	0

Objective/s and Expected outcome

"Math and basic science are certainly the foundations of any engineering program. This fact will not change in the foreseeable future" said by Ellis et al. Engineering Mathematics is an essential tool for describing and analyzing engineering processes and systems. Mathematics also enables precise representation and communication of knowledge. Core mathematics courses have broader objectives than just supporting engineering programs. The learning objectives of core mathematics courses can be put into three categories: (1) Content Objectives: Students should learn fundamental mathematical concepts and how to apply them. (2) Skill Objectives: Students should learn critical thinking, modeling/problem solving and effective uses of technology. (3) Communication Objectives: Students should learn how to read mathematics and use it to communicate knowledge. The students are expected to understand the fundamentals of the mathematics to apply while designing technology and creating innovations.

PART – A

Partial Derivatives: Basic Differentiation in single variable; Function of two or more variables; Partial differentiation; Homogeneous functions and Euler's theorem;

composite functions; Total derivative; Derivative of an implicit function; Change of variable; Jacobians.

Applications of partial Differentiation: Review of Curve Tracing and conics; A brief introduction of cylinder, cone and standard conicoids;Tangent and normal to a surface; Taylor's and Maclaurin's series for a function of two variables; Maxima and Minima of function of several variables.

PART – B

Multiple Integrals: Basic Integration; Double and triple integral and their evaluation; change of order of integration; change of variable; application of double and triple integrals to find area and volume; a brief introduction to moment of inertia and centre of gravity.

Vector Calculus: Scalar and Vector fields; differentiation of vectors; velocity and acceleration; Vector differential operators: Del, Gradient, Divergence and Curl and their physical interpretations; Formulae involving Del applied to point functions and their products; Line ,surface and volume integrals.

Application of Vector Calculus: Flux, Solenoidal and irrotational vectors; Gauss Divergence theorem, Green's theorem in plane, Stoke's theorem (without proofs) and their applications.

Suggested Readings / Books

1. Thomes, G.B, Finney, R.L. Calculus and Analytic Gemetry, Ninth Edition, Peason Education.

2. Kreyszig, E., Advanced Engineering Mathematics, Eighth edition, John wiley.

3. Peter. V. O" Nil, Advanced Engineering Mathematics, Wordsworth Publishing Company.

4. Jain, R.K and Lyengar, S.R.K., Advanced Engineering Mathematics, Narosa Publishing Company.

5. Grewal, B.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi.

6. Taneja, H.C., Engineering Mathematics, Volume-I & Volume-II, I.K. Publisher.

7. Babu Ram, Advance engineering Mathematics, Pearson Education.

8. Bindra,. J.S., Applied Mathematics, Volume-I, Kataria Publications.

ACPH-101 Engineering Physics

L	T	P
4	1	0

Prerequisite:

Knowledge of intermediate level physics.

Objective/s

The objective of the course is to develop a scientific temper and analytical capability in the engineering graduates through the learning of physical concepts and their application in engineering & technology.

Expected outcome:

Comprehension of some basic physical concepts will enable graduates to think logically the engineering problems that would come across due to rapidly developing new technologies. The student will be able to understand the various concepts effectively, logically explain the physical concepts and apply the concept in solving engineering problem, realize, understand and explain scientifically the new developments and breakthroughs in engineering and technology, relate the developments on Industrial front to the respective physical activity, happening or phenomenon.

PART A

1. Lasers: Spontaneous & Stimulated emissions, Significance of Einstein's Coefficients, Population Inversion, Components of a laser System, Properties of Laser, Ruby Laser, He-Ne Laser, CO_2 Laser, Introduction to Holography, Applications of Laser.

2. Fibre Optics: Introduction, Acceptance Angle, Numerical Aperture, Normalized frequency, fibre connectors, splicers and couplers, applications of optical fibres.

3. X-Rays: Continuous & Characteristic X-Rays, X-Ray Diffraction & Bragg's law in Crystals, Bragg's spectrometer, X-ray radiography, Applications.

4. Nanophysics: Nanoscale, Nanomaterials, Unusual properties of nanomaterials, synthesis of nanomaterials- ball milling and sol-gel techniques, applications of nanomaterials.

PART B

1. EM waves & Dielectrics: Physical significance of Gradient, Divergence & Curl, Relationship between Electric Field & Potential, Dielectric polarization, displacement Current, Types of polarization, Maxwell's Equations, Applications of EM Waves.

2. Magnetic Materials: Types of Magnetic materials, Magnetic Anisotropy, Magnetostriction and its application in production of ultrasonics, B-H Curve, Applications of magnetic materials.

3. Superconductivity: Superconductivity, Superconductors as ideal diamagnetic materials, Isotope effect, Meissner Effect, Type I & Type II Superconductors, London Equations,Introduction to BCS theory, Applications.

4. Quantum Theory: Wave-particle duality, Matter waves, Group & Phase velocities, Uncertainty Principle, Non-existence of electron in nucleus, Normalization of wave function, Schrodinger wave equation- time independent & dependent (Qualitative Idea), Particle in one dimensional box.

Suggested Readings / Books:

1. Physics for Scientists & Engineers (Vol. I & II), Serway & Jewett, 9th Edition. Cengage

Learning.

2. Engineering Physics, Malik; HK, Singh; AK, Tata McGraw Hill,

3. Concepts of Modern Physics, Beiser; A., Mahajan; S., Choudhary; SR, Tata McGraw Hill.

4. Physics; A calculus based approach (Vol. I & II) Serway; RA & Jewitt; JW, Cengage Learning.Materials Science & Engineering, Callister; WD, John Wiley & Sons.

5. Introduction to Electrodynamics, Griffiths; DJ, Prentice Hall.

6. Optical Fibre system, Technology, Design & Applications, Kao; CK, McGraw Hill.

7. Laser Theory & Applications, Thygrajan; K, Ghatak; AK, Mc Millan India Ltd.

(ACPH-102) Engineering Physics Lab.

L	T	P
0	0	2

Note: Each student is required to perform any ten practicals.

1. To study the laser beam wave length using diffraction grating aperture.

2. To find divergence of given laser beam.

3. To determine numerical aperture of an optical fibre.

4. To determine attenuation & propagation losses in an optical fibre.

5. To study the voltage regulating characteristics of Zener diode.

6. To study V-I characteristics of PN junction diode.

7. To study variation of magnetic field along axis of circular coil carrying current.

8. To study the dielectric constant and polarizability of dielectric material.

9. To find frequency of AC mains using electric-vibrator.

10. To determine impedance of LCR circuit.

11. To find energy band gap of a semiconductor material.

12. To find the velocity of ultrasound in liquid.

ACFC 101 Fundamentals of Computer Programming and IT

L	T	P
3	0	0

Objective/s and Expected outcome:

To familiarize the students of all branches in engineering with computer organization, operating systems, problem solving and programming in C++. After the students have successfully completed the course, they shall have sufficient knowledge of the basic computer operations and various programming techniques especially in C++.

1. Introduction to Computers

Define a Computer System, Block diagram of a Computer System and its working, associated peripherals, memories, RAM, ROM, secondary storage devices, Computer Software and Hardware, Introduction to the operating system, its functions and types, working knowledge of GUI based operating system

2. Problem Solving & Program Planning

Need for problem solving and planning a program; program design tools - algorithms, flow charts, and pseudocode, illustrative examples.

3. Introduction to C

History, concepts of procedural programming, Structure of C program, character set , Tokens (keywords, identifier, literals, operators, Special Characters, Strings), Data Types- primitive, user defined & derived, preprocessor directives (include , define)

4. Operators, Expressions and formatted input/output

Types of operators, operator precedence & associativity, expressions, printf() , scanf() with type specifiers

5. Control structures

Conditional – (simple if, if else, else if ladder, nested if), jumping-(conditional and unconditional), switch statement, looping statements-while, do while, for, nested loops

6. Pointers

Definition, uses, advantages, declaration and definition, pointer arithmetic

7. Functions

Function prototyping , uses of functions, types of functions, inbuilt library functions (math, character) , getch(), getche(), getchar(), passing arguments to functions, storage class-auto, static, extern, register

8. Arrays and strings

Definition, types, declaration and definition, advantages and disadvantages, implementation of arrays as string, string handling functions, linear search, sorting using array with bubble sort, , passing an array to function, pointer with array

9.Structure and Union

Defining structure, structure with in structure, array of structure, union , pointer to structure, self referential structure

10. File handling

FILE structure , file opening modes, reading writing and searching operations on file, file error handling functions , command line argument.

ACFC 102 Fundamentals of Computer Programming and IT Lab.

L	T	P
0	0	4

1. Familiarization with the Computer System:

To explain the part of the computer system such as system unit, input devices, output devices connected to the computer.

To explore the outside view of the system unit that includes the panels on front and ports at the rear

To explore the inside view of the system unit that includes the motherboard, processor, expansion slots, various add-on cards, storage devices, power supply, fans.

To understand the booting process that includes switching on the system, execution of POST routine, then bootstrap loader, and loading of the operating system, and getting it ready for use.

2. Linux Commands:

- ls
- mkdir
- cd
- rm
- who
- who am i
- cal
- cat
- pwd
- chmod
- chown
- man
- cp
- date
- echo
- passwd
- ps

3. C-Programming

1. Write a program to find the sum of two numbers
2. Write a program to find the average of three numbers
3. Write a program to swap two numbers
4. Write a program to convert temperature from Celsius to Fahrenheit
5. Write a program to evaluate following algebraic expressions after reading necessary values from the users
    a. (ax+b)/(ax-b)
    b. 2.5 logx-cos30 | x^3 –y^2|
    c. Sqrt(a-b)
6. Write a program to find the sum of geometric series.
7. Write a program to find the roots of a quadratic equation
8. Write a program to greatest among three numbers

9. Write a program , which takes two integer operands and one operator from user to performs the operations and prints the result.

10. Write a program to print the following series using goto statement

- ✓ 1+2+3+4+5+6+7+8+9+10
- ✓ 1+1/2+1/3+……+1/20
- ✓ 1-2+3-4+5-6+……..n

11. Write a program to print n Fibonacci terms using while loop

12. Write a program to check weather a number is prime or not using while loop
13. Write a program to print the sum of digits of a number using do while loop
14. Write a program to find the factorial of a number using for loop
15. Write a program to check whether the no is palindrome or not.
16. Write a program to print all the prime numbers between the range
17. Write a program to print following pattern

```
        *
      * * *
    * * * * *
  * * * * * * *
* * * * * * * * *
```

```
        1
      1 2 1
    1 2 3 2 1
  1 2 3 4 3 2 1
1 2 3 4 5 4 3 2 1
```

```
      1
    2   2
  3   3   3
4   4   4   4
5   5   5   5   5
```

```
    1
  1   1
1   1   1
1   1   1   1
1   1   1   1   1
```

18. Write a program to find the sum of two numbers using functions with

- ✓ No argument no return value
- ✓ No argument with return value
- ✓ Argument without return value

- ✓ Argument with return value

19. Write a program to implement inbuilt string handling functions (strlen, strcpy, strcat, strrev, strcmp, strcmpi, strstr)

20. Write a program to check whether a string is palindrome or not without using inbuilt function.

21. Write a program to search an element from a one dimensional array using linear search technique

22. Write a program to sort an array using bubble sort technique.

23. Write a menu driven program for matrices to do the following operations depending on whether the operation requires one or two matrices

- ✓ Addition of two matrices
- ✓ Subtraction of two matrices
- ✓ Finding the sum of upper, lower triangle and diagonal elements
- ✓ Transpose of Matrix
- ✓ Multiplication of two Matrices

24. Write a program to find the largest element from a given array with the help of user defined function by passing array as an argument.

25. Write a program to count the vowels in a string using pointer.

26. Write a program to swap two values using call by reference technique.

27. Write a program to find the sum of diagonal elements of a matrix using pointer.

28. Write a program to read and display the record of n students using structure.

29. Write a program to write data to a file and then display the vowels only by reading the same file

30. Write a program to copy the content of one file to another using command line argument.

31. Write a program to implement the DOS's (Disk Operating System 's)**type and copy** command using command line argument.

ACHV 101 Human Values & Professional Ethics

L	T	P
3	0	0

Objective/s and Expected outcome:

To help the students to discriminate between valuable and superficial in the life. To help develop the critical ability to distinguish between essence and form, or between what is of value and what is superficial, in life - this ability is to be developed not for a narrow area or field of study, but for everyday situations in life, covering the widest possible canvas. To help students develop sensitivity and awareness; leading to commitment and courage to act on their own belief. It is not sufficient to develop the discrimination ability, it is important to act on such discrimination in a given situation. Knowingly or unknowingly, our education system has focused on the skill aspects (learning and doing) - it concentrates on providing to its students the skills to do things. In other words, it concentrates on

providing “How to do” things. The aspects of understanding “What to do” or “Why something should be done” is assumed. No significant cogent material on understanding is included as a part of the curriculum. A result of this is the production of graduates who tend to join into a blind race for wealth, position and jobs. Often it leads to misuse of the skills; and confusion and wealth that breeds chaos in family, problems in society, and imbalance in nature. This course is an effort to fulfill our responsibility to provide our students this significant input about understanding. This course encourages students to discover what they consider valuable. Accordingly, they should be able to discriminate between valuable and the superficial in real situations in their life. It has been experimented at IIITH, IITK and UPTU on a large scale with significant results.

PART A

1. Course Introduction - Need, Basic Guidelines, Content and Process for Value Education:

Understanding the need, basic guidelines, content and process for Value Education.

Self Exploration-what is it? - its content and process; „Natural Acceptance‟ and Experiential Validation- as the mechanism for self exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations

Right understanding, Relationship and Physical Facilities- the basic

requirements for fulfillment of aspirations of every human being with their correct priority Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario Method to fulfill the above human aspirations: understanding and living in **harmony** at various levels

2. Understanding Harmony in the Human Being - Harmony in Myself!

Understanding human being as a co-existence of the sentient „I" and the material „Body"

Understanding the needs of Self („I") and „Body" - *Sukh* and *Suvidha*
Understanding the Body as an instrument of „I" (I being the doer, seer and enjoyer)

Understanding the characteristics and activities of „I" and harmony in „I"

Understanding the harmony of I with the Body: *Sanyam* and *Swasthya*; correct appraisal of Physical needs, meaning of Prosperity in detail Programs to ensure *Sanyam* and *Swasthya*

PART B

3. Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

Understanding harmony in the Family- the basic unit of human interaction
Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*; Trust (*Vishwas)* and Respect (*Samman)* as the foundational values of relationship

Understanding the meaning of *Vishwas*; Difference between intention and competence

Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship

Understanding the harmony in the society (society being an extension of family): *Samadhan, Samridhi, Abhay, Sah-astitva* as comprehensive Human Goals Visualizing a universal harmonious order in society- Undivided Society (*Akhand Samaj),* Universal Order (*Sarvabhaum Vyawastha)*- from family to world family!

4. Understanding Harmony in the Nature and Existence - Whole existence as Co-existence

Understanding the harmony in the Nature

Interconnectedness and mutual fulfillment among the four orders of nature-recyclability and self-regulation in nature

Understanding Existence as Co-existence (*Sah-astitva*) of interacting units in all-pervasive space Holistic perception of harmony at all levels of existence.

Recommended Books:

1. R R Gaur, R Sangal, G P Bagaria, 2009, *A Foundation Course in Value Education*.

Suggested Readings / Books:

2. Ivan Illich, 1974, *Energy & Equity,* The Trinity Press, Worcester, and HarperCollins, USA

3. E.F. Schumacher, 1973, *Small is Beautiful: a study of economics as if people mattered*, Blond & Briggs, Britain.

4. A Nagraj, 1998, *Jeevan Vidya ek Parichay,* Divya Path Sansthan, Amarkantak.

5. Sussan George, 1976, *How the Other Half Dies,* Penguin Press. Reprinted 1986, 1991

6. PL Dhar, RR Gaur, 1990, *Science and Humanism*, Commonwealth Purblishers.

7. A.N. Tripathy, 2003, *Human Values*, New Age International Publishers

8. Subhas Palekar, 2000, *How to practice Natural Farming,* Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.

9. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, *Limits to Growth - Club of Rome's report*, Universe Books.

10. E G Seebauer & Robert L. Berry, 2000, *Fundamentals of Ethics for Scientists & Engineers ,* Oxford University Press

11. M Govindrajran, S Natrajan & V.S. Senthil Kumar, *Engineering Ethics (including Human Values)*, Eastern Economy Edition, Prentice Hall of India Ltd

12. B P Banerjee, 2005, *Foundations of Ethics and Management,* Excel Books.

13. B L Bajpai, 2004, *Indian Ethos and Modern Management*, New Royal Book Co., Lucknow. Reprinted 2008.

ACMP 101Manufacturing Practice

L	T	P
0	0	6

PART A

1. Carpentry and Pattern Making: Various types of timber and practice boards,defects in timber, seasoning of wood; tools, wood operation and various joints; exercises involving use of important carpentry tools to practice various operations and making joints.

2. Foundry Shop: Introduction to molding materials; moulds; use of cores; melting furnaces; tools and equipment used in foundry shops; firing of a cupola furnace; exercises involving preparation of small sand moulds and castings.

3. Forging Practice: Introduction to forging tools; equipments and operations; forgability of metals; exercises on simple smithy; forging exercises.

4. Machine Shop: Machines, Grinders etc; cutting tools and operations; exercises involving awareness.

PART B

5. Welding Shop: Introduction to different welding methods; welding equipment; electrodes; welding joints; welding defects; exercises involving use of gas/electric arc welding.

6. Electrical and Electronics Shop: Introduction to electrical wiring; preparation of PCBs involving soldering applied to electrical and electronic applications; exercises preparation of PCBs involving soldering applied to electrical and electronic applications.

7. Sheet Metal: Shop development of surfaces of various objects; sheet metal forming and joining operations, joints, soldering and brazing; exercises involving use of sheet metal forming operations for small joints.

8. Fitting Shop: Introduction of fitting practice and tools used in fitting shop; exercise involving marking, cutting, fitting practice (Right Angles), male-

Female mating parts practice, trapping practice.

B.Tech ECE 3rd Semester onwards study scheme

Amritsar College of Engineering and Technology

Scheme & Syllabus of B. Tech. Electronics & Communication Engineering [ECE]

	Course: B.Tech. Semester: **3rd**							
Course code	Course Name	Load Allocation			Marks Distribution		Total Marks	Credit
		L	T	P	Internal	External		
ACFE-16311	Functional English-I	1	1		50		50	2
ACAP-16312	Aptitude- I	1	1	-	50		50	2
ACAM-16301	Engineering Mathematics-III	3	1	-	40	60	100	4
ACCS-16302	Object Oriented Programming	3	1	-	40	60	100	4
ACEC-16301	Analysis and Synthesis of Networks	3	1	-	40	60	100	4
ACEC-16302	Digital Circuit and Logic Design	3	1	-	40	60	100	4
ACEC-16303	Electronic Devices & Circuits	3	-	-	40	60	100	3
ACEC-16304	Lab Electronic Devices & Circuits			2	30	20	50	1
ACEC-16305	Lab Digital Circuit and Logic Design			2	30	20	50	1
ACCS-16305	Lab Object Oriented Programming			2	30	20	50	1
ACEC-16306	Institutional Training(3rd sem)				60	40	100	2
		17	6	6	450	400	850	28
		Contact Hours= 29 hrs						

***Note: Institutional Training will be conducted after the 2nd semester examination. Contact hours for this training will be 70-80 hours.**

	Course: B.Tech. Semester: **4th**							
Course code	Course Name	Load Allocation			Marks Distribution		Total Marks	Credit
		L	T	P	Internal	External		
ACFE-16411	Functional English-II	1	1	-	50		50	2
ACAP-16412	Aptitude- II	1	1	-	50		50	2
ACEE-16402	Linear Control Systems	3	1	-	40	60	100	4
ACEC-16401	Analog Communication Systems	3	1	-	40	60	100	4
ACEC-16402	Linear Integrated Circuit	3	1	-	40	60	100	4
ACEC-16403	Signal and Systems	3	1	-	40	60	100	4
ACEC-16404	Electromagnetics &Field Theory	3	-	-	40	60	100	3
ACEC-16405	Lab Linear Integrated Circuit			2	30	20	50	1
ACEC-16406	Advanced Networking lab			2	30	20	50	1
ACEC-16407	Simulation Lab for Electronic Engineers			2	30	20	50	1
GF-400	General Fitness						100	1
		17	6	6	390	360	850	27
		Contact Hours= 29 hrs						

	Course: B.Tech. Semester: **5th**							
Course code	Course Name	Load Allocation			Marks Distribution		Total Marks	Credit
		L	T	P	Internal	External		
ACFE-16511	Functional English-III	1	1	-	50	-	50	2
ACAP-16512	Aptitude- III	1	1	-	50	-	50	2
ACEC-16501	Digital Communication	3	1	-	40	60	100	4
ACEC-16502	Digital Signal Processing	3	1	-	40	60	100	4
ACEC-16503	Embedded system-1	3	1	-	40	60	100	4
Elective –I ACEC-16901	EEIM	3	1	-	40	60	100	4
ACEC-16504	Lab Communication systems			2	30	20	50	1
ACEC-16505	Lab Digital Signal Processing			2	30	20	50	1
ACEC-16506	Lab Hardware programming language			2	30	20	50	1
ACEC-16507	Industrial Training-I (5th Sem)	6 or 8 Week			60	40	100	2
		14	6	6	410	340	750	25
		Contact Hours= 26 hrs						

	Course: B.Tech. Semester: **6th**							
Course code	Course Name	Load Allocation			Marks Distribution		Total Marks	Credit
		L	T	P	Internal	External		
ACFE-16611	Functional English- IV	1	1	-	50	-	50	2
ACAP-16612	Aptitude- IV	1	1	-	50	-	50	2
ACEC-16601	Wireless Communication System	3	1	-	40	60	100	4
ACEC-16602	Embedded System-II	3	1	-	40	60	100	4
ACEC-16603	Microwave & Radar Engineering	3	1	-	40	60	100	4
ACEC-16604	Optical Communication	3	1	-	40	60	100	4
Elective –II ACCS-16404	Programming in Python	3	-	-	40	60	100	3
ACEC-16605	Lab Wireless Communication system			2	30	20	50	1
ACEC-16606	Lab Microwave &Optical Engineering			2	30	20	50	1
Elective –III ACEC-16409	Programming Lab Programming in Python Lab			2	30	20	50	1
GF-600	General Fitness				100		100	1
		17	6	6	490	360	850	27
		Contact Hours= 29 hrs						

	Course: B.Tech. Semester: **Seventh**							
Course code	Course Name	Load Allocation			Marks Distribution		Total Marks	Credit
		L	T	P	Internal	External		
ACCS-16603	Machine Learning	3	1	-	40	60	100	4
ACEC-16702	VLSI Design	3	1	-	40	60	100	4
	Open Elective	3	-	-	40	60	100	3
ACEC-16XXX	Elective IV	3	-	-	40	60	100	3
ACEC-16703	Lab VLSI	-	-	2	30	20	50	1
ACCS-16606	Lab Machine learning	-	-	2	30	20	50	1
ACTP-16701	Pre Placement Activity			2	50	-	50	1
ACEC-16705	Major Project	-	-	2	100	100	200	2
GF-700	General Fitness	-	-	-	100	-	100	1
		12	2	8	470	380	850	20
		Contact Hours= 22 hrs						

	Course: B.Tech. Semester: **Eighth**							
Course code	Course Name 6th months Industry	Load Allocation			Marks Distribution		Total Marks	Credit
		L	T	P	Internal	External		
ACEC-16801	Industrial Oriented Project Training				300	200	500	10
ACEC-16802	Software Training				150	100	250	5
Total					450	300	750	15

Summary		
Sem	**Credits**	**Marks**
1st /2nd	**55(27+28)**	**1600**
3rd	**28**	**850**
4th	**27**	**850**
5th	**25**	**750**
6th	**27**	**850**
7th	**22**	**850**
8th	**15**	**750**
Total	**199**	**6500**

Departmental Elective – I (Common Code XXX)

ACEC- 16901 Engineering Economics and Industrial Management

ACEC-16902 Cyber law &IPR

ACCS-16402 Operating System

Departmental Elective -II (Common Code YYY)

ACCS-16405 Relational Data Base Management System

ACEC- 16904 Electronic Measurement and Instrumentation

ACCS- 16301 Data Structures
ACCS – 16404 Programming in Python
ACCS – 16501 Programming in java

Departmental Elective - III (Common Code ZZZ)

ACCS – 16408 Relational Data Base Management System lab

ACCS- 16304 Data Structure Lab

ACCS- 16406 Operating system Lab

ACCS- 16409 Programming in Python Lab

ACCS- 16506 Programming in java Lab

ACEC-16905 Electronic Measurement and Instrumentation Lab

Open Elective

ACCE-16814	Disaster Management
ACCE-16818	Infrastructure Development & Management
ACEE-16703	Non Conventional Energy Sources
ACCS-16712	HAINA(Routing and Switching Technology)
ACCS-16613	Human Resource Management
ACME-16704	Operation Research

Departmental Elective - IV

ACEC- 16922	Satellite Communication
ACEC-16923	Artificial Intelligence Techniques & Applications
ACEC-16924	Intellectual property rights & patent systems
ACEC-16926	Antenna and Wave Propagation
ACEC- 16918	Telecommunication switching networks
ACEC-16919	Total Quality Management
ACEC- 16920	Speech & image Processing
ACEC – 16921	Computer Networks

Third Semester

Engineering Mathematics - III

ACAM - 16302

Internal Marks : 40 **L T P**

External Marks : 60 **3 1 -**

. **Objectives:**

- The learning objectives of core mathematics courses can be put into three categories: Content objectives: Students should learn fundamental mathematical concept and how to apply them.
- Skill Objectives: Students should learn critical thinking, modeling/problem solving and effective uses of technology.

Section I

Fourier Series: Periodic functions, Euler's formula. Even and odd functions, half range expansions.

Laplace Transforms: Laplace transforms of various standard functions, properties of Laplace transforms, inverse Laplace transforms, transform of derivatives and integrals, applications to solution of ordinary linear differential equations with constant coefficients.

Section II

Partial Differential Equations: Formation of partial differential equations, homogeneous partial differential equations with constant coefficients.

Applications of PDEs: Wave equation and Heat conduction equation in one dimension.

Section III

Functions of Complex Variable: Analytic function, Cauchy-Riemann equations, conjugate functions, harmonic functions; Cauchy's theorem, Cauchy's integral formula and derivatives of analytic function. Taylor's and Laurent's expansions (without proofs), Cauchy residue theorem, singular points, poles, residue, Integration of function of complex variables using the method of residues.

Section IV

Non Linear Equations: Bisection Method, Newton Raphson Method, False Position Method.

Linear System : Gauss Elimination Method, Gauss Jordan Method.

Differential Equations: Runge Kutta Methods upto 4^{th} order, Euler method.

Reference Books:

1. Kreyszing, E., Advanced Engineering Mathematics, Eighth edition, John Wiley, New Delhi.
2. Grewal, B. S., Higher Engineering Mathematics, Khanna Publishers, New Delhi.
3. Higher Engineering Mathematics, N.P.Bali.
4. Ian N. Sneedon, Elements of Partial Differential Equations, McGraw- Hill, Singapore, 1957.
5. Numerical Methods in Engineering , B.S Grewal.

Object Oriented Programming using C++

ACCS - 16302

Internal Marks : 40	**L**	**T**	**P**
External Marks : 60	**3**	**1**	**-**

Objectives: To understand the basic concepts of object oriented programming languages and to learn the techniques of software development in C++.

Section – I

Introduction , Basic terminologies & Control structure: Introduction, comparison between procedural programming paradigm and object-oriented programming paradigm, Application areas, Different compilers. Basic concepts of object-oriented programming concepts of an object and a class, interface and implementation of a class, operations on objects, relationship among objects, abstraction, encapsulation, data hiding, inheritance, overloading, polymorphism, messaging.

Tokens- keywords, identifier, constant, operators, special characters and strings, control statements- conditional, loop, branch, data types- basic, user, & derived, manipulators, Concept of streams, input/output using overloaded operators >> and << and members functions of i/o stream classes, formatting output.

Section – II

Function, Array & Structure: Types of functions-user & pre (standard) defined, Advantages and disadvantages of using functions, Types of calling, inline function, difference between inline and macros, default valued function, function overloading, array definition and types, uses, advantages and disadvantages of using array, passing an array to a function. Defining structure, role of structure, self referential structure, bit level field

Pointers and dynamic memory management: Declaring and initializing pointers, accessing data through pointers, pointer arithmetic, memory allocation (static and dynamic), dynamic memory management using new and delete operators, pointer to an object, void pointer, pointer related problems - dangling/wild pointers, null pointer assignment, memory leak and allocation failures.

Section – III

Classes and Constructors : Specifying a class, creating class objects, accessing class members, access specifiers, static data members and member functions, use of const keyword, friends of a class, friend with multiple classes, empty class, nested classes, container classes, difference between class and structure. Definition of constructor , characteristics, Need for constructors and destructors, Types of constructor- default, parameterized, default valued, copy constructor ,constructor overloading, dynamic constructors, explicit constructor calling and implicit constructor calling, destructors.

Inheritance: Introduction, defining derived classes, forms of inheritance, types of derivation, virtual base class, abstract class, object slicing, ambiguity, overriding member functions, order of execution of constructors and destructors.

Polymorphism: Concept of binding - early binding and late binding, Operator overloading, rules for operator overloading, type conversions-(user defined to pre-defined, user to user defined, pre to user defined and pre to pre-defined) , virtual functions, pure virtual functions, abstract class, virtual destructors.

Section – IV

Templates and Generic Programming & File Handling: Template concepts, Function templates, class templates, illustrative examples. File streams, hierarchy of file stream classes, error handling during file operations, reading/writing of files, accessing records randomly, updating files.

References

1. Lafore R., Object Oriented Programming in C++, Waite Group.

2. E. Balagurusamy, Object Oriented Programming with C++, Tata McGraw Hill.
3. R. S. Salaria, Mastering Object-Oriented Programming with C++, Salaria Publishing House.
4. Bjarne Stroustrup, The C++ Programming Language, Addison Wesley.

Analysis and Synthesis of Networks

ACEC-16301

Internal Marks: 40	**L**	**T**	**P**
External Marks: 60	**3**	**1**	**-**

Objectives:

- To make the students capable of analyzing any given electrical network.
- To analyse the various three phase circuits star and delta connections.
- To make the students learn how to synthesize an electrical network from a given impedance/admittance function.
- To design various types of filters.

Section I

Circuit Concepts: Circuit elements, series and parallel combination of resistances, inductances and capacitances, Energy source, source transformation , star delta connection, kirchhof's laws, voltage and current divison in circuit.

Section II

Analysis of networks and network theorems: Node and mesh anaylsis**,**Tree and co-Tree, Twigs and Links, Network Theorems: Superposition, Thevenin's, Norton's, Maximum Power Transfer, and Reciprocity.

Section III

Network Synthesis: Network functions, Impedance and Admittance function,Transfer Function Hurwitz polynomial, Synthesis of reactive one port by foster method and Synthesis of reactive one port by cauer method, Synthesis of R L networks by foster method and Synthesis of R L networks by cauer method, Synthesis of R C networks by foster method, Synthesis of R C networks by cauer method.

Section IV

Filter Synthesis: Classification of filters, characteristics impedance and propagation constant of pure reactive network, Ladder network, T-section, π-section, terminating half section, Design of constant-K, m-derived filters, Composite filters.

References:

1 Chakrabarti, *Circuit Theory*, 2nd Edition, Dhanpat Rai, 2001.
2.Edminister J.A., *Electric Circuits*, 4th Edition, Tata McGraw Hill, 2002.

Digital Circuit and Logic Design

ACEC-16302

Internal Marks: 40	**L**	**T**	**P**
External Marks: 60	**3**	**1**	**-**

Objectives:

- To be well versed with the number systems such as binary, octal, hexadecimal and able to perform various operations such as conversion, addition, subtraction etc.
- Will have understanding of various logic gates such as AND, OR, NOR, NOT, XOR etc. along with knowledge of Boolean minimization techniques like K-Map and Q-M Method.
- To be able to design combinational circuits such as encoders, decoders, code converters, adder, subtractor, multiplexer, de-multiplexer and parity encoder.
- To be able to design sequential circuits such as shift registers, counters etc. using flip flops, clocked flip flop, SR, JK, D, T and edge triggered flip flop.
- Will gain working knowledge of various types of digital to analog converters such as binary ladder digital to analog converter, weighted register digital to analog converter and analog to digital converters such as parallel analog to digital converters, counter type analog to digital converters, successive approximation type analog to digital converters, single and dual slope analog to digital converters.
- To be able to understand logic families such as RTL, DCTL, DTL, TTL, ECL, CMOS and their characteristics.

Section I

Number System and Binary Code:
Introduction, Binary, Octal and Hexadecimal Number System (Conversion, Addition & Subtractions). Signed and unsigned numbers, Binary Subtractions using 1's and 2's compliment, ASCII code, Excess 3 code, Grey code, BCD code and BCD additions.

Section II

Minimization of logic function:
OR, AND,NOT,NOR,NAND,EX-OR, EX-NOR, Basic theorem of Boolean Algebra, Sum of Products and Product of Sums, canonical form, Minimization using K-map and Q-M method.

Section III

Combinational Circuits:
Introduction, Combinational circuit design, Encoders, decoders, Adders, Sub tractors and Code converters. Parity checker, seven segment display, Magnitude comparators. Multiplexers, De-multiplexer, Implementation of Combinational circuit using MUX

Sequential Circuits
Introduction, flip flops, Clocked flip flops, SR, JK, D, T and edge triggered flipflops. Excitation tables of Flip flops. Shift Registers, Type of Shift Registers, Counter, Counter types, counter design with state equation and state diagrams.

Section IV

D/A, A/D Converters and Logic Families
Introduction, Weighted register D/A converter, binary ladder D/A converter, steady state accuracy test, D/A accuracy and resolution, parallel A/D converter, Counter type A/D converter Successive approximation A/D converter. Single and dual slope A/D converter, A/D accuracy and resolution. RTL, DCTL, DTL, TTL, ECL, CMOS and its various types, Comparison of logic families.

References:

1. Morris Mano, Digital Design- Prentice Hall of India Pvt. Ltd., new Delhi.
2. R.P. Jain , "Modern digital electronics" , 3rd edition , 12th reprint Tata McGraw Hill Publication, 2007.
3. Anand Kumar, "Fundamentals of digital circuits" 1st edition, Prentice Hall of India, 2001

Electronic Devices & Circuits

ACEC-16303

Internal Marks: 40	**L**	**T**	**P**
External Marks: 60	**3**	**1**	**-**

Objectives:

- Understand the basics of semiconductor energy bands and diodes
- Understand the working of various kinds of transistors and their operating conditions.
- To study the transistor hybrid model and their circuit analysis.
- To understand the difference between the positive and negative feedback and to study various oscillators.
- To study the various kinds of amplifiers and their drawbacks with the basics of clipping and clamping circuits

Section I

Semiconductor diode : Intrinsic and Extrinsic Silicon Energy bands Theory of PN junction diode, Volt Ampere Characteristics, Temperature Dependence of PN diode, LED, LCD and Photo- diodes, Tunnel diode, Zener diode as Voltage Regulator**.**

Section II

Transistors, Characteristics and Biasing : Transistor, Types of Transistor, Transistor current components, Transistor as an Amplifier, Transistor characteristics in CB, CE and CC modes. Operating point, bias stability, stabilization against Ico, VBE and beta, Construction, Characteristics & applications of Junction Field Effect Transistor (JFET), UJT and MOSFET.

Section III

Low & High Frequency Transistor Model Feedback Amplifiers and Oscillator : Transistor Hybrid Model, h parameter equivalent circuit of transistor, Analysis of transistor amplifier using h-parameters in CB, CE and CC configuration . Feedback Concept, Effect of negative feedback on gain, bandwidth, stability, distortion and frequency Response, Sinusoidal Oscillators, Sinusoidal oscillators; criterion for oscillation, Different types of oscillators: RC Phase Shift, Wein Bridge, Hartley, Colpitts and Crystal Oscillators. Derivation of expression for frequency and amplitude of these oscillators.

Section IV

Large Signal Amplifiers: Class A direct coupled with resistive load, Transformer coupled with resistive load, harmonic distortion, variation of output power with load, Push-Pull Amplifiers, operation of class- B push-pull amplifier, crossover distortion, transistor phase inverter, complementary- symmetry amplifier. Basics of clipping and clamping of circuits

References:

1. **Electronic Devices & Circuits by J.B.Gupta**, Katson Publishers
2. **Electronic Devices & Circuits by Millman- Halkias**, Tata Mcgraw Hill
3. **Electronic Devices & Circuits by S.K Sehdev**
4. **Electronic Devices & Circuits Theory by Boylested, Pearson Education**

Lab Electronic Devices & Circuits
ACEC-16304

	L	T	P
Internal Marks: 30			
External Marks: 20	**0**	**0**	**2**

Objectives:

- Designing and implementation of various rectifiers and diodes and transistors.
- Calculation of the efficiencies of various amplifiers and oscillators.
- By imparting more practical knowledge by giving a physical demonstration on voltage and current elements.
- Construction of mini projects like power supply circuit and simple projects on IC555 Timer
- To understand the physical implementation of various electronic components mini projects like temperature controlled device and wire fault detector can be constructed.

List of Experiments

Section-A

.To design and implement a half wave and full wave rectifier with help of discrete components

2.To implement and design a voltage regulator circuit with help of zener diode .

3.To determine the input and output characteristics of common base configuration.

4.To determine the input and output characteristics of common emitter configuration.

5.To demonstrate practically the concept of voltage and current with resistance with the help of small demonstration.

Section-B (Project oriented)

1. To construct a Simple power supply circuit
2. Project based on 3*3*3 LED Cube using 555 Timer and CD4020 IC.
3. Project based on temperature controlled automatic switch.
4. Project based on broken wire detector circuit using IC CD 4069**.**

Lab Digital Circuit and Logic Design

ACEC-16305

Internal Marks: 30	**L**	**T**	**P**
External Marks: 20	**-**	**-**	**2**

Objectives:

- To have practical understanding of logic gates IC's their input and output pins and logic levels.
- To be able to implement combinational logic circuits such as half/full adders and subtractors.
- To practically design the various combinational circuits such as comparators, encoders, code convertors (binary to gray, gray to binary etc.) Using logic gate IC's.
- Verify the truth table of circuits such as half adder and full adders by using multiplexers and demultiplexers.
- To verify practically the truth table and working schema of various sequential circuits such as RS, JK, D, T, JK master-slave Flip flops.

Part - A

1. Study of Logic Gates: Truth-table verification of OR, AND, NOT, XOR, NAND and NOR gates.
2. Realization Half Adder / Full Adder , Half Subtractor / Full Subtractor using Logic gates.
3. Design 4-Bit Binary-to-Gray & Gray-to-Binary Code Converter.
4. Multiplexer: Truth-table verification and realization of Half adder and Full adder using MUX.
5. Flip Flops: Truth-table verification of RS, JK , D, JK Master Slave Flip Flops.

Part-B : **Do any Five live projects** from the list below**:**

i. Musical Bell
ii. IR Remote Tester
Static Electricity Detector
iii. Ticking Bomb
iv. The Fading LED
v. Light Activated LED
vi. Dark activated LED
vii. LED Dimmer
viii. Single Chip Electronic Dice
ix. Manual counter

Object Oriented Programming Using C++ Lab

ACCS – 16305

Internal Marks : 30 **L T P**

External Marks : 20 **- - 2**

PART A

1.[Control statements] Write programs to implement basics of control structures

2.[Function Array & Structure] Write a programs to implement the concepts of function types, array and structures

3.[Pointer] Write the programs to implement the concept of pointer.

4. [Classes and Objects] Write a program that uses a class where the member functions are defined inside a class.

5. [Classes and Objects] Write a program that uses a class where the member functions are defined outside a class.

6. [Classes and Objects] Write a program to demonstrate the use of static data members.

7. [Classes and Objects] Write a program to demonstrate the use of const data members.

8. [Constructors and Destructors] Write a program to demonstrate the use of zero argument and parameterized constructors.

9. [Constructors and Destructors] Write a program to demonstrate the use of dynamic constructor.

10. [Constructors and Destructors] Write a program to demonstrate the use of explicit constructor.

11. [Inheritance] Write a program to demonstrate the multilevel inheritance.

12. [Inheritance] Write a program to demonstrate the multiple inheritance.

13. [Inheritance] Write a program to demonstrate the virtual derivation of a class.

14. [Operator Overloading] Write a program to demonstrate the overloading of increment and

decrement operators.

15. [Operator Overloading] Write a program to demonstrate the overloading of binary arithmetic operators.

16. [Operator Overloading] Write a program to demonstrate the overloading of memory management operators.

17. [Typecasting] Write a program to demonstrate the typecasting of basic type to class type.

18. [Typecasting] Write a program to demonstrate the typecasting of class type to basic type.

19. [Typecasting] Write a program to demonstrate the typecasting of class type to class type.

20. [Polymorphism] Write a program to demonstrate the runtime polymorphism.

21. [Templates and Generic Programming] Write a program to demonstrate the use of function template.

22. [Templates and Generic Programming] Write a program to demonstrate the use of class template.

23. [File Handling] Write a program to copy the contents of a file to another file byte by byte. The name of the source file and destination file should be taken as command-line arguments,

24. [File Handling] Write a program to demonstrate the reading and writing of mixed type of data.

25. [File Handling] Write a program to demonstrate the reading and writing of objects.

PART B

[Application Development] Based on unit 8 or any other file handling development based on unit 8

FOURTH SEMESTER

Linear Control Systems

ACEE-16402

Internal Marks: 40	**L**	**T**	**P**
External Marks: 60	**3**	**1**	**-**

Objectives:

- Study about the various types of systems used in control system.
- Obtaining the transfer function of different types of systems using the block diagram reduction techniques and signal flow graph.
- Finding the various time domain specifications, steady state error and routh hurwitz criteria for stability
- Time domain analysis using the root locus plot.
- Frequency domain analysis using the frequency domain specifications, plotting the bode plot and nyquist plot along with finding the stability of the system. Study of the compensation techniques.

Section I

Introductory Concepts: Plant, Systems, Servomechanism, regulating systems, disturbances, Open loop control system, closed loop control systems, linear and non-linear systems, time variant and invariant, continuous and sampled-data control systems, Block diagrams, some illustrative examples.

Modeling: Formulation of equation of linear electrical, mechanical, thermal, pneumatic and hydraulic system, electrical, mechanical analogies. Transfer function, Block diagram representation, signal flow graphs and associated algebra, characteristics equation.

Section II

Time Domain Analysis: Typical test - input signals, Transient response of the first and second order systems. Time domain specifications, Dominant closed loop poles of higher order systems. Steady state error and coefficients, pole-zero location and stability, Routh-Hurwitz Criterion.

Section III

Root Locus Technique: The extreme points of the root loci for positive gain. Asymptotes to the loci, Breakaway points, intersection with imaginary axis, location of roots with given gain and sketch of the root locus plot.

Section IV

Frequency Domain Analysis and Compensation: Closed loop frequency response, Bode plots, stability and loop transfer function. Frequency response specifications, Relative stability, Relation between time and frequency response for second order systems, Log. Magnitude versus Phase angle plot, Nyquist criterion for stability. Necessity of compensation, series and parallel compensation, compensating networks.

References:

- Ogata K., Modern Control Engineering‖, Prentice Hall,
- Kuo B. C., Automatic Control System‖, Prentice Hall
- Nagrath I.J. and Gopal M., Control System Engineering, Wiley Eastern Ltd.
- Hasan Saeed, Automatic Control Systems , Katson books

Analog communication and systems

ACEC-16401

Internal Marks: 40	**L**	**T**	**P**
External Marks: 60	**3**	**1**	**-**

Objectives:

- To make the students capable of analyzing various type of Modulation.
- To analyse various AM,FM transmission and reception methods
- To study various pulse modulation Transmission and reception methods

Section I

Baseband signals and Analog Modulation Techniques:

Elements of communication system, noise and its types, Noise figure and noise factor, noise equivalent temperature, Modulation and demodulation, Mixing; linear and non linear, need of modulation, types of modulation systems, frequency multiplexing technique, Introduction, theory of amplitude modulation; AM power calculations, AM current calculations, theory of frequency modulation; mathematical analysis of FM, spectra of FM signals, narrow band of FM, Wide band FM, Theory of phase modulation, comparison of AM & FM, Comparison of PM & FM.

Section II

AM Transmission: Introduction, generation of Amplitude Modulation, basic principle of AM generation; square law modulation, suppressed carrier AM generation (Balanced Modulator), ring Modulator, Product Modulator/balanced Modulator. SSB,ISB,VSB, SSB Generation of SSB; Filter method, Phase Shift Method, Third Method.

Section III

AM Reception: Receiver Parameters; Selectivity, Sensitivity, Fidelity, Tuned Ratio Frequency (TRF) Receiver, Super heterodyne Receiver; Basic elements of AM super heterodyne Receiver; Image Frequency Rejection Tracking & Alignment, IF Amplifier, AM detector; square law detector, Envelope or Diode detector, AM detector with, Double hetro-dyne receiver, SSb product demodulator,SSB BFO receiver, coherent SSB receiver,SSB envelope detection,Multichannel pilot carrier SSb Receiver.

SectionIV

FM Transmission and FM Reception: FM allocation standards, generation of FM by direct method, varactor diode Modulator, Indirect generation of FM; Armstrong method.Frequency

demodulators, Tuned circuit frequency discriminators; Slope Detector, Balance Slope Detector, Foster Seeley discriminator, Ratio Detector, pre emphasis and de emphasis, limiter circuits.

Pulse Modulation Transmissions and Reception: Introduction, Sampling Theorem Pulse Amplitude Modulation (PAM), Natural PAM Frequency Spectra for PAM , Flat-top PAM, Sample and hold circuits, Time division Multiplexing, PAM Modulator Circuit, Demodulation of PAM Signals, Pulse Time Modulation (PTM); Pulse Width Modulation(PWM), Pulse Position Modulation (PPM), PPM Demodulator.

References:

1.Electronic Communication System, Tomasi, Pearson Education.

2. Analog Communication Systems by Symon Hykens, John Wiley & Sons .

Linear Integrated Circuit

ACEC-16402

Internal Marks: 40	**L**	**T**	**P**
External Marks: 60	**3**	**1**	**-**

Objectives:

- To study various configuration of Differential amplifier
- To study various performance parameters of operational amplifier
- To make the students learn how op-amp can be used in various applications
- To design various multivibrators using IC 555

Section 1
Differential And Cascade Amplifiers:

Introduction, Differential Amplifier, Differential Amplifier Circuit Configuration, Dual Input-Balanced output Differential Amplifier, Dual Input-Unbalanced output Differential Amplifier, Single Input-Balanced output Differential Amplifier, Single Input-unbalanced output Differential Amplifier with their DC and AC analysis, Differential Amplifier with swamping resistors, Constant current bias, Current Mirror, Cascaded differential Amplifier Stages, Level Translator, CE-CB configuration.

Section 2
Introduction To Operational Amplifiers:

Block diagram of a typical Op-Amp, Schematic symbol, integrated circuits and their types Characteristics and performance parameters of and Op-Amp, Ideal Op-Amp, Equivalent circuit of an Op-Amp, Ideal voltage transfer curve, Open loop configurations : Differential, Inverting & Non Inverting. Practical Op-Amp: Input offset voltage, Input bias current, Input offset current, total output offset voltage, Thermal drift, Effect of variation in power supply voltages on offset voltage, Change in Input offset voltage and Input offset current with time, Temperature and supply voltage sensitive parameters, Noise, Common Mode configuration and common mode rejection Ratio.

Section 3
Aplications Of Op-Amp:

DC and AC amplifiers, Peaking Amp, Summing, Scaling and Averaging Amp, Instrumentation Amplifier, V to I and I and to V converter, Log and Antilog Amp, Integrator, Differentiator. Voltage controlled oscillator, Basic comparator, Zero crossing detector, Schmitt trigger, window detector, V to F and F to V converters, Peak Detector, Sample and Hold Circuit, Precision Rectifier

Section 4

Specialized Ic Applications:

IC 555 Timer: Pin configuration, Block diagram, application of IC 555 as Monostable and Astable Multivibrator., Phase Lock Loops: Operating principles & applications of IC 565, Voltage Regulators: Fixed voltage regulators, Adjustable voltage regulators, Switching Regulators.

Refrences:

1. Op Amps & Linear Integrated circuits by Ramakant Gayakwad.
2. Op Amps & Linear Integrated circuits by Coughlin.
3. Op Amps & Linear Integrated circuits by RaviRaj Dudeja.

Signals And Systems

ACEC-16403

Internal Marks: 40	**L**	**T**	**P**
External Marks: 60	**3**	**1**	**-**

Objectives:

- To make the students capable of understanding various signlas and systems.
- To analyze various signals in Continuous and discrete form.
- To make the students learn how signal behaves in Frequency domain

Section I

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 & aperiodic, random &deterministic signals, Even& Odd Signals, Energy & Power Signals, Description of continuous time and discrete time systems.

Section II

Analysis of Continuous Time Signals and analysis of Discrete Time Signals:

Fourier series analysis, Spectrum of C.T. signals, Fourier Transform and its properties in Signal Analysis, Power Spectral Density and Energy spectral density, Sampling of CT signals and aliasing, DTFT and its properties.

Section III

Linear Time Invariant -Continuous Time Systems:

Linear Time invariant Systems and their properties. Differential equation & Block diagram representation, Impulse response, Convolution integral, Frequency response (Transfer Function), Fourier transforms analysis.

Section IV

Linear Time Invariant -Discrete Time System:

Difference equations, Block diagram representation, Impulse response, Convolution sum, LTI systems analysis using DTFT.Random Signal Theory: Introduction to probabilities, Definition, probability of Random events, Joint and conditional probability, probability Mass function statistical averages. Probability density functions and statistical averages. Examples of P.D.

function, transformation of random variables random processes, stationary, True averages and Ergodic.

References:

1. Communication Signals & System by Simon Haykins, John Wiley & Sons.
2. Signal, System & Transforms, Phillips, Pearson Education.
3. Fundamentals of Signals and Systems by Edward W Kamen & Bonnie's Heck, Pearson Education.

Electromagnetics & Field Theory

ACEC-16404

Internal Marks: 40	**L T P**
External Marks: 60	**3 1 -**

Objectives:

- To study the difference between the circuit theory and electromagnetic theory and scalar and vector fields
- To give a basic review to various laws of electrostatics and magnetostatics
- To understand the Maxwell equations and wave equations in detail.
- To understand the types of waveguides and the parameters associated with them.
- To study the concept of transmission lines and the losses associated with them.

Section I : **Review of Electrostatics and Magnetostatics:** Difference between the circuit theory and electromagnetic theory, scalars and vectors ,line ,surface and volume integrals ,gradient of ascalar ,divergence of a vector, del operator,curl of a vector, divergence theorem ,strokes theorem Coulombs law and field intensity ,electric fields due to continous charge distribution,Gauss's law, Biot savart's law,Ampere circuital law,Magnetic flux density,Faraday's law,Displacement current,retarded potential

SectionII: Electromagnetic Waves: Maxwell's equations in differential and integral forms and their boundary conditions Wave equation and its solution in different media, polarization. Plane wave propagation in a dielectric medium, Reflection and transmission of an EM waves. Surface impedance, Poynting theorem

Section III : **Rectangular and circular wave guides**. Wave impedance and characteristics impedances. Transmission line analogy for wave guides. Losses in transmission lines. Input Impedance of transmission lines. Relation between reflection co-efficient and VSWR

Section IV: Transmission Lines : Circuit representation of parallel plane transmission lines. Parallel plane transmission line with losses. Low loss RF and UHF transmission lines. Distortionless condition. ,impedance matching,smith charts

References:

1. **Electromagnetics and radiating systems, Jordan E.C., PHI**
2. **Antenna and wave propagation,K.D Prasad**
3. **Electromagnetics and Antenna by Dr. Amit Sarin , Kalyani Publishers**
4. **Electromagnetics : Kraus : T.M.H.**

Lab Linear Integrated Circuit

ACEC-16405

Section -A

1. To study differential amplifier configurations.
2. To measure the performance parameters of an Op amp.
3. Application of Op amp as Inverting and Non Inverting amplifier.
4. To use the Op-Amp as summing, scaling & averaging amplifier.
5. To use the OP-Amp as Differentiator and Integrator.
6. Application of Op Amp as Sawtooth wave generator.
7. Application of Op Amp as Schmitt Trigger. √

Section -B

1. To Design Automatic Porch Light using IC 555 Timer.
2. To develop Smoke Detector Alarm using IC 555 Timer
3. To develop Electronic Lock using IC 555 Timer
4. To develop Water Level cum Pump failure Indicator using IC 555 Timer
5. To design Main leakage Detector Circuit using OPAMP and IC 555 Timer

Simulation Lab for Electronic Engineers

ACEC-16407

Internal Marks: 30	**L T P**
External Marks: 20	**- - 2**

Objectives:

- Generation of various types of standard signals, sequences and waves in continuous domain and discrete domain using matlab.
- Basic operations on the signals like addition, subtraction, shifting, folding and multiplication using matlab.
- Obtaining the convolution and correlation between the signals using the matlab software.
- Obtaining the magnitude and phase response of LTI system and pole zero location plot with the help of matlab software.
- Image processing programs using matlab.

1. Introduction to MATLAB commands
2. Generation of continuous and discrete time sine signals
3. Generation of continuous and discrete time cosine signals
4. To generate continuous time sine pulse
5. To generate continuous time unit impulse signal
6. To generate discrete time rectangular pulse signal
7. Generation of unit step signal ,exponential rising signal and exponential decaying signal

Part –B

1. Design and simulation of sine wave using Simulink
2. Simulative analysis of a bouncing ball using integrator block
3. Simulative analysis of room temperature using Simulink

*Any other project based on Simulnk

Digital Communication System

ACEC-16501

Internal Marks: 40	L T P
External Marks: 60	3 1 0

Objectives:

1. To understand the building blocks of digital communication system.
2. To prepare mathematical background for communication signal analysis.
3. To understand and analyze the signal flow in a digital communication system
4. Design optimum receivers for digital modulation techniques.

Section I

Elements of Digital Communication System: Block diagram of Digital Communication system, Advantages and Disadvantages of Digital Communication system, Bandwidth -S/N trade off, Hartley Shannon Law, Concept of amount of Information and entropy, Shannon Fano Source Coding, Huffman source coding and Lampel-Ziv Source coding Algorithm.

Section II

Pulse Code Modulation:- Sampling Theorem of baseband and bandpass signals, Sampling Rate, Aliasing, Block diagram of PCM system, Bandwidth of PCM , quantization error, Uniform and Non uniform quantization, Delta Modulation, Continuously variable Slope Delta Modulator (CVSDM) or Adaptive Delta Modulation, Intersymbol Interference, Eye Patterns.

Section III

Line Coding , Multiplexing Techniques &Network Security: Line Coding & its properties. NRZ & RZ types, signaling format for unipolar, Polar, bipolar (AMI) & Manchester,HDB3 AND B8ZS Code, Statistical TDM,Four Aspects of Security, Encryption and Decryption ,Public key encryption system.

Section IV

Introduction, Amplitude Shift Keying, ASK Modulator, Coherent ASK Detector, Noncoherent ASK Detector, Frequency Shift Keying (FSK), FSK Bit Rate and Baud, Bandwidth and Frequency Spectrum of FSK, FSK Transmitter, Non-coherent FSK Detector, Coherent FSK Detector, FSK Detection Using PLL, Binary Phase Shift Keying, Binary PSK Spectrum, BPSK Transmitter, Coherent PSK Detection, Quadrature Phase Shift Keying (QPSK), QPSK Demodulator, Offset QPSK, $\pi/4$ QPSK, Comparison of conventional QPSK, Offset QPSK and $\pi/4$ QPSK, Quadrature Amplitude Modulation (QAM),Differential PSK.

References:

1. Electronic Communication System Fundamentals through Advance Wayne Tomasi 5th 2009 Pearson Education.
2. Simon Haykin, “Digital Communications”, John Wiley and Sons, 2008.

Digital Signal Processing

ACEC-16502

Internal Marks: 40	**L T P**
External Marks: 60	**3 1 0**

Objectives:

- Introduction about how processing of signal is done
- Knowledge of basic elements used in DSP
- How to apply the DFT and Z - Transform techniques in signal processing
- Designing of digital filters (IIR and FIR filters)
- Learning of various of DSP processors and its applications

Section I

Introduction: Limitations of analog signal processing, Advantages of digital signal processing and its applications, Some elementary discrete time sequences and systems, Basic elements of digital signal processing such as convolution, correlation and autocorrelation, Concepts of stability, causality, linearity, difference equations.

Section II

DFT: DFT and its properties, Linear Periodic and Circular convolution, Linear Filtering Methods based on DFT, Fast Fourier Transform algorithm using decimation in time and decimation frequency techniques, Goertzel algorithm.

Section III

The Z - Transform : Introduction, Z - Transform, Region of convergence, Inverse Z - Transform methods, properties of Z - Transform.

Section IV

Design of Digital Filters & DSP Processors: Structures of realization of discrete time system, direct form, Cascade form, parallel form structure of FIR and IIR systems. Linear Phase FIR filters, Design methods for FIR filters using Window and frequency sampling method, IIR filter design by Impulse Invariance, Bilinear Transformation, Matched Z - Transformation, Analog and Digital Transformation in the Frequency Domain.

DSP Processors: Architectures of ADSP and TMS series of processor. Applications of DSP Processors, Applications of DSP in the field of Speech Processing, Image Processing and Bio - Medical Engineering.

References:

1. Discrete - Time Signal Processing Alan V Oppenheim, Ronald W Schafer, John R Back 2nd 2008, Prentice Hall.
2. Digital Signal Processing S. Salivahan, A Vallavaraj, Gnanpiya 1st 2008 Tata McGraw Hill.
3. Digital Signal Processing - A computer based approach S. K. Mitra 1st 2006 Tata McGraw Hill.
4. Jervis, “Digital Signal Processing”, Pearson Education India.
5. Introduction to Digital Signal Processing Johny R . Johnson 1st 2006, Prentice Hall.
6. Digital Signal Processing Dr. Sanjay Sharma, S. K. Kataria & Sons

EMBEDDED SYSTEMS-1

ACEC-16503

Internal Marks: 40	L T P
External Marks: 60	3 1 2

Objectives:

1. To understand the basic concepts of microprocessors.
2. To prepare conceptual background for processor based applications.
3. Design optimum projects in microcontrollers.
4 . Basic knowledge with embedded C

Unit I- INTRODUCTION TO 8085 MICROPROCESSOR: Evolution of Microprocessors, Introduction to Neumann and Harvard's architecture and its Benefits, 8085 Microprocessor and its architecture and Addressing modes of 8085, Instruction set of 8085.

Unit II- 8051 MICROCONTROLLER: Comparison of Microprocessor and Microcontroller, Introduction to 8051 microcontroller family, Architecture and pin configuration of 8051, 8051 flag bits and PSW, Register banks, Memory organization of 8051.

Unit III- 8051 ASSEMBLY LANGUAGE PROGRAMMING: Instruction set of 8051, Jump, loop and call instructions, addressing modes of 8051, I/O Port programming, Timer/counter Assembly programming in the 8051.

Unit-IV: Introduction to 8051 embedded C Programming

Integrated Development Environment (IDE) for C/C++ Programming, Simple example programs of 8051 timers, interfacing with Stepper motor, ADC,DAC, Keyboard, LCD.

References

1. Microprocessor Architecture, Programming and application with 8085 by Gaonkar
2. The 8051 Microcontroller and embedded Systems by: - Ali Mazidi, Pearson Education
3. Learn Arduino yourself in 24 hours by sam series

Lab Communication Systems

ACEC-16504

PART A-Lab Analog Communication lab

1. To generate amplitude modulated wave and determine the percentage modulation.

2. To generate frequency modulated signal and determine the modulation index and bandwidth for various values of amplitude and frequency of modulating signal.

3. Generation. & study of Analog TDM at least 4 channels.

4. To study the circuit of PWM & PPM modulator & Demodulator

-Digital Communication Lab

1.Study of amplitude shift keying modulator and demodulator.

2.To generate the waveforms of phase shift keying.

3. To generate the waveforms of phase shift keying

4. Data decoding techniques for various formats.

Part B- Basic Projects Implementation

1.To Design a Simple FM Radio Jammer Circuit

2. To design FM Transmitter Circuit using discrete components.

Digital signal processing lab

ACEC - 16505

	L	T	P
Internal Marks: 30			
External Marks: 20	**0**	**0**	**2**

List of Experiments:

1.To develop elementary signal function modules (m-files) for unit sample, unit step, exponential and unit ramp sequences.

2.Write a program in MATLAB to generate standard sequences.

3.Write a program in MATLAB to compute power density spectrum of a sequence.

4.To develop program modules based on operation on sequences like signal Shifting, signal folding, signal addition and signal multiplication.

5.Write a program in MATLAB to verify linear convolution.

6.Write a program in MATLAB to verify the circular convolution.

7.To develop program for finding magnitude and phase response of LTI system Described by system function H(z).

8.To develop program for finding response of the LTI system described by the difference equation.

9.To develop program for computing inverse Z-transform.

10.To develop program for computing DFT and IDFT.

11.To develop program for designing FIR filter.

12./To develop program for designing IIR filter.

13.To write a MATLAB programs for pole-zero plot, amplitude, phase response and impulse response from the given transfer function of a discrete-time causal system.

14.Write a program in MATLAB to find frequency response of different types of analog filters.

15.Write a program in MATLAB to design FIR filter (LP/HP) through Window technique

(i) Using rectangular window

(ii) Using triangular window

16.To Develop Program for Discrete Correlation.

17.Generation of Even and Odd Signals in Discrete Time Domain.

18.To Write a MATLAB Program for Pole - Zero Plot From the Given Transfer Function of a Discrete Time Causal System in S - Domain and Z - Domain along With Checking the Stability Criteria in the Z - Plane.

19.To Study TMS3200C6713 Digital Signal Processing Kit (DSK).

20.To Compute DFT of any particular sequence using TMS320C6713 Digital Signal Processing Kit (DSK).

21.To Design FIR filter using TMS320C6713 Digital Signal Processing Kit (DSK).

22.To Design IIR filter using TMS320C6713 Digital Signal Processing Kit (DSK)

Lab Hardware programming Language

ACEC-16506

Internal Marks: 30	**L**	**T**	**P**
External Marks: 20	**0**	**0**	**2**

LIST OF EXPERIMENTS

Part A

Experiments using 8085

1. Study of 8085 Microprocessor Kits. Write a program to add and subtract two 8 bit numbers.
2. Write a program to multiply two 8 bit numbers using 8085.
3. Write a program to find maximum and minimum from series using 8085.
4. Study of 8051 Micro controller kits.
5. Write a program to Display 'SUPERB' on display using 8051.
6. Write a Program to arrange 10 numbers stored in memory location in Ascending and Descending order.

Part B

Arduino Programming Concepts (Arduino based projects)

2. Demonstration of UNO Arduino board and its technical specifications.
3. Interfacing of Simple LED based circuits with ARDUINO .
4. Implementation of Temperature sensor using Arduino.
5. Interfacing a gas sensor using Arduino.
5. Designing a traffic light control system using Arduino

Elective-I

Engineering Economics & Industrial Management
ACEC-16901

Internal Marks: 40	**L**	**T**	**P**
External Marks: 60	**3**	**1**	**0**

Objectives-:
1. It is a field that helps students to study the structure and organization of industrial management.
2. To make them aware about how to work for maximum output in any industrial concern.
3. Mobilizing best talents.
4. To study interconnection of Engineering economics and industrial management.

Section-I
Cost analysis, Replacement Studies: Break-even analysis, two and three alternatives and graphical solution. Breakeven charts, effects of changes in fixed and variable costs. Minimum cost analysis, economics order quality. Effect of risk and uncertainty on lot size. Reasons for replacement, factors to be considered in replacement Studies, discounted cash flow analysis, economic life of a project, challenger and defender.

Section-II
Economic Analysis Of Investment Alternatives Cost Estimation Depreciation: Basic economy study patterns and their comparison, decision making in selection of alternative by present worth methods, rate of return method, payout period method and uniform annual cost method, economic analysis of new projects, effect of taxation on economic studies. Difference between cost estimation and cost accounting, qualifications of an estimator. Estimating procedure, Estimate of material cost and labour cost. Estimation of cost in various manufacturing operations. Types of depreciation and their Methods.

Section-III
Concepts of Industrial Management Productivity : Concept, Development, application and scope of Industrial Management **,** Functions of Management, Evolution of Management Thought : Taylor's Scientific Management, Fayol's**,**Principles of Management, Douglas Mc-Gregor's Theory X and Theory Y, Mayo's Hawthorne, Experiments, Hertzberg's Two Factor Theory of Motivation, Maslow's Hierarchy of Human Needs' Definition, measurement, productivity index, types of production system, Industrial Ownership.

Section-IV
Designing Organizational Structures and Materials Management: Concept, Importance and characteristics of organization, Types of organization - Project, matrix and informal organization. Span of control, Delegation of authority. Objectives, Inventory – functions, types, associated costs, Inventory Control Systems-Continuous review system-periodical review system. Stores Management and Stores Records. Purchase management, duties of purchase of manager.

TEXT BOOKS
1. O.P Khanna, Industrial Engineering.
2. T.N. Bhagooiwal Economics of Labour and Industrial Relations (Sahitya BhawanAgra)

Cyber Law & IPR

ACEC-16902

Internal Marks: 40	**L**	**T**	**P**
External Marks: 60	**3**	**1**	**0**
Total Marks: 100			

Objectives-: 1. Students will be able to learn about basics of internet and cyberspace
2. Students will have knowledge about E-Commerce
3. Students will have knowledge about basics of IPR
4. Students will have knowledge about cyber crimes.

Unit-I Basics of Computer & Internet Technology Internet, ISP & domain name; Network Security; Encryption Techniques and Algorithms; Digital Signatures Introduction to Cyber World Introduction to Cyberspace and Cyber Law; Different Components of cyber Laws; Cyber Law and Netizens.

Unit-II E-Commerce Introduction to E-Commerce; Different E-Commerce Models; E-Commerce Trends and Prospects; E-Commerce and Taxation; Legal Aspects of E-Commerce.

Unit-III Intellectual Property Rights IPR Regime in the Digital Society; Copyright and Patents; International Treaties and Conventions; Business Software Patents; Domain Name Disputes and Resolution.

Unit IV- IT ACT 2000 Aims and Objectives; Overview of the Act; Jurisdiction; Role of Certifying Authority; Regulators under IT Act; Cyber Crimes-Offences and Contraventions; Grey Areas of IT Act. Unit VI- Project Work Candidates will be required to work on a project.

Reference Books:

1. Nandan Kamath, ―A Guide to Cyber Laws & IT Act 2000 with Rules & Notification‖.
2. Law and practice of intellectual property in India by Vikas Vashishth
3. Intellectual property- patents, copyrights, trademarks and allied rights by Cornish W R
4. Keith Merill & Deepti Chopra (IK Inter.), Cyber Cops, Cyber Criminals & Internet

Operating Systems
ACCS – 16402

Internal Marks : 40 **L T P**

External Marks : 60 **3 1 -**

Total Marks : 100

Objectives: This course should provide the students with good understanding of Operating System including its architecture and all its components. Good conceptions on all the subjects like processes, inter-process communication, semaphore, message passing, classical IPC problems, scheduling, memory management, file systems, security and protection mechanism, I/O hardware and software, deadlocks, etc. should be provided

Section - I

Introduction: Operating System and its Classification -Batch, Interactive, Multiprogramming, Time sharing, Real Time System, Multiprocessor Systems, Multithreaded Systems, System Protection, System Calls, Monolithic and Microkernel Systems, Operating System Components and Views, Operating System Functions and Services.

Section - II

Processes & Process Synchronization: Process Concept, Process States, Process State Transition Diagram, Process Control Block (PCB), Process Scheduling Concepts, Threads and its types, Principle of Concurrency, Producer / Consumer Problem, Critical Section Problem, Semaphores, Classical Problem in Concurrency: Readers Writers Problem.

Process Scheduling: Definition , Scheduling objectives ,Types of Schedulers ,Scheduling criteria : CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time (Definition only) , Scheduling algorithms : Pre emptive and Non , pre emptive , FCFS ,SJF ,RR , Multiprocessor scheduling : Types , Performance evaluation of the scheduling.

Deadlocks: Definition, Deadlock characteristics, Deadlock Prevention , Deadlock Avoidance :banker's algorithm, Deadlock detection and Recovery.

Section - III

Memory Management : Definition ,Logical and Physical address map , Memory allocation : Contiguous and noncontiguous Memory allocation Fixed and variable partition ,Internal and External fragmentation and compaction , Paging : Principle of operation ,Page allocation, Hardware support for paging ,Protection and sharing ,Disadvantages of paging, Segmentation, Basics of Virtual Memory ,Hardware and control structures ,Locality of reference, Page fault , Dirty page/Dirty bit ,Demand paging (Concepts only) ,Page Replacement policies : Optimal (OPT) , First in First Out (FIFO) and Least Recently used (LRU),Thrashing

Section - IV

Device Management & File System: Secondary Storage Structure, Disk Scheduling :FCFS,SCAN,C-SCAN,LOOK,C-LOOK,SSTF , File concept, File organization and access mechanism, File directories, File system implementation issues, File system protection and security.

Protection and Security: Goals and Domain of Protection, Access Matrix, Program Threats: Virus, Worms, Trojan Horse, TrapDoor, Denial of Service Attacks

Introduction to Unix/Linux

References:

1. A Silberschatz and Peter B. Galvin, “Operating System Concepts" Addison Wesley Publishing Company
2. Dhamdhere, ―Systems Programming & Operating Systems” Tata McGraw Hill
3. Gary Nutt, “Operating Systems Concepts”, Pearson Education Ltd. 3rd Edition
4. Operating System by Madnick Donovan

B.Tech ECE 6th Semester

Syllabus

Wireless Communication System

ACEC-16601

	L	T	P
Internal Marks: 40			
External Marks: 60	**3**	**1**	**0**

Objectives:

- Wireless communication techniques
- Design, implementation, and operation of emerging wireless technologies
- Applications of mobile, wireless systems into emerging domains, 4G, 5G networks

Section I

Introduction and Elements of Cellular Radio Systems Design:
A basic cellular system, performance criteria, operation of cellular systems, planning a cellular system, analog & digital cellular systems. General description of the problem, concept of frequency reuse channels, co-channel interference reduction factor, desired C/I from a normal case in an omni directional antenna system, cell splitting, consideration of the components of cellular systems.

Section II

Digital Communication through fading multipath channels and Multiple Access Techniques for Wireless Communications
Fading channel and their characteristics- Channel modeling, Digital signaling over a frequency non selective slowly fading channel. Concept of diversity branches and signal paths. Combining methods: Selective diversity combining, Switched combining, maximal ratio combining, Equal gain combining. Rayleigh and Ricean Distribution. Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Spread Spectrum Multiple Access, Space Division Multiple Access

Section III
Wireless Systems & Standards: AMPS and ETACS, United states digital cellular (IS- 54 & IS 136), Global system for Mobile (GSM): Services, Features, System Architecture, and Channel Types, Frame Structure for GSM, Speech Processing in GSM, GPRS/EDGE specifications and features. 3G systems: UMTS & CDMA 2000 standards and specifications. CDMA Digital standard (IS 95): Frequency and Channel specifications, Forward CDMA Channel, Reverse CDMA Channel, RAKE receiver

Section IV
Future trends: 4G mobile techniques, LTE-Advance systems, 5G and other latest technologies

References:

1.T.S.Rappaport, wireless communication: principles and Practice, 2nd Edition, Pearson Education Asia,2010
2.William C.Y. Lee, Mobile cellular Telecommunications,2nd Edition,MGH2004

Embedded System-II

ACEC-16602

Internal Marks: 40	**L**	**T**	**P**
External Marks: 60	**3**	**1**	**0**

Objectives

Knowledge and Understanding After completion of this course block the student will show:

• Knowledge and understanding of fundamental embedded systems design paradigms, architectures, possibilities and challenges, both with respect to software and hardware.

• A wide competence from different areas of technology, especially from computer engineering, robotics, electronics, intelligent systems and mechatronics.

• Deep state-of-the-art theoretical knowledge in the areas of real-time systems, artificial intelligence, learning systems, sensor and measuring systems, and their interdisciplinary nature needed for integrated hardware/software development of embedded systems.

• Ability to analyze a system both as whole and in the included parts, to understand how these parts interact in the functionality and properties of the system, and

•Understanding and experience of state-of-the-practice industrial embedded systems and intelligent embedded system development.

Unit-I: Arm Processor Architecture

Architecture, Registers, Interrupts & Vector Table, I/O Ports, ARM Processor family, JTAG, I2C bus

Unit-II: Arm Programming Instructions

Instruction Set: Data processing instructions, Addressing modes, Load Store Instructions, PSR (Program Status Register) Instructions, Conditional Instructions, Interrupt Instructions

Unit III- Introduction To Arduino Uno And Raspberry Pi Processors: Introduction to Arduino family, Arduino Architecture and Pin configuration, Basic Arduino commands (IDE), Basic Functions viz.:–void, pinMode, digitalRead, digitalWrite, delay,millis, analogRead,analogWrite, Serial.begin,serial.println and basic programming based on Arduino:- Interfacing of Simple LED based circuits with Arduino, Implementation of Temperature sensor using Arduino, Interfacing a gas sensor using Arduino, Designing a traffic light control system using Arduino, Introduction to Raspberry pi. Processor and its architecture.

Unit-IV: Interfacing Peripherals

Interfacing: introduction to Debugging Tools , interfacing with ADC & DAC, Sensors, Memory, LCD Display, Stepper Motor, Biometric & RFID, ZIGBEE, GSM Interfaces.

References Books:

1. Andrew N. Sloss, Dominic Symes, Chris Wright, John Rayfield, ARM System Developer's Guide Designing and Optimizing System Software?, Elsevier 2008.

2. Brooks, Cole, Embedded Microcontroller Systems, Real Time Interfacing Thomson Learning 1999.

3. Steve Furber, ARM system on Chip Architecture, Addision Wesley.

4. Trevor Martin, The Insider's Guide to The Philips ARM7 - Based Microcontrollers, An Engineer's Introduction To The LPC2100 Series? Hitex Ltd.

Microwave & Radar Engineering

ACEC-16603

	L	T	P
Internal Marks: 40			
External Marks:60	**3**	**1**	**0**

Objectives:

To understand the basic concepts of microwave engineering and understanding the need of microwaves.

To understand the basic concepts of microwave tubes.

To understand the basic concepts of microwave solid state devices

To understand the various microwave measurement techniques

To understand the radar systems in detail along with the various scanning and tracking techniques.

Section-I

Microwave Tubes: Construction, operation and properties of Klystron Amplifier, reflex Klystron, Magnetron, Travelling Wave Tube (TWT), Backward Wave Oscillator (BWO), Crossed field amplifiers, microwave propagation.

Section-II

Microwave Solid State Devices: Limitation of conventional solid state devices at Microwaves, , Transferred Electron Devices (Gunn diode), Avalanche transit time effect (IMPATT, TRAPATT, SBD), Microwave Amplification by Stimulated Emission of Radiation (MASER), HEMT,MESFET

Section-III

Microwave Components and Microwave Measurements: Analysis of Microwave components using s-parameters, Junctions (E, H, Hybrid),Bends and Corners, Microwave posts, S.S. tuners, Attenuators, Phase shifter, Ferrite devices (Isolator, Circulator, Gyrator), Cavity resonator, Matched termination, microstrip circuits. Power measurements using calorimeters and bolometers, Measurement of Standing Wave Ratio (SWR), Microwave bridges, microwave antennas

Section-IV

Introduction to Radar Systems, Doppler Radars ,Scanning and Tracking Techniques, : Basic Principle: Block diagram and operation of Radar, Radar range Equation, Pulse Repetition Frequency (PRF) and Range Ambiguities, Applications of Radar. Doppler determination of velocity, Continuous Wave (CW) radar and its limitations, Frequency Modulated Continuous Wave (FMCW) radar, Basic principle and operation of Moving Target Indicator (MTI) radar, Delay line cancellers, Blind speeds and staggered PRFs. Various scanning techniques (Horizontal, vertical, spiral, palmer, raster, nodding), Angle tracking systems (Lobe switching, conical scan, monopulse), Range tracking systems, Doppler (velocity) tracking systems.

Reference books:

1. Microwave devices and circuits: Samuel Liao; PHI
2. Foundation of Microwave Engg. : R.E. Collin; McGraw Hill
3. Introduction to radar systems: Merill I. Skolnik

Optical Communication
ACEC-16604

Internal Marks: 40 **L T P**

External Marks: 60 **3 1 0**

Objectives:

- Basic knowledge of subject
- Qualitative and quantitative aspects
- Losses, types and challenges
- Optical transmitters ,receivers, types and characteristics

Section I: INTRODUCTION AND TYPES

Introduction Need of Fiber Optic Communications, Evolution of Light wave Systems,Optical Communication Systems, Optical Fibers Geometrical-Optics Description; Step-Index Fibers, Graded Index Fibers, Wave Propagation; Maxwell's Equations, Fiber Modes, Single-multi Mode-Fibers

Section II: DISPERSION AND LOSSES

Dispersion in Single-Mode Fibers; Group Velocity Dispersion, Material Dispersion, Wave guide Dispersion, Higher-order Dispersion, Polarization-Mode Dispersion, , Fiber Losses; Attenuation Coefficient, Material Absorption, Rayleigh Scattering, wave guide Imperfections, Nonlinear Optical effects; Stimulated Light Scattering, Nonlinear Phase Modulation, Four Wave Mixing

Section III: OPTICAL TRANSMITTER

Emission and Absorption Rates, p-n Junctions, Non radiative Recombination, Semiconductor Materials, Light Emitting Diodes; Power-current Characteristics, LED spectrum, Modulation Response, LED Structures, Semi Conductor Lasers; DFB Lasers, Coupled Cavity semiconductor Lasers, Tunable Semiconductor Lasers, Vertical Cavity Semiconductor Lasers, Laser Characteristics, Small & Large Signal Modulation, Spectral Line width, Source Fiber Coupling

Section IV: OPTICAL RECEIVERS

Basic concepts, p-n Photo Diodes, p-i-n Photo Diodes, Avalanche Photo Diode, MSM Photo detector, Receiver Design, Receiver Noise; Noise mechanism, Receiver sensitivity; Bit error rate, Minimum Receiver Power, Sensitivity Degradation, Receiver Performance.

References:

1. ***Djafar K. Mynbeav, —Fiber-Optics Communications Technology‖ Pearson.***
2. ***Keiser G., Optical Fiber Communication Mc graw-hill.***

Lab Wireless Communication System
ACEC-16605

Internal Marks: 30	**L**	**T**	**P**
External Marks: 20	**0**	**0**	**2**

Objectives:

- Wireless communication techniques
- Design, implementation, and operation of emerging wireless technologies
- Applications of mobile, wireless systems into emerging domains, 4G, 5G networks

List of Experiments

Part-A

1. Basic Intro to Labview.
2. Design of a MIMO System using LABVIEW.
3. Design an modulation scheme like QPSK and QAM
4. Design and implement a wireless based communication link.
5. Study and analysis of Vector signal transceiver and design a WCDMA Link

Part-B

1. Study and analysis of VNA and design a HORN Antenna.
2. Design and implement different antennas at 2.1 Ghz using VNA.
3. Design an OFDM BASED SYSTEM using LABVIEW.

References:

1.T.S.Rappaport, wireless communication: principles and Practice, 2nd Edition, Pearson Education Asia,2010
2.William C.Y. Lee, Mobile cellular Telecommunications,2nd Edition,MGH2004

Lab Microwave & Optical Engineering

ACEC-16606

Internal Marks: 30	**L**	**T**	**P**
External Marks: 20	**0**	**0**	**2**

Section-I

1. Study of various microwave components and instruments.
2. Measurement of crystal characterstics and proof of square law characterstics of the diode.
3. Measurement of Klystron characterstics.
4. Measurement of VSWR
5. Study and measurement of attenuation and loss in optical fibers,
6. Study and measurement of bending loss in optical fibers

.

Section-II

1. To design a patch antenna using HFSS software.
2. To design a yagi uda antenna using HFSS software.
3. To design a helical antenna using HFSS software
4. 8.To design a 3D model design using HFSS software

Elective-II

Relational Database Management System

ACCS-16405

Internal Marks : 40	**L T P**
External Marks : 60	**3 1 -**
Total Marks : 100	

Section - I

Introduction to Database Systems:

File Systems Versus a DBMS, Components of a DBMS, Advantages of a DBMS, Describing and Storing Data in a DBMS, Database System Architecture, Data independence.

Relational Query Languages:

SQL: Basic SQL Query, SQL Data types, Creating Tables and Views, Integrity Constraints in SQL,SQL as DML, DDL and DCL, SQL Functions: Numeric, character, date and general functions, Aggregate Functions, Nested Queries.

Section - II

Data Models:

Relational Model, Network Model, Hierarchical Model, ER Model: Entities, Attributes and Entity Sets, Relationships among entities, Strong and Weak Entities, Conceptual Database Design with the ER Model.

The Relational Model:

Introduction to the Relational Model, Difference between DBMS and RDBMS, Codd ‘s Rules, ER to Relational Model Conversion, Keys in relational Algebra, SET operators and Relational Algebra operators:, Relational Algebra queries.

PL/SQL: PL/SQL: Advantages, Anonymous block, control statements**,** Cursors and its various types: Implicit and Explicit, Exception handling, Functions and Procedures**,** Packages, Triggers.
(Programs/Applications relating primarily to table data to be covered.)

Section -III

Database Design:

Functional Dependencies ,Normalization & its need, Normal Forms, First, Second and Third Normal Forms, BCNF, Multi-valued Dependency, Join Dependency, Fourth and Fifth Normal Forms.

Transaction Management and Concurrency Control:

ACID Properties of a transaction, Life cycle of a transaction, Schedules: Types of schedules, Serializability, Concurrent Transactions, Advantages, Lock Management, Lost Update Problem, Inconsistent Read Problem , Read-Write Locks, 2 Phase Locking protocol,

Section - IV

Distributed Databases:

Distributed Database Concepts, Advantages and Disadvantages, Data Fragmentation, Replication and Allocation Techniques for Distributed Database Design.

Database Protection and Recovery:

Threats to a database and its prevention, Privileges and its types: Grant and Revoke, Roles and Role Based Security.

Backup and Recovery:

Types of Database Recovery, Recovery Techniques: Deferred Update, Immediate Update, Shadow Paging, Checkpoints, Buffer Management.

References :

1. Ramez Elmasri, Shamkant Navathe ,Fundamentals of Database Systems, Fifth Edition, Pearson Education, 2007.
2. C.J. Date , An Introduction to Database Systems, Eighth Edition, Pearson Education
3. Alexis Leon, Mathews Leon , Database Management Systems, Leon Press.
4. S. K. Singh, Database Systems Concepts, Design and Applications, Pearson Education.

Data Structures
ACCS – 16301

Internal Marks : 40 **L T P**

External Marks : 60 **3 1 -**

Total Marks : 100

Objectives: This course should provide the students with a fairly good concept of the fundamentals of different types of data structures and also the ways to implement them. Algorithm for solving problems like sorting, searching, insertion & deletion of data etc. related to data structures should also be discussed. After completion of this subject student should be able to choose an appropriate data structure for a particular problem

Section - I

Introduction: Concept of data type, definition and brief description of various data structures, data structures versus data types, operations on data structures, algorithm complexity, Asymptotic notations.

Section - II

Arrays & Linked List: Linear and multi-dimensional arrays and their representation, operations on arrays, sparse matrices and their storage. Linear linked list, operations on linear linked list, header and circular linked list, doubly linked list, operations on doubly linked list, applications of linked lists, Comparing arrays with linked lists, advantages and disadvantages of linked lists

Stacks & Queues: Sequential and linked representations, operations on stacks, application of stacks such as parenthesis checker, evaluation of postfix expressions, conversion from infix to postfix representation, implementing recursive functions. Sequential representation of queue, linear queue, circular queue, operations on linear and circular queue, linked representation of a queue and operations on it, deque, priority queue, applications of queues.

Section – III

Trees: Basic terminology, sequential and linked representations of trees, traversing a binary tree using recursive and non-recursive procedures, inserting a node, deleting a node, brief introduction to binary search trees with its operations like searching, insertion, deletion. AVL trees and B-trees, insertion and deletion in a heap.

Graphs: Basic terminology, representation of graphs (adjacency matrix, adjacency list), traversal of a graph (breadth-first search and depth-first search), Warshall's algorithm and applications of graphs.

Section - IV

Hashing & Hash Tables: Introduction to hashing, hash functions, concept of collision and its resolution using open addressing and separate chaining, double hashing, rehashing.

Searching & Sorting: Searching an element using linear search and binary search techniques, Sorting arrays using bubble sort, selection sort, insertion sort, quick sort, merge sort, heap sort, shell sort and radix sort, complexities of searching & sorting algorithms.

References :

1. Sartaj Sahni, **Data Structures, Algorithms and Applications in C++,** Tata McGraw Hill.
2. Tenenbaum, Augenstein, & Langsam, **Data Structures using C and C++**, Prentice Hall of India.
3. R. S. Salaria, **Data Structures & Algorithms Using C++,** Khanna Book Publishing Co. (P) Ltd.
4. Seymour Lipschutz, **Data Structures**, Schaum's Outline Series, Tata McGraw Hill

Electronics Measurements and Instrumentation

ACEC-16904

Objectives

1. **To understand the basic instrumentation standards**
2. **To know about the basic measuring instruments**
3. **To understand the various display devices**
4. **To know about the data acquisition techniques**

Unit I Fundamentals: Generalized instrumentation system - Units and Standards, Calibration Methods, Standards of measurements, Classification of errors, error analysis. Static Characteristics- Accuracy, Precision, sensitivity, linearity, resolution, hysteresis, threshold, input impedance, loading effects etc. Dynamic Characteristics. Electronic Analog voltmeter: DC voltmeters-Choppers type-DC amplifier, solid state voltmeter, Differential voltmeter, peak responding voltmeter, True RMS voltmeter, calibration of DC voltmeters. Digital Voltmeter:- Introduction, Ramp Techniques, dual slope, integrating type DVM, Successive approximation type DVM, Resolution and sensitivity of digital meters, general specification of a DVM. CRO's 18 study of various stages in brief, measurement of voltage, current phase and frequency, special purpose oscilloscope.

Unit II Measuring Instruments: Principle of operation of galvanometer, PMMC, Moving Iron instruments, Resistance measurements using Wheatstone bridge, Kelvin Double Bridge, Ohm meter, AC bridges: Maxwell bridge, Maxwell wein bridge, Hey's Bridge, Schering Bridge, Anderson Bridge, Campbell Bridge. Unit IV Instrumentation for Generation and Analysis of Waveforms: Signal generators: Fixed and variable AF oscillators, AF sine and square wave generator, Function generator: Square and pulse generator, Sweep generator wave analyzer, harmonic distortion analyzer, spectrum analyzer, spectrum analysis.

Unit III Storage and Display Devices: Necessity of recorders, recording requirements, graphic recorders, strip chart recorders, magnetic tape recorders, digital tape recorders. Electronic indicating instruments, seven segment display, fourteen segmental display Nixie tube.

Unit IV Transducers and DATA Acquisition Systems: Strain gauge, LVDT, thermocouple, piezoelectric, crystal and photoelectric transducers and their applications. Data acquisition systems. Unit VII Telemetry: Introduction, method of data transmission, types of telemetry systems and applications.

Suggested Readings / Books:

Electrical and Electronic Measurements and Instrumentation, by K. SAWHNEY.

Electronic Instrumentation and Measurement Techniques, by D Cooper.

Electronic Instrumentation, by H.S. Kalsi, Tata McGraw Hill

Applied Electronics Instrumentation and measurement, David Buchla

Electronic Measurement & Instrumentation Lab

ACEC-16905

1. Measurement of Inductance by Maxwell's Bridge.
2. Measurement of small resistance by Kelvin's Bridge.
3. Measurement of Capacitance by Schering Bridge.
4. Measurement of Frequency by Wein Bridge.
5. Measurement of medium resistance by Wheat Stone's Bridge.
6. Determination of frequency & phase angle using C.R.O.
7. To find the Q of a coil using LCR-Q meter.
8. To determine output characteristic of a LVDT and determine its sensitivity.
9. Study characteristics of temperature transducer like Thermocouple, Thermistor and RTD with implementation of small project using signal conditioning circuit.
10. Study characteristics of Light transducer like Photovoltaic cell, Phototransistor and Pin Photodiode with implementation of small project using signal conditioning circuit.
11. To study input- output characteristics of a potentiometer and to use two potentiometers as an error detector.
12. To study transmitter- receiver characteristics of a synchro set to use the set as control component.

Programming in Python

ACCS – 16404

Internal Marks : 40	**L T P**
External Marks : 60	**3 - -**
Total Marks : 100	

Objectives : This course provides knowledge about the basics of python, its various constructs and concepts

Section – I:

Introduction to Python language, Advantages of Python in comparison with other Languages , Different methods of using python: Using python as a calculator, Setting up the Python development environment, Basic syntax, interactive shell, editing, saving, and running a script, Concept of data types, Random number, Real numbers, immutable variables, Python console Input / Output using input and print statements. Arithmetic operators and expressions, Conditions, Comparison operators, Logical Operators, Is and In operators, Control statements: If , If-else ,Nested if-else, Break and Continue, Loops: For ,While ,Nested loops

Section–II:

Function and Methods, Defining a function ,Calling a function ,Types of functions ,Function Arguments ,Anonymous functions , Recursion, Global and local variables Modules: Importing modules: Math module ,Random module , Tuples ,Arrays and Matrices, Sets ,Lists, Accessing list ,Operations ,Working with lists , Dictionaries: Introduction ,Accessing values in dictionaries , Data Frames, Date and Time Value Manipulation , String Handling, Unicode strings, Strings Manipulation:-compare strings, concatenation of strings, Slicing strings in python, converting strings to numbers and vice versa.

Section– III:

Classes and Object-oriented Programming: Abstract Data Types and Classes, Inheritance, Encapsulation and information hiding, Graphics, Search Algorithms, Sorting Algorithms, Hashtables, Plotting using PyLab, Plotting mortgages and extended examples,

Section– IV:

Exceptions and Assertions: Errors and Formatting, Handling exceptions, Exceptions as a control flow mechanism, Assertions File handling: Strings and text files; manipulating files and directories, os and sys modules; text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab-separated).

References :

5. Computers Today by Sanders.
6. Fundamentals of Computers TTTI Publication.
7. Learning Python by Mark Lutz, 5th Edition
8. Python Cookbook, by David Beazley , 3rd Edition

Programming in Java

ACCS- 16501

Internal Marks : 40 **L T P**

External Marks : 60 **3 - -**

Total Marks : 100

Objectives : This course provides knowledge about the basics of Java, its various constructs and concepts

Section- I

Overview of Java: Object oriented programming, Two paradigms, abstraction, the three OOP principles, Java class libraries
Data types, Variables and Arrays: Integers, floating-point types, characters, Boolean, Iterates, Variable, Data types and casting, automatic type promotion in expressions, arrays.
Operators and Control Statements: Arithmetic operators, bit wise operators, relational operators, Boolean logical operators, the ? Operator, operator precedence, Java's selection statements, iteration statements, jump statements.

Section -II
Introduction to Classes: Class fundamentals, declaring object reference variable, introducing methods, constructors, this keyword, garbage collection, the finalize () method.
Methods and Classes: Overloading methods, using objects as parameters, recursion.
Inheritance: Inheritance basics, using super, method overriding, dynamic method dispatch, using abstract Classes, using final with inheritance, Package and Interfaces, Package access protection, importing packages.
Exception Handling: Exception handling fundamentals, Exception types, Uncaught Exceptions Using try and catch, multiple catch clauses, nested try statements, throw, finally Java ‘s built-in exceptions, creating your own exception sub classes, using exceptions.

Section -III
Multithreaded Programming: The Java thread model, the main thread, creating thread, creating multiple threads, using is alive () and join (), Thread priorities, synchronization, inter thread communications, suspending resuming and stopping threads.
String Handling: The string constructors, string length, special string operations, character extraction, string comparison, searching string, modifying string, data conversion, changing the case of characters, string buffer.
I/O and Applets: I/O Basics, Reading Console Input, Writing Console Output, Reading and Writing Files, Applet Fundamentals, Applet Architecture, The HTML Applet tag, Passing parameters to Applets.

Section -IV
Networking: Networking basics, Java and the Net, TCP/IP Client Sockets URL, URL Connection, TCP/IP Server Sockets
Event Handling: Delegation Event Model, Event Listener Interfaces, Adapter Classes, Swings controls (JFrame, JTextField, JButton) & Layout Managers
Database Connectivity
JDBC drivers, DriverManager Class, Connection interface, Statement interface, Resultset interface, Query Execution

Refrences.

1. Herbert Schildt, The Complete Reference Java 2, McGraw-Hill.
2. Joycee Farrell, Java For Beginners, Cengage Learning
3. Deital and Deital, Java: How to Program, 6th Edition, Pearson Education.

Elective-III

Relational Database Management System Lab
ACCS – 16408

Internal Marks : 30 **L T P**

External Marks : 20 **- - 2**

Total Marks : 50

List of Practical

1. Introduction to SQL and installation of SQL Server / Oracle.
2. Creating Tables, Retrieval of Rows using Select Statement, Conditional Retrieval of Rows, Alter and Drop Statements. Update and Delete Statements.
3. Working with Null Values, Matching a Pattern from a Table, Ordering the Result of a Query, Functions: Character, Number, Date, and General Functions, Aggregate Functions, Grouping the Result of a Query, Set Operators, Nested Queries, Joins, Sequences.
4. Views, Database Security and Privileges: Grant and Revoke Commands, Commit and Rollback Commands.
5. PL/SQL Anonymous block, control statements
6. Cursors and its various types: Implicit and Explicit,
7. Exception handling, Functions and Procedures,
8. Packages, Triggers

Data Structures Lab

ACCS – 16304

Internal Marks : 30 **L T P**
External Marks : 20 **- - 2**
Total Marks : 50

Part A

1. Write a menu driven program that implement following operations (using separate functions) on a linear array:

- Insert a new element at end as well as at a given position
- Delete an element from a given whose value is given or whose position is given
- To find the location of a given element
- To display the elements of the linear array

2. Write a menu driven program that maintains a linear linked list whose elements are stored in on ascending order and implements the following operations (using separate functions):

- Insert a new element
- Delete an existing element
- Search an element
- Display all the elements

3. Write a program to demonstrate the use of stack (implemented using linear array) in converting arithmetic expression from infix notation to postfix notation.
4. Program to demonstrate the use of stack (implemented using linear linked lists) in evaluating arithmetic expression in postfix notation.
5. Program to demonstration the implementation of various operations on a linear queue represented using a linear array.
6. Program to demonstration the implementation of various operations on a circular queue represented using a linear array.
7. Program to demonstration the implementation of various operations on a queue represented using a linear linked list (linked queue).
8. Program to illustrate the implementation of different operations on a binary search tree.
9. Program to illustrate the traversal of graph using breadth-first search.
10. Program to illustrate the traversal of graph using depth-first search.
11. Program to sort an array of integers in ascending order using bubble sort.
12. Program to sort an array of integers in ascending order using selection sort.
13. Program to sort an array of integers in ascending order using insertion sort.
14. Program to sort an array of integers in ascending order using radix sort.
15. Program to sort an array of integers in ascending order using merge sort.
16. Program to sort an array of integers in ascending order using quick sort.
17. Program to sort an array of integers in ascending order using heap sort.
18. Program to sort an array of integers in ascending order using shell sort.
19. Program to demonstrate the use of linear search to search a given element in an array.
20. Program to demonstrate the use of binary search to search a given element in a sorted array in ascending order

Part B

1. Implementing Hashing based application.
2. Implement Shortest path in graphs (Travelling Salesman).

Operating Systems Lab
ACCS – 16406

Internal Marks : 30 **L T P**

External Marks : 20 **- - 2**

Total Marks : 50

Part A

1. Installation Process of various operating systems
2. Concept of Virtualization, Installation of Virtual Machine Software and Installation of Operating System on Virtual Machine.
3. Introduction to UNIX: Architecture, Features.
   Introductory Commands: date, cal, banner, write, mesg, who, passwd etc.
   Files and directories: pwd, mkdir, cd, ls,rmdir, chmod, chgrp, chown, cat, cp, mv, rm, cmp.
   Pipes, Filters and Redirection: Pipes, Filters, Redirection, Tees, head, tail, wc, sort, grep etc.
   Processes: ps, kill etc.
4. Vi editor: Introduction, entering text, deleting text, modifying text.

Part B

5. Shell Programming-I: Features of the shell, Shell as a programming language, Creating and executing shell scripts, shell variables, arithmetic and logical operators, tests. Decision making: if…fi, if….else….fi.
6. Shell programming-II: Looping structure: for loop, while loop, until loop, continue break loop, case…..esac construct.
7. Write a C/C++ program to simulate the following non-preemptive CPU scheduling algorithms to find turnaround time and waiting time.

   a. FCFS b. SJF c. Round Robin d. Priority

8. Write a C/C++ program to simulate page replacement algorithms

   a. FIFO b. Optimal c. LRU

Programming in Python Lab

ACCS – 16409

Internal Marks : 30 **L T P**

External Marks : 20 **- - 2**

Total Marks : 50

Part A

Machine Exercises based on:

1. Use of Data Types, Integer Arithmetic, Variables and Assignment
2. Use of Print Function, Branching programs, Strings and Input, Iteration
3. Implementation of Functions and Recursion
4. Application of Global variables
5. Functions as Objects
6. Implementation of Tuples, List and Dictionaries.
7. Implementation of Modules, Files and Dictionaries
8. Implementation of Array and Matrices
9. Use of Exception Handling Mechanisms
10. Applications of Classes and Object-oriented Programming
11. File I/O, Reading CSV and Excel Files, Reading Text Files, Writing and Saving to Files

Part B

Statistical Analysis using Python(Application of python in Big Data Analytics.

Programming in Java Lab

ACCS-16506

Internal Marks : 30
External Marks : 20
Total Marks : 50

L	T	P
-	-	2

PART A

1. Programs based on classes and constructors

2. Programs based on packages

3. Programs based on interfaces

4. Programs based on threads

5. Programs based on exception handling mechanisms

6. Programs based on basic file reading and writing methods

7. Programs based on sockets

8. Programs based on Applets

9. Programs based on swing GUI components and event handling

10. Programs based on JDBC Database Connectivity

PART-B

1. Create a chatting application.

2. Create a GUI application for maintaining department-wise student records.

3. Create a GUI application for maintaining department book bank books records.

7^{th} Semester Syllabus
ECE

Machine Learning

ACCS-16603

Internal Marks : 40

ExternalMarks : 60

Total Marks : 100

Part-I

Introduction : Why Machine learning, Examples of Machine Learning Problems, Applications of Machine Learning , Structure of Learning, Supervised vs. Unsupervised Learning , Statistical Learning: Bayesian Method, The Naive Bayes Classifier Learning versus Designing, Training versus Testing, Characteristics of Machine learning tasks, Predictive and descriptive tasks, Machine learning Models: Geometric Models, Logical Models, Probabilistic Models

Part-II

Classification: Binary Classification: - Assessing Classification performance , Multiclass Classification Linear Regression :Prediction using Linear Regression, Gradient Descent, Linear Regression with one variable, Linear Regression with multiple variables, Polynomial Regression, Feature Scaling/Selection, Support Vector Machines.

Part-III

Logistic Regression : Logistic Regression :Classification using Logistic Regression, Logistic Regression vs. Linear Regression, Logistic Regression with one variable and with multiple variables. Regularization: Regularization and its utility: The problem of Overfitting, Application of Regularization in Linear and Logistic Regression, Regularization and Bias/Variance.

Part-IV

Neural Networks (10 lectures): Introduction, Model Representation, Gradient Descent vs. Perceptron Training, Stochastic Gradient Descent, Multilayer Perceptrons, Multiclass Representation, Backpropagation Algorithm.

Trends in machine learning -Model and Symbols- Bagging and Boosting, Multitask learning, Online learning and Sequence Prediction, Data Streams and Active Learning, Deep Learning, Reinforcement Learning.

Recommended Books

1. EthemAlpaydin, "Introduction to Machine Learning" 2nd Edition, The MIT Press, 2009.

2. Tom M. Mitchell, "Machine Learning", First Edition by Tata McGraw-Hill Education, 2013.

3. Christopher M. Bishop, "Pattern Recognition and Machine Learning" by Springer, 2007.

4. Mevin P. Murphy, "Machine Learning: A Probabilistic Perspective" by The MIT Press, 2012.

Machine Learning Lab

ACCS-16606

Internal Marks : 30

External Marks : 20

Total Marks : 50

Part-A

1. Perform elementary mathematical operations in Octave/MATLAB like addition, multiplication, division and exponentiation.

2. Perform elementary logical operations in Octave/MATLAB (like OR, AND, Checking for Equality, NOT, XOR).

3. Create, initialize and display simple variables and simple strings and use simple formatting for variable.

4. Create/Define single dimension / multi-dimension arrays, and arrays with specific values like array of all ones, all zeros, array with random values within a range, or a diagonal matrix.

5. Use command to compute the size of a matrix, size/length of a particular row/column, load data from a text file, store matrix data to a text file, finding out variables and their features in the current scope.

6. Generate different subplots from a given plot and color plot data.

7. Perform vectorized implementation of simple matrix operation like finding the transpose of a matrix, adding, subtracting or multiplying two matrices.

8. Implement Linear Regression problem. For example, based on a dataset comprising of existing set of prices and area/size of the houses, predict the estimated price of a given house

9. Based on multiple features/variables perform Linear Regression. For example, based on a number of additional features like number of bedrooms, servant room, number of balconies, number of houses of years a house has been built – predict the price of a house.

Part-B

Implementation of Support Vector Machine

VLSI Design

ACEC-16702

Internal Marks: 40	L	T	P
External Marks: 60	3	1	0

Course Objectives:

1. To apply concepts of Boolean algebra for handling logical expressions.
2. To understand working and realization of combinational circuits.
3. To understand working flip-flops and use them in designing of sequential circuits.
4. To use HDL programming tool for simulation of combinational & sequential circuits.

SECTION - I

Introduction: Introduction to computer - aided design tools for digital systems, Hardware description languages, Introduction to VHDL, Data objects, Data types, Operators, Operator overloading, Entity and architecture declaration, Introduction to behavioral, dataflow and structural models.
VHDL Statements: Assignment statements, Sequential statements and process, Conditional statements, Case statements, Array and loops, Resolution functions, Concurrent statements.

SECTION - II

Combinational circuit design: Combinational circuit design such as such as multiplexers, encoders, decoders, code converters, comparators, and implementation of boolean functions using VHDL.

SECTION - III

Sequential circuit design and introduction to FSM and ASM: Review of flip flops and their modelling using VHDL, Introduction to FSM, Memory elements and their excitation functions, Capabilities and limitations of FSM, Introduction to ASM chart, its components and salient features.

SECTION - IV

Introduction to PLD's: Introduction to PLD's such as PAL, PLA , GAL, FPGA and CPLD.

Recommended Books:

1. Charles Roth, Digital System Design using VHDL, Tata McGraw Hill
2. A VHDL Primmer‖: Bhasker; Prentice Hall 1995.
3. VHDL - 3rd Edition - Douglas Perry - TMH

4. Fundamentals of Digital Logic with VHDL design - Stephen Brown, ZvonkoVranesic - TMH.
5. Digital Design Principles - William I Fletcher.

Lab VLSIDesign

ACEC - 16703

Internal Marks : 30

External Marks : 20

Total Marks : 50

Part - A: Experiments

1. Design of basic Gates: AND, OR, NOT
2. Design of universal gates
3. Design of 2:1 Mux using other basic gates
4. Design of 2 to 4 Decoder
5. Design of Half Adder, Full Adder
6. Design of Half Subtractor, Full Subtractor
7. Design of 3:8 Decoder
8. Design of 8:3 Priority Encoder
9. Design of 4 Bit Binary to Grey code Converter
10. Design of 4 Bit Binary to BCD Converter using sequential statement
11. Design an 8 Bit parity generator (for loop and Generic statements)
12. Design of 2's Complementary for 8-bit Binary number using Generate statements
13. Design of all type of Flip-Flops using (if-then-else) Sequential statements

Part - B: Lab Projects

1. Pulse Width Modulator based LED dimmer using 555 timer IC.
2. Up - down 4 - bit counter with seven - segment display.
3. Construction of combinational circuits using universal gates.
4. Bi - directional visitors counter
5. Traffic light control system
6. Any project based on Arduino platform

Elective-IV

Telecommunication Switching Networks

ACEC-16918

Internal Marks: 40	L	T	P
External Marks: 60	3	1	0

Objectives:

1. To learn Switching, Signaling and traffic in the context of telecommunication network.
2. To expose through the evolution of switching systems from manual and electro mechanical systems to stored-program-controlled digital systems.
3. To study signaling, packet switching and networks.
4. To analyze and evaluate fundamental telecommunication traffic models.

Section-I

Switching Systems and Telecommunications Traffic: Evolution of Telecommunications; Basics of a Switching System; Functions of a Switching System; Crossbar Switching-Principle of Crossbar Switching; Crossbar Switch Configurations; Cross-Point Technology; Crossbar Exchange Organization; A General Trunking; Electronic Switching; Digital Switching Systems, Fundamentals of Traffic Engineering, The Unit of Traffic; Congestion; Traffic Measurement; Traffic Performance; Loss Systems in Tandem, Probability of Delay

Section-II

Switching Networks: Single Stage Networks; Gradings-Principle; Two Stage Networks; Three Stage Networks; Four Stage Networks, Basic Time Division Space Switching; Basic Time Division Time Switching; Time Multiplexed Space Switching; Time Multiplexed Time Switching; Combination Switching; Control of Switching Systems: Call Processing Functions-Sequence of Operations; Signal Exchanges

Section-III

Signaling: Introduction; Customer Line Signaling; Audio Frequency Junctions and Trunk Circuits; PCM Signaling; Inter Register Signaling; Common Channel Signaling Principles-

General Signaling Networks; The High Level Data Link Control Protocol; Signal Units; The Signaling Information Field.

Section-IV

Packet Switching and Network: Introduction; Statistical Multiplexing; Local Area and Wide Area Networks-Bus Networks; Ring Networks; Comparison of Bus and Ring Networks; Optical Fiber Networks; Datagrams and Virtual Circuits; Routing; Flow Control; Standards; Frame Relay; ATM Switches. Analog Networks; Integrated Digital Networks; Integrated Services Digital Networks; Private Networks; Routing.

TEXT BOOKS

1. J. E Flood, "Telecommunications Switching and Traffic Networks," Pearson Education,
2. TyagarajanViswanathan, "Telecommunications Switching Systems and Networks," Prentice Hall of India Pvt.Ltd..

REFERENCE BOOKS

1. John C Bellamy, "Digital Telephony,N John Wiley International Student Edition,3rd Edition
2. Behrouz A. Forouzan, "Data Communications and Networking," TMH, 2nd Edition

TOTAL QUALITY MANAGEMENT

ACEC-16919

Internal Marks:40 **L T P**

External Marks: 60 **3 1 0**

Objectives:

1. To ensure excellence in manufacturing/service
2. To ensure the importance of just in time(JIT)
3. To explain the planning process
4. To know the skills of problem solving and defining problems

1. **Quality and Total Quality Management**; Excellence in manufacturing/service, factors of excellence, relevance of TQM. Concept and definition of quality; total quality control (TQC) and Total Quality Management(TQM), salient features of TQC and TQM. Total Quality Management Models, benefits of TQM.
2. **Just-in-time (JIT):** Definition: Elements, benefits, equipment layout for JIT system, Kanban system MRP (Material Requirement planning) vs JIT system, Waste elimination, workers involvement through JIT: JIT cause and effect chain, JIT implementation. Customer: Satisfaction, data collection and complaint, redressal mechanism.
3**. Planning Process**: Policy development and implementation; plan formulation and implementation. Process Management: Factors affecting process management, Quality function development (QFD), and quality assurance system. Total Employees Involvement (TEI): Empowering employees: team building; quality circles;reward and Recognition; education and training, Suggestion schemes.
4. **Problems solving Defining problem**; Problem identification and solving process; QC tools. Benchmarking definition, concept, process and types of benchmarking. Quality Systems: Concept of quality system standards: relevance and origin of ISO 9000;Benefits; Elements of ISO 9001, ISO 9002, ISO 9003.

BOOKS:

1. Total Quality Management by sunder Raju, Tata Mcgraw Hill
2. TQM for engineers by M.Zairi, Aditya Books
3. Total Quality Management Handbook by J.L. HradeskymMCGraw Hill
4. ISO 9000 quality System by Dalela and Saurabh, standard Publishers

Speech and Image Processing

ACEC-16920

Internal Marks:40 **L T P**

External Marks: 60 **3 1 0**

Objectives:

1. To know the basics of human speech and acoustic theory.
2. To know the process of speech signal processing
3. To know the process of Image Processing
4. To know the methods of image enhancement

1.Human speech and Acoustic theory: Review of human speech and Acoustic theory, nature of sound, harmonics, resonance measurement, virtual display. Music theory, pitch, duration, intervals, rhythm.Human speech production, the vocal tract, the Larynx, the source filter.

2. **Speech Signal Processing :**Speech signal processing-the phasor mode, Fourier transfer, DFT, FFT. The hardware use of FIR & IIR filters. Software, Elements of speech Synthesis-speech Recognition-speech in the computer-human interface.

3.Image Processing: Characterization of images as two-dimensional discrete fields, unitary transforms— DFT. Hadamard, slant and cosine transforms, compression schemes-KarhunenLoeve compression predictive coding schemes.

4**. Image Enhancement :**Image enhancement-gray scale modification, edge enhancement, restoration-Wiener filtering, constrained deconvolution, recursive filtering. Segmentation, edge detection, thresholding, textural properties, geometry and shape description.

Books Recommended: 1. Digital Signal Processing - by Proakis&Manolakis

2. Speech and Audio Processing for multimedia PC's - by Iain Murray

3. Digital Image Processing - by Keenneth R Castleman, Pearson Education Society.

4. Digital Image Processing - by Rafact Gonzalez and Richard E. Woods, Pearson Education Society.

5. Related IEEE/IEE publications

Computer Networks

ACEC – 16921

Internal Marks : 40L T P

External Marks : 603 1 0

Total Marks : 100

Objectives: This course provides knowledge about computer network related hardware and software using a layered architecture.

Section – I

Introduction to Computer Networks:

Data Communication System and its components, Data Flow, Computer network and its goals, Types of computer networks: LAN, MAN, WAN, Wireless and wired networks, broadcast and point to point networks, Network topologies, Network software: concept of layers, protocols, interfaces and services, ISO-OSI reference model, TCP/IP reference model.

Section – II

Physical Layer:

Concept of Analog& Digital Signal, Bandwidth, Encoding methods, Transmission Impairments: Attenuation, Distortion, Noise, Data rate limits : Nyquist formula, Shannon Formula, Multiplexing : Frequency Division, Time Division, Wavelength Division, Introduction to Transmission Media : Twisted pair, Coaxial cable, Fiber optics, Wireless transmission (radio, microwave, infrared), Switching: Circuit Switching, Message Switching ,Packet Switching & their comparisons.

Section – III

Data Link Layer:

Design issues, Framing, Error detection and correction codes: checksum, CRC, hamming code, Sliding Window Protocols: Stop & Wait ARQ, Go-back-N ARQ, Selective repeat ARQ, CSMA protocols.

Network Layer:

Design issues, IPv4 classsful and classless addressing, subnetting, Congestion control: Principles of Congestion Control, Congestion prevention policies, Leaky bucket and token bucket algorithms.

Section - IV

Transport Layer & Application Layer

Introduction to TCP/UDP protocols and their comparison. World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), Introduction to Network security, Introduction to protocols like SMTP,TFTP,RPC, ICMP,IGMP,TELNET,DHCP,ARP,RARP,HTTP,HTTPs.

References :

1. Computer Networks, 4th Edition, Pearson Education by Andrew S. Tanenbaum

2. Data Communication & Networking, 2nd Edition, Tata McGraw Hill. By Behrouz A. Forouzan.

3. Computer Networking, 3rd Edition, Pearson Education by James F. Kurose and Keith W. Ross

Satellite Communications
ACEC 16922

Internal Marks: 40 L T P
External Marks: 603 1 0
Total Marks: 100

Objective

- **To study the fundamental of satellite orbits, frequency band**
- **To study the operation of modulation, multiplexing channel coding.**
- **To determine the properties of earth station antenna & satellite antenna.**

Unit-I Introduction to Satellite Communication
Origin, Brief History, Current state and advantages of Satellite Communication, Active & Passive satellite, Orbital aspects of Satellite Communication, Angle of Evaluation, Propagation Delay, Orbital Spacing, System Performance

Unit-II Satellite Link Design
Link design equation, system noise temperature, C/N & G/T ratio, atmospheric &econospheric effects on link design, complete link design, interference effects on complete link design, earth station parameters, Earth space propagation effects, Frequency window, Free space loss, Atmospheric absorption, Rainfall Attenuation, Ionospheric scintillation, Telemetry, Tracking and command of satellites.

Unit-III Satellite Multiple Access System
FDMA techniques, SCPC & CSSB systems, TDMA frame structure, burst structure, frame efficiency, super-frame, frame acquisition & synchronization, TDMA vs FDMA, burst time plan, beam hopping, satellite switched, Erlang call congestion formula, DA-FDMA.

Unit-IV Laser and Satellite Communication& Satellite Services
INTELSAT, INSAT Series, VSAT, Weather forecasting, Remote sensing, LANDSAT, Satellite Navigation, Mobile satellite Service. Link analysis, optical satellite link Tx& Rx, Satellite, beam acquisition, tracking & pointing, cable channel frequency, head end equation, distribution of signal, n/w specifications and architecture, optical fibre CATV system. Front Fed paraboloid reflector antennas, offset fed antennas, Global Beam Antennas

Reference Books:
1. Trimothy Pratt, Charles W. Bostian, ―Satellite Communications‖, John Wiley & Sons, 1986.

2. Dr. D.C. Aggarwal, ―Satellite Communications‖, Khanna Publishers, 2001.

3. Dennis Roddy, ―Satellite Communications‖, McGraw Hil

Artificial Intelligence Techniques & Applications

ACEC -16923

Internal Marks: 40 L T P
External Marks: 60 3 1 0
Total Marks: 100

Objective

1. To study the artificial Intelligence system
2. To study the different model of Artificial neural network
3. To study the Fuzzy logic system

Unit-I Artificial Intelligence Techniques & Applications

Approaches to intelligent control, Architecture of intelligent control, Linguistic reasoning, Rulebase, Knowledge representation.

Unit-II: Artificial Neural Networks

Biological neuron, Artificial Neural Network, Mathematical Models, McCulloch Neural Model, Perceptron, Adaline and Madaline, Learning & Training in ANN, Hopfield Neural Network, SelfOrganizing Networks, Recurrent Networks, Associative memories

Unit-III: Fuzzy Logic System

Crisp Vs Fuzzy set theory, Membership functions, Fuzzy set operations, Fuzzy rules, Mamdani and Sugeno fuzzy inference systems, Defuzzification methods

Unit-IV: Artificial Neural Networks

Introduction and biological background of GA, String Encoding of chromosomes, Selection methods, Single & multi-point crossover operation, Mutation, Adjustment of strategy parameters such as Population size, Mutation & Crossover probabilities

Reference Books:

1. Jacek M. Zurada - Introduction to Artificial Neural Systems
2. S N Sivanandam, S N Deepa - Principles of Soft Computing, Wiley Publications
3. John Yen, Reza Langari - Fuzzy Logic Intelligence, Control, and Information

INTELLECTUAL PROPERTY RIGHTS AND PATENT SYSTEMS

ACEC-16924

Internal Marks: 40 **L T P**
External Marks: 60
Total Marks: 100 **4 1 0**

Objectives :
1.To understand the basic concept of intellectual property Rights.
2.To understand the Copyrights and related rights.
3. Basic knowledge of design rights.
4.Basic knowledge of the Patent System.

Section-A

Basic of intellectual property Rights: Introduction, Justification and Classification of intellectual property Rights, Classification of Treaties relating to intellectual property Rights, Stranded setting treaties, Global protection system treaties, and Classification treats.

Section-B

Patent System :History of the patent system, Patent on genetic resources, patents on chemicals, designs, patent based on software, business methods, internet patent, Exception to exclusive rights conferred to a patent holder, Remember for infringement of a patent.

Section-C

Copyrights and related rights :Nature and scope of protection of copyrights and related rights, Protection of copyrights in the digital media. Defense of fair use, Moral rights of the author, Copyrights societies, Remedies for infringement of Copyrights.

Section-D

Design rights: Nature and scope of protection of design rights, protection of layout designs (topographies) of integrated circuits, protection of undisclosed information, protection of trademarks, domain names and geographical indications.Drafting of a patent, Few Exercises on the preliminary rules on preparing an application seeking a patent.

Recommended Text Books:

1. Cornish W.R., Intellectual property: patents, copyright, trademarks and allied rights, sweet and Maxwell 2007.

2. P. Narayana, Intellectual property law, eastern law house 2nd ed., 2001.

Operating Systems

ACCS – 16402

Internal Marks : 40

External Marks : 60

Total Marks : 100

Objectives: This course should provide the students with good understanding of Operating System including its architecture and all its components. Good conceptions on all the subjects like processes, inter-process communication, semaphore, message passing, classical IPC problems, scheduling, memory management, file systems, security and protection mechanism, I/O hardware and software, deadlocks, etc. should be provided

Section – I

Introduction: Operating System and its Classification -Batch, Interactive, Multiprogramming, Time sharing, Real Time System, Multiprocessor Systems, Multithreaded Systems, System Protection, System Calls, Monolithic and Microkernel Systems, Operating System Components and Views, Operating System Functions and Services.

Section - II

Processes & Process Synchronization: Process Concept, Process States, Process State Transition Diagram, Process Control Block (PCB), Process Scheduling Concepts, Threads and its types, Principle of Concurrency, Producer / Consumer Problem, Critical Section Problem, Semaphores, Classical Problem in Concurrency: Readers Writers Problem.

Process Scheduling: Definition , Scheduling objectives ,Types of Schedulers ,Scheduling criteria : CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time (Definition only) , Scheduling algorithms : Pre emptive and Non , pre emptive , FCFS ,SJF ,RR , Multiprocessor scheduling : Types , Performance evaluation of the scheduling.

Deadlocks: Definition, Deadlock characteristics, Deadlock Prevention , Deadlock Avoidance :banker’s algorithm, Deadlock detection and Recovery.

Section – III

Memory Management :

Definition ,Logical and Physical address map , Memory allocation : Contiguous and noncontiguous Memory allocation Fixed and variable partition ,Internal and External fragmentation and compaction , Paging : Principle of operation ,Page allocation, Hardware support for paging ,Protection and sharing ,Disadvantages of paging, Segmentation, Basics of Virtual Memory ,Hardware and control structures ,Locality of reference, Page fault , Dirty page/Dirty bit ,Demand paging (Concepts only) ,Page Replacement policies : Optimal (OPT) , First in First Out (FIFO) and Least Recently used (LRU),Thrashing

Section – IV

Device Management & File System: Secondary Storage Structure, Disk Scheduling :FCFS,SCAN,C-SCAN,LOOK,CLOOK,SSTF , File concept, File organization and access mechanism, File directories, File system implementation issues, File system protection and security.

Protection and Security: Goals and Domain of Protection, Access Matrix, Program Threats: Virus, Worms, Trojan Horse, TrapDoor, Denial of Service Attacks

Introduction to Unix/Linux

References:

1. A Silberschatz and Peter B. Galvin, “Operating System Concepts" Addison Wesley Publishing Company
2. Dhamdhere, ―Systems Programming & Operating Systems” Tata McGraw Hill
3. Gary Nutt, “Operating Systems Concepts”, Pearson Education Ltd. 3rd Edition
4. 4. Operating System by Madnick Donovan

Antenna and Wave Propagation

ACEC-16926

Internal Marks: 40	L	T	P
External Marks: 60	3	1	0

Objectives:

1. To understand the performance parameters of Antenna
2. To get familiar with Linear Wire and Aperture Antenna
3. To understand antenna array with its classifications which are useful in communication system
4. To know about the ground and wave propagation

Section-I

Introduction and Fundamental Parameters of Antenna: Physical concept of Radiation in single wire, two wire, and dipole, Current Distribution on a thin wireantenna. Radiation Pattern, Radiation Power Density, Radiation intensity, Directivity, Gain, Antenna efficiency, Beamwidth, Bandwidth, Polarisation, Antenna Input Impedance, Elementary idea about self and mutual impedance, Radiation efficiency, Effective aperture, AntennaTemperature.

Section-II

Linear Wire Antennas and Aperture Antennas: Retarded potential, Infinitesimal dipole, Current distribution of short dipole and half wave dipole, Far-field, Radiating near-field and reactive near-field region, Monopole and Half wavedipole. Field Equivalence principle, Rectangular and circular apertureantennas,Hornantenna,Babinet'sPrinciple,SlotAntenna,Reflectorantenna, Microstrip Patch Antenna and Fractal Antenna

Section-III

Antenna Arrays: Array of two point sources, Array factor, n-element linear array with uniform amplitude and spacing, Analysis of Broadside array, Ordinary end-fire array, Hansen-woodyard end fire array, n-element linear array with non-uniformspacing,

,Analysis of Binomial and Dolph-Tschebyscheff array, Scanning Array,.

Section-IV

Ground wave and Ionospheric Propagation: Friis Free space equation, ,Reflection from earth's surface, Surface and Space wave propagation for vertical and horizontal dipole, Field strength of Space wave, Range of space wave propagation, Structure of ionosphere, propagation of radio waves through ionosphere, Refractive index of ionosphere, Reflection and refraction of waves by ionosphere, Critical frequency, Maximum usable frequency, Optimum working frequency, Lowest usable high frequency, virtual height, Skip Distance, Effect of earth's magneticfield.

Text Books:

1. Antenna Theory ,Balanis C.A ,John Wiley &sons.
2. antenna and wave propagation by K.D. Prasad, SatyaPrakashan

Reference Books:

1. Antenna and radio wave propagation, Collins R.E., McGrawHill.
2. Antenna Theory , Krauss J.D.,McGrawHill.