Far Western University
School of Engineering
Bachelor of Computer Engineering
(Course of Study)

Course Title: Basic Electrical Engineering **Credit: 3**
Course Code: **Number of periods per week: 3**
Nature of the Course: Theory + Practical **Total hours: 45**
Year: I, Semester: I
Level: B.E.
Degree: Bachelor's Degree in Computer Engineering

1. Course Introduction

This course introduces the concept of basic electrical engineering. It includes the basic circuit concepts of AC & DC, single phase and poly phase AC circuit, single phase transformers, power systems and electrical safety.

2. Objectives

After successfully completing the course activities, the student will be able to:

- Analyze electric circuits (AC & DC)
- Work on electrical instrumentation projects.
- Operate, distinguish and use electrical devices and transformers.
- Gain knowledge about the fundamentals of power systems, wiring and earthing.

3. 3. Specific Objectives and Contents

Specific Objectives	Contents
• To understand the basic concept of electricity and its role in the society.	**Unit I: Introduction (1 hr)** 1.1 Role of electricity in modern society 1.2 Energy sources and production 1.3 Consumption of electricity.
• To be familiar with DC Circuit. • To be familiar with different circuit elements and their characteristics. • To understand the concept of power and energy. • To be familiar with different types of sources.	**Unit II: DC Circuit Analysis (12 hrs)** 2.1 Circuits concepts (Lumped and distributed parameters) 2.2 Linear and non- linear parameter, passive and active circuits 2.3 Circuit elements (Resistance, Capacitance and Inductance), their properties and characteristics in a geometrical and hardware aspects, color coding 2.4 Series of parallel compilation of resistance, equivalent resistance and its calculation 2.5 Star-delta transformation 2.6 Concept of power, energy and its calculations 2.7 Short and open circuit 2.8 Ideal and non-ideal sources, source conversion 2.9 Voltage divider and current divider formula 2.10 Kirchhoff's current and voltage laws

• To be familiar with Kirchoff's current and voltage laws. • To be familiar with different network theorems. • To understand the concept of single phase AC circuit. • To be familiar with the steady response of RL, RC and RLC series circuit. • To understand the concept of poly phase AC circuit. • To understand the concept of transformer and its operation. • To understand the basic electrical safety related things. • To be familiar with wiring and earthing. • To understand the concept of power systems.. • To understand the concept of generator and its applications. • To understand the operation of hydroplant.	2.11 Nodal Method and Mesh method of network analysis (without dependent source) 2.12 Network theorems (i.e. Superposition Thevenin's, Norton's), Maximum power transfer. **Unit III: Single Phase AC Circuit Analysis (10 hrs)** 3.1 Generation of EMF by electromagnetic induction 3.2 Generation of alternating voltage, Sinusoidal Functions-terminology (phase, phase angle, amplitude, frequency, peak to peak value), average value and RMS or effective value of any type of alternating voltage or current waveform 3.3 Phase algebra, power triangle, impedance triangle, steady state response of circuits (RL, RC, RLC series and parallel) and concept about admittance, impedance reactance and its triangle), instantaneous power, average real-power, reactive power, power factor and significance of power factor, resonance in series and parallel RLC circuit. bandwidth, effect of Q-factor in resonance. **Unit IV: Poly-Phase AC Circuit Analysis (6 hrs)** 4.1 Concept of a balanced three phase supply 4.2 Generation and differences between single phase over three phase system 4.3 Star & delta connected supply and load circuits. 4.4 Line and phase voltage/current relations, power measurement, concept of three-phase power and its measurement by single and two wattmeter method. **Unit V: Transformers (4 hrs)** 5.1 Ideal and practical transformer 5.2 EMF equation, equivalent circuit 5.3 Losses in transformers 5.4 Regulation and efficiency. **Unit VI: Electrical Safety and Wiring (5 hrs)** 6.1 Safety measures in electrical system 6.2 Types of wiring, wiring accessories 6.3 Staircase, fluorescent lamps and corridor wiring 6.4 Basic principles of earthing 6.5 Types of earthing **Unit VII: Introduction of Power System (4 hrs)** 7.1 general layout of electrical power system 7.2 generation, transmission & distribution of power. 7.3 Standard transmission and distribution voltages 7.4 Concept of grid. **Unit VIII. Case Study (3 hrs)**

	In this chapter students will study the operation of any existing hydropower plant of Nepal, prepare a report and present it.

Laboratory Work:

1. To measure current, voltage and power across the passive components.
2. To verify Kirchhoff's Current Law (KCL) & Kirchhoff's Voltage Law (KVL).
3. To verify Thevenin's Theorem.
4. To verify maximum power transfer theorem.
5. To verify superposition theorem.
6. To measure three phase power by using two wattmeter.
7. To determine efficiency and voltage regulation of a single-phase transformer by direct loading.
8. To study open circuits & short circuits tests on a single phase transformer.

Prescribed Text

1. *"Introduction of Electric circuit":*Albert Boylested, Prentice Hall of India Private Limited, New Delhi.
2. *"First Course in Electrical Engineering":* S.N. Tiwari, , att. Wheeler and Co. Ltd., Allabhad.

References

1. *"A Text Book of Electrical Technology":* B.L Theraja & A.K. Theraja, S. Chand Publication
2. "*Basic Electrical Engineering*": Mehta.V.K, Rohit Mehta, Chand. S & Co.
3. "*ABC of Electrical Engineering*": Jain & Jain
4. "*Basic Electrical Engineering*" : Kothari.D.P and Nagrath.I.J, Tata McGraw -Hill.

Far Western University

School of Engineering

Bachelor of Computer Engineering

(Course of Study)

Course Title: Engineering Physics	**Credit: 3**
Course Code:	**Number of lecture/week: 3**
Nature of the Course: Theory	**Tutorial/week:1**
Year/Semester: I/I	**Total hours: 45**

1. Course Description

The course intends to enable the students to be acquainted with the basic concepts and principles of physics with the present need and applications.

2. Course Objectives

At the end of this course the students should be able:

- to provide the basic concept and knowledge of physics.
- to apply this knowledge base for studying major courses.

- to introduce the concepts and methods of mechanics and optics needed for application in various areas.
- to provide the basic concepts of electronic circuits.

Specific Objectives	**Contents**
• Understand the oscillations • Know the related relations and their use	**Oscillation: 4** Introduction, Types of mechanical oscillations (free, damped and forced), EM oscillation (types and examples only)
• Understand the combination of lenses • Know the cardinal points • Understand aberration	**Geometrical Optics 3** Lens, combination of lenses, cardinal points, chromatic aberration
• Understand the interference and formation of maxima and minima • Understand Newton's ring pattern and variation of their radii • Know the working of Michelson's interferometer • Understand the difference between interference and diffraction • Understand the distribution of energy by diffraction • Know the working and use of diffraction • Understand X-ray diffraction and their applications in crystallography • Understand the concept of double refraction, role of half and quarter wave plates • Understand optical activity and specific rotation	**Physical Optics (12)** **Interference:** Young's experiment, interference in thin films, Newton's rings, Michelson's interferometer **Diffraction:** Fresnel and Fraunhoffer's diffraction, Diffraction at a single slit, diffraction grating, X-ray diffraction and its use in solids **Polarization:** Double refraction, Nichol prism, half wave and quarter wave plates, optical activity and specific rotation
• Understand the principles of laser and know their applications • Know the construction and working of He-Ne laser • Know the principle and applications optical fibre	**Laser and Fibre Optics (3)** Principles and uses of laser, He-Ne laser, optical fibre and its applications
• Understand coulomb's law • Understand the concepts of electric field and potential • Understand the principle of capacitor and the role of dielectric • Know charging and discharging of capacitors	**Electrostatics (6)** Coubomb's law, electric field and potential, capacitors, capacitors with dielectric, charging and discharging of capacitors
• Understand Ohm's law. • Know the difference between semiconductors and superconductors	**Electromagnetism (10)**

• Understand the force and torque due to magnetic field • Understand electromagnetic induction, self inductance and mutual inductance • Understand Maxwell's equations • Know equation of continuity	Ohm's law, semiconductors and superconductors, magnetic force and torque, Faraday' laws, Induction and energy transformation, induced field, LCR circuits. Maxwell's equations, E and B fields, continuity equation.
• Understand types and properties of different waves • Understand the concept of energy quantization • Understand Schrodinger wave equation • Develop the concept of barrier tunnel and potential well	**Matter waves and Energy (6)** Waves, electron and matter waves, quantization of energy, Schrodinger wave equation, Probability distribution, one dimensional potential well, barrier tunneling.
• To understand the band theory and types of semiconductor. • understand the biasing of diodes and transistors, their characteristics • understand the function of FET • understand different logic gates	**Electronics (6)** Types of semiconductor, Diodes, Bipolar Transistor (BJT), Field effect transistor (FET), Logic gates, RTL and TTL gates, Memory circuits.

Prescribed Text

Physics (Part I and II): Robert Resnick and David Halliday, Wiley Eastern Limited

References

1. *Fundamentals of Physics*: Haliday, Resnick and Walker, John Wiley and Sons
2. *Modern Engineering Physics:* A. S. Vasudeva, S. Chand & Co
3. *A Text Book of Optics: Brij Lal and* Subramanyam, S. Chand & Co
4. *Optics:*A. K. Ghatak, Tata Mc-Graw Hill
5. *Engineering Physics:* R.K Gaur and S.L. Gupta, Dhanpat Publisher
6. *Electronic Principles*, 7th ed., A. P. Malvino, Tata McGraw Hill Publishing House, New Delhi
7. *Modern Digital Electronics*, 2nd ed., R. P. Jain, Tata McGraw Hill Publishing House, New Delhi.

Practical

1. To determination the acceleration due to gravity and radius of gyration of a bar pendulum.
2. To verify Hooke's law and determine Young's modulus of a material given by bending beam method.
3. To determine the refractive index of material of given prism using spectrometer.
4. To determine wavelength of sodium light by Newton's rings.
5. To determine the specific rotation of sugar solution using polarimeter.
6. To determine wavelength of given light (He-ne laser light) and thickness of a material by diffraction method.
7. To determine the capacitance of a capacitor by charging and discharging through a resistor.
8. To study a relation between current and frequency in an LCR series circuit, also find the resonant frequency and quality factor.

9. To determine the dielectric constant of a given substance and study its variation with frequency by resonance method.
10. To determine the susceptibility of a solution of given material by quinces method.
11. To study the electric field mapping.
12. To construct and verify truth tables of different gates (AND, OR, NOT, NAND, NOR, EX-OR).

Far Western University

School of Engineering

Bachelor of Computer Engineering

(Course of Study)

Course Title: Engineering Drawing	**Credit: 2**
Course Code:AR111	**Number of Periods Per week: 1T+ 3P=4**
Nature of the Course: Theory + Practical	**Practical Assignments Per week: at least 1**
Year/Semester: I/I	**Total hours: 15+45**

1. Course Introduction:

The course intends to enable the students to be acquainted with the basic concepts and principles of drawing. Students will be familiarized with the fundamentals of drawing, instruments, symbols, conventions and current practices of different types of drawings.

2. Objectives:

To develop basic concept of projection with reference to points, lines, planes and geometrical solids and enhance the skills of engineering graphic technology to the students. It also aims to develop sketching and drafting skill to facilitate communication.

At the end of this course, students should be able:

- To acquire sufficient knowledge of drafting
- To apply knowledge for studying major courses in BE

3. Specific Objectives and Contents

Specific Objectives	Contents
• Use of different instruments to draw technical drawing	**Unit I: Instrumental Drawing; Practices & Techniques 2 (hrs)** 1.1 Equipment and Materials; Description of drawing instruments, auxiliary equipment and drawing materials 1.2 Techniques of Instrumental Drawing, Pencil sharpening, securing paper, proper use of T- squares, triangles, scales, dividers, and compasses, erasing shields, French curves, inking pens.
• Practice of free hand writing letters and numbers.	**Unit II: Freehand Technical lettering 2(hrs)** 2.1 Lettering strokes, letter proportions, use of pencils and pens, uniformity and appearance of letters, freehand techniques, inclined and vertical letters and numerals, upper and lower cases, Standard English lettering forms

• Use of dimension technique and dimension conventions	**Unit III: Dimensioning** **2(hrs)** 3.1 Fundamentals and techniques; Size and location dimensioning ; measurement units; SI conventions 3.2 General dimensioning practices; placement of dimensions; aligned and unidirectional
• Types of scale • Application of scale and	**Unit IV: Engineering Scale:** **2(hrs)** 4.1 Use of scales, , reducing and enlarging drawings 4.2 Representative Factor, 4.3 Construction and Types of Scales, Plain Scales, Diagonal Scales, Vernier Scales, Comparative Scales 4.4 Scale of Chords
• Enhance skills and technique in 2D and 3D geometry • Applications of conic sections, space curves, and other engineering curves • Generate ideas about solids.	**Unit V Applied Geometry** **6 (Hrs)** 5.1 Plane Geometrical construction; Bisecting and trisecting lines and angles, proportional division of lines, construction of angles, triangles, squares, and polygons. Construction using tangents and circular arcs 5.2 Methods of drawing standard curves such as ellipses, parabolas, hyperbolas, involutes, spirals, cycloid, helices (cylindrical and conical). 5.3 Solid Geometrical Construction; Classification and pictorial representation of solid regular objects such as; Prisms: square, cubical, triangular and oblique Cylinders: right and oblique; Cones: right and oblique, Pyramid : square, triangular, oblique, truncated, Doubly-Curved and Warped Surfaces: Sphere, Torus, oblate ellipsoid, serpentine, paraboloid, hyperboloid
• Explain the history of Descriptive Geometry • Understand the way of locating point, line, plane and solid in space • Develop idea of solving geometry when given verbally. • Calculate angle and length of lines and planes when they are in space	**Unit VI Basic Descriptive Geometry** **12 (Hrs.)** 6.1 Introduction: Application of descriptive geometry, principles to the solution of problems involving positioning of objects in three-dimensional space 6.2 The projection of points, lines, planes and solid in space 6.3 Projection of Solids Placed in different positions, 6.4 Parallel Lines 6.5 True Length of Lines; horizontal , inclined and oblique lines 6.6 Perpendicular Lines 6.7 Bearing of a Line 6.8 Point view or End View of a Line 6.9 Shortest Distance from a point to a Line 6.10 Principal Lines of a plane 6.11 Edge View of a plane 6.12 True shape of an Oblique plane 6.13 Intersection of a Line and a plane 6.14 Angle Between a Line and a plane 6.15 Angle Between Two Intersecting Lines 6.16 Angle Between Two Non- Intersecting (Skew) lines 6.17 Angle between two planes 6.18 Shortest Distance Between Two Skew Lines

• Understand the classification projection • Learn the symbol of projection • Understand the process of changing 3D figure into 2D figure • Learn the idea of hidden lines for unseen parts	**Unit VII Theory of Projection and Multi view (Orthographic) Projection Drawing 12 (hrs)** 7.1 Common types of projections – Pictorial (Perspective, Isometric, Oblique) and Orthographic Projection 7.2 System of orthographic projection: First angle projection and Third angle projection 7.3 Principal Views; Methods for obtaining orthographic views ;Projection of lines, angles and plane surfaces; analysis in three views 7.4 Projection of curved lines and surfaces, object orientation and selection of views for best representation; full and hidden lines 7.5 Orthographic Drawings; making an orthographic drawing, visualizing objects from the given views 7.6 Interpretation of adjacent areas, true-length lines, representation of holes, conventional practices
• Develop the concept of cutting solids by an imaginary cutting plane and revealing the unseen parts from the solid • Use of section lines • Conventions for hidden lines, holes, ribs, spokes	**Unit VIII Sectional Views 4 (Hrs.)** 8.1 Full Section 8.2 Half Section 8.3 Broken Section 8.4 Revolved Section 8.5 Removed (Detail) Section 8.6 Phantom or Hidden Section 8.7 Auxiliary Sectional views 8.8 Specifying Cutting Planes for Section 8.9 Conventions for hidden lines, holes
• Develop the concept of development of outer surface of solids • Develop an idea of penetration of solids into planes • Understand the process of generation of curves on the surface of when different solids get intersected / penetrated	**Unit IX Developments and Intersections 18(Hrs.)** 9.1 Introduction and Projection of Solids 9.2 Developments: General Concepts and Practical Consideration; Developments of a right or oblique prism, cylinder, pyramid and cone ; Development of a truncated pyramid and cone; Triangulation method for approximately developed surfaces; Transition pieces for connecting different shapes; Development of a sphere 9.3 Intersections & Interpretation : (i) Lines of intersection of geometric surfaces (ii) Piercing point of a line and a geometric solid (iii)Intersection lines of two planes (iv) Intersection of prisms and pyramids (v) Intersection of a cylinder and an oblique plane (vi) Intersection of a sphere and an oblique plane (vii)Constructing a development using auxiliary views (viii) Intersection of two cylinders (ix) Intersection of a cylinder and a cone

LABORATORY

1. Freehand technical lettering and use of drawing instruments
2. Freehand technical lettering and use of drawing instruments (cont)
3. Dimensioning and Scaling
4. Applied geometrical drawing I

5. Applied geometrical drawing I
6. Descriptive geometry I
7. Descriptive geometry II
8. Descriptive geometry III
9. Projection and Multi view Drawing I
10. Projection and Multi view Drawing II
11. Sectional Views I
12. Sectional Views II
13. Developments of Surface I
14. Developments of Surface II
15. Effect of Intersections

Recommended Books:

- Bhatt N.D. (2011) *Elementary Engineering drawing*, Charotar Publishing House.
- Dhawan,R.K. (2006). *A Text book of Engineering Drawing*. S. Chand and Company Limited , India.
- French T E., Vierck C.J. and Foster R.J (1981). *Engineering Drawing and Graphic Technology*, McGraw Hill.
- Luintel, M. C. *Engineering Drawing (Vol I),* Athrai Publication (P) Limited.
- Luzadder W.J. (1981). *Fundamentals of Engineering Drawing,* Prentice Hall.

Course Title: Engineering Mathematics I	**Credit: 3**
Course Code.:	**Number of lecture/week: 4**
Nature of the Course: Theory	**Tutorial/week: 2**
Year/Semester: First/First	**Total hours: 45**

Course Objective:

The basic objective of the course is to provide a sound knowledge of differential calculus, integral calculus, two dimensional analytical geometry and vector algebra. After learning the course one may enhance the fundamental concepts on Mathematics and able to study the further courses of the subject which are more applicable in Engineering. Detail of the course is as follows:

Course Contents:

Part 1(Differential Calculus)

1.1 Higher Order Derivative:Review of limit, continuity and derivative. Successive differentiation of some special functions, higher order derivative and Leibnitz rule for derivative of product of two functions. (4 hrs.)

1.2 Mean Value Theorems: Rolle's Theorem and Lagrange's Mean Value Theorem (Statement and proof), their geometry and applications. Cauchy Mean Value Theorem (statement and proof) with applications. Taylor's and Maclaurin's infinite series for real valued functions (without derivation) with examples. (5 hrs.)

1.3 Indeterminate forms: L' Hospital rule and its application to evaluate the limit of a function.

(2 hrs.)

1.4 Asymptotes: Types (horizontal, vertical and oblique) and equation of asymptotes to the curve represented by algebraic polynomial equations (2 hrs.)

1.5 Curvature: concept of curvature and its radius. Radius of curvature of Cartesian, polar, parametric and pedal curves. (2 hrs.)

Part 2 (Integral Calculus)

2.1 Indefinite Integrals: Evaluation of indefinite integrals by using standard methods (methods of substitution, partial fraction and integration by parts)(3 hrs)

2.2Definite Integrals: Definite integral with properties.(3 hrs)

2.3 Beta-Gamma function and Reduction formulae. (3 hrs.)

2.4 Integration by summation method of some standard functions (2 hrs.)

2.5 Improper integrals and Cauchy principal value. (2 hrs.)

2.6 Techniques of curve sketching (Cartesian and polar form) (2 hrs)

2.7 Application of integration: Arc length, Area between curves, Volume of solid of revolution. (3 hrs.)

Part 3(Two Dimensional Analytical Geometry)

3.1 Review of Standard equation of parabola, ellipse and hyperbola in Cartesian form, equation of tangent and normal to those curves and problems related to tangent and normal only. (4 hrs.)

3.2 polar equation of conic section and their classification in terms of eccentricity. (2 hrs.)

Part 4(Vector Algebra)

4.1 Review of scalar and vector product of two vectors and their geometrical interpretation.

(1 hr.)

4.2 Scalar product of three and four vectors and their geometrical interpretation with properties. (2 hrs.)

4.3 Vector product of three and four vectors, Reciprocal system of vectors of three non-coplanar vectors. (3 hrs.)

References Books

1. E.Kreyszig, *Advanced Engineering mathematics*, Wiley- Eastern,Publication.
2. N. P. Bali, Dr. Manish Goyal, *A text book of engineering mathematics,* Laxmi Publication (P). LTD.
3. Thomas George B. and Finney. Ross L. ,*Calculus and Analytical Geometry*, Pearson Education

Far Western University
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(Course of Study)

Course Title: Computer Programming **Credit: 3**
Course Code: CT 115 **Number of lecture/week: 3**
Year/Semester: First/First **Tutorial/week: 1**
Level: Bachelor of Engineering (Computer) **Total hours: 45**

Course Objective: To acquaint the student with computer software and high level programming languages. Emphasis will be given on developing computer programming skills using C.

Course Outline:

Specific Objectives	Contents (UNIT/CHAPTER)	Duration
	1. Introduction to Programming 1.1. Computer software 1.2. Classification of Computer software 1.4. Generation of programming languages 1.5. Categorization of high level languages	(2 hours)
	2. Problem solving using Computer 2.1. Problem analysis 2.2. Algorithm development and Flowchart 2.3. Compilation and Execution 2.4. Debugging and Testing 2.5. Programming Documentation	(2 hours)
	3. Introduction to C 3.1. Introduction 3.2. Structure of C Program 3.3. Character set, Keywords, and Identifiers 3.4. Data types in C 3.5. Preprocessor Directives 3.6. Constants and Variables 3.7. Operators in C 3.8. Statements and Expressions 3.9. Type Conversion and Type Casting	(4 hours)
	4. Input and Output 4.1. Unformatted input/output 4.2. Formatted input/output 4.3. Programs using input/output statements	(2 hours)
	5. Decision/Control statements and looping statements 5.1. Introduction 5.2. The ***goto, if, if … … else, switch*** statements 5.3. The ***while, do … while, for*** statements 5.4. Nested loops	(6 hours)

	5.5. Break and Continue Statements	
	6. Functions 6.1. Introduction 6.2. Types of function 6.3. Function Prototypes 6.4. Function definition and return statement 6.5. Function invocation 6.6. Passing Parameters to the function 6.7. Recursive Functions	(6 hours)
	7. Arrays and Strings 7.1. Defining an Array 7.2. Accessing Array Elements 7.3. One-dimensional Arrays 7.4. Multi-dimensional Arrays 7.5. Strings and string manipulation 7.6. Passing Array and String to function	(8 hours)
	8. Structures 8.1. Introduction 8.2. Processing a Structure 8.3. Arrays of Structures 8.4. Arrays within Structures 8.5. Structures and Function 8.6. Self Referential Structures	(5 hours)
	9. Pointers 9.1. Introduction 9.2. Pointer declaration 9.3. Pointer arithmetic 9.4. Pointer and Array 9.5. Passing Pointers to a Function 9.6. Pointers and Strings 9.7. Dynamic Memory Allocation	(5 hours)
	10. Data Files 10.1. Defining opening and closing a file 10.2. Input/Output operations on Files 10.3. Error handling during input/output operations	(5 hours)

Project work:

Students must submit mini project at the end of course

Tutorials:

A number of tutorial assignments can be given for fluency in programming.

Practical:

Minimum 12 sets of computer programs in C

References:

1. Reema Thareja, "*Introduction to C Programming"*, Oxford University Press
2. Kelly & Pohl, "*A Book on C*", Benjamin/Cumming
3. Brian W. Keringhan & Dennis M. Ritchie, "*The 'C' Programming Language*", PHI
4. Bryons S. Gotterfried, "*Programming with C*", TMH
5. Yashavant Kanetkar, "*Let Us C*", BPB

Evaluation scheme:

The questions will cover all the chapters in the syllabus. The evaluation scheme will be as possible as indicated in the table below:

Unit / Chapter	Hours	Marks Distribution* (Tentative)
1	2	2
2	2	3
3	4	5
4	2	3
5	6	8
6	6	8
7	8	10
8	5	7
9	5	7
10	5	7

* There may be minor variation in marks distribution.

Internal Evaluation (Marks Weightage)		Final Exam (Marks Weightage)	Total	Remarks
Assessment/Class Performance/Attendance/Quizzes/ Tutorials/Presentation	Practical			
20	20	60	100	Internal marks will be of 20 if there are practicals in the course (20 marks will be allocated for Practicals)

Far Western University

School of Engineering

Bachelor of Computer Engineering

(Course of Study)

Course Title: Workshop Technology	**Credit: 1**
Course Code.:	**Number of lecture/week: 1**
Nature of the Course: Theory	**Tutorial/week: 3**
Year/Semester: I/I	**Total hours: 15**

1. Course description:

This subject deals with the identification, uses and care of basic hand tools, measuring instrument, power tools, imparting knowledge and skill in the field of mechanical engineering and apply safety precautions in mechanical work while manufacturing simple metal components and articles.

2. Course Objectives:

Make the students familiar with theoretical and applied field of mechanical engineering to:

1. Apply the safety rules in the workshop.
2. Identify the tools, measuring instrument and power tools.
3. Joining the metal by different processes by hand.
4. Maintenance and care of the measuring instrument, hand tools and power tools.
5. Operate various machine tools for producing simple metal components and articles
6. Acquire knowledge and practice on foundry, forging and welding

Evaluation

	Theory	Practical	Total
Sessional	-	50	50
Final	-	-	-
Total	-	50	50

3. Specific Objectives and Contents

Specific Objectives	**Contents**
➢ Basic introduction and on various workshop tools	**Unit I: General safety Considerations (2 hrs)**
➢ Knowledge of safety requirements during handling of various workshop tools.	Introduction and general safety considerations during handling of Bench Tools, Hammers, Screw Drivers, Punches, Chisels, Scrapers, Scribers, Files, Pliers and Cutters, Wrenches, Hacksaw, Bench Vice, Hand drill, Taps and Dies, Hand Shears, Rules, Tapes and Squares, Soldering Iron, Rivets.
➢ Introduction to hand working operations Soldering,	**Unit II: Hand Working Operations (1 hr)** Brief introduction on various hand working operations - Sawing, Filing, Threading, Scribing, Shearing, Riveting.
➢ Familiar with various measuring and gauging tools.	**Unit III: Measuring and Gauging(1 hr)** Introduction

Semi – Precision Tools – Calipers, depth Gauge, Feeler Gauge
Precision Tools– Micrometers, Vernier Calipers, Vernier Height Gauge, Telescopic Gauge, Hole Gauge, Bevel Protractor, Dial Indicator, Gauge Blocks and Surface Plate

- Familiar with drills and drilling processes

Unit IV: Drills and Drilling Processes (1 hr)
Types of drilling machines, Work holding devices and accessories, Cutting tools, Geometry of Drill Bits, Grinding of Drill Bits, Operations- Drilling, Counter-boring, Counter-sinking, Reaming, Honing, Lapping, Cutting speeds, Drilling safety.

- Able to perform various machining operations.

Unit V: Machine Tools (4 hours)
General safety considerations, Introduction: Engine Lathes, Physical Construction, Types and operation of Lathe Machine- Facing, Turning, Threading
Shapers: Introduction, Types and Physical Construction of Shapers, General Applications
Milling machine: Introduction and Types of Milling machine, Physical construction, Milling cutters- Plain, Side, Angle, End, Form. Work holding devices, Cutter holding devices.
Grinding Machines: Abrasives, Bonds, Grinding wheels. Round Grinders- Portable grinders, Bench Grinders, Swing Frame Grinders, Abrasive Belt Grinders and Precision Grinder-Cylindrical grinders and Surface Grinders

- Knowledge of different metals and their use as tool material
- Knowledge of various heat treatment processes and their operation.

Unit VI: Material Properties (2 hours)
Tool materials- Low, medium and high carbon steels, hot and cold rolled steels, Alloy steels, Carbide and Ceramic materials.
Heat treating methods for steels- Annealing, Tempering, Normalizing, Hardening and Quenching
Non-ferrous metals- Brass, Bronze, Aluminum- Comparative properties

- Familiar with sheet metal tools and sheet metal works.
- Able to perform sheet metal operations-

Unit VII: Sheet Metal Works(1 hr)
Introduction to sheet metal works and sheet metal tools, Marking and Layout Operations and sheet metal Bending, Cutting, Rolling

- Familiar with foundry tools and foundry practice.
- Able to perform foundry operation Pattern making, Core Making, Melting Furnace- Cupola and Sand Casting Process

Unit VIII: Foundry Practice(1 hr)
Introduction to foundry tools and foundry process,

- Familiar with forging tools and forging practice.

Unit IX: Forging Practice (1hr)

➢ Able to perform forging operation.	Introduction to forging tools- Forging Presses and Hammers, Forging operations- Upsetting, Drawing, Cutting, Bending, Punching
➢ Familiar with various types of metal joining process ➢ Able to perform soldering, brazing, gas welding	**Unit X: Metal Joining(1 hr)** Safety considerations and introduction to Soldering, Brazing and Welding- Gas Welding, Arc Welding, Resistance Welding, Tungsten Gas Welding(TIG), Metal Inert Gas Welding(MIG)

References

1. "Shop Theory", J. Anderson and E. E. Tatro, McGraw – Hill, 5th Edition, 1942

2. "Machine shop operations and setups", O. D. Lascoe, C. A. Nelson and H. W. Porter, American Technical society, 1973

3. "Machine shop Practice – Vol. I" , Industrial Press, New York, 1971

4. "Machine shop Practice – Vol. I" , Industrial Press, New York, 1971

5. " Technology of Machine Tools", Mc Graw Hill – Ryerson, 3rd Edition

6. "Machinery's Handbook", Oberg, Jones and Horton, 23rd Edition, Industrial Press, New York.

7. "Elements of Workshop Technology – Vol. I (Manufacturing Processes)" – S. K. Hajra Choudhury and A. K. Hajra Choudhury – Media Promoters and Publishers Pvt. Ltd. , Bombay, INDIA, Tenth Edition, 1993

8. "Elements of Workshop Technology – Vol. II: (Machine Tools)" – S. K. Hajra Choudhury, S. K. Bose and A. K. Hajra Choudhury – Media Promoters and Publishers Pvt. Ltd. , Bombay, INDIA, Eight Edition, 1988

9. "A Course in Workshop Technology – Vol. I" – Prof. B. S. Raghuwanshi – Dhanpat Rai and Co. (P) Ltd, Delhi, INDIA, Ninth Edition, 2002

10. "A Course in Workshop Technology – Vol. II" – Prof. B. S. Raghuwanshi – Dhanpat Rai and Co. (P) Ltd, Delhi, INDIA, Ninth Edition, 2002

11. "Workshop Technology – Vol. I" – H. S. Bawa – Tata Mc – Graw Hill publishing company Limited, New Delhi, INDIA,

12. "Workshop Technology – Vol. II" – H. S. Bawa – Tata Mc – Graw Hill publishing company Limited, New Delhi, INDIA,

A text book of Workshop Technology – R. S. Khurmi and J. K. Gupta – S. Chand and Company Ltd, New Delhi. India

Workshop Practice: 3 hours/week; 15 weeks

Bench Tools and hand operations: Measuring, Marking, Layout, Cutting, Filling, Drilling, Tapping, Assembly

1. Bench Tools and hand operations: (Contd.)

2. Drilling machines

3. Measuring and Gauging Instruments

4. Engine lathe: Basic operations such as Plain turning, facing, cutting off, knurling.

5. Engine lathe: Taper turning, drilling and boring

6. Basic Shaper Operations

7. Milling Machines

8. Grinding Machines

9. Sheet Metal works

10. Foundry Practice

11. Forging Practice

12. Electric Arc Welding

13. Gas Welding

Far Western University
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Bachelor's Degree in Computer Engineering
Course of Study

Course Title: **Applied Mechanics**	Credit: 3
Course Code: CE	Number of lecture/week: 3
Nature of the Course: Theory /	Tutorial/week: 2
Year/Semester: First/Second	Total hours: 45

1. **Course Introduction:**

The course provides a basic knowledge to the students to understand the basics of engineering mechanics. It enables the students to be acquainted with the basic concepts and principles of forces, centroid and Moment of Inertia, along with fundamental analysis of structures. The course deals with the statics and dynamics of particles as well as rigid bodies.

2. **Course Objectives:**

At the end of this course the student will be able to:

- Understand basic principles of particle and rigid bodies at rest and motion.
- Apply the knowledge base for developing development of architectural configuration.
- Introduce the concepts of engineering mechanics in various branches of engineering problems.

3. **Specific objectives and Concepts:**

Specific Objectives	Contents
• Realize the concept and scope of mechanics • Learn about the particles, rigid and deformable bodies. • Learn to draw free body diagram for establishing equations of equilibrium. • Learn about different systems of unit used in engineering mechanics.	**Unit I: Introduction (6 Hours)** Definition and scope of Engineering Mechanics, concepts of particles, rigid, deformable and fluid bodies. Fundamental concepts and principles of mechanics. Concepts of Particles and Free Body Diagram, Physical meaning of Equilibrium and its essence in structural application. Equations of static equilibrium, systems of units.
• Understand the characteristics of force. • Learn the composition and resolution of forces. • Understand the moment and couple of forces and their resolution.	**Unit II Forces (6 hours)** Definition and principle of forces, types of forces, principle of transmissibility & its limitations, resolution & composition of forces, moment of forces about a point and axes, theory of couples, resolution of forces into forces & couple & vice versa, composition and resolution of system of forces.
• Distinguish between CG and Centroid. • Compute centroid of different plane figures • Compute moment of inertia of plane figures and composite figures. • Determines moments of inertia of compound figures using parallel axis theorem.	**Unit III : Center of gravity, centroid and moments of inertia (6 hours)** Definition & derivation of center gravity, Centroid of lines areas and volumes. First and second moments of area, radius of gyration, moments of inertia of common figures, parallel and perpendicular axis theorems, moments of inertia of built-up sections. Determination of moments of inertia by direct integration.

• Understand development of friction • Learn characteristics of friction • Apply this knowledge to analyze practical problems.	**Unit IV : Friction (2 hours)** Introduction: definition, types, causes & effects, Laws of dry friction, static and dynamic coefficient of friction, angle of friction, condition of sliding or tipping, application of friction in static problems.
• Understand the principle and functions of a beam as a structure. • Understand statically and kinematic determinacy. • Learn internally developed forces of different kinds developed in beams. • Analyze member forces in beam with sketch	**Unit V: Analysis of Beams and Frames (9hours)** Definition and types of Beams, supports – roller, hinged and fixed supports. Reactions and degrees of freedom of the supports, external and internal forces in beams. Statically indeterminacy, kinematic indeterminacy. Definition and sign convention of axial force, shear force and bending moment, relation between loads, shear force and bending moment. Axial force, shear force and bending moment diagrams of beams and frames.
• Understand Truss as a structural member. • Determine stability and determinacy of trusses. • Analyze plane trusses by the method of joints and sections.	**Unit VI : Analysis of Plane Trusses (4 hours)** Definition of a Truss, types of trusses, geometrical stability of trusses, determinacy and stability, analysis of trusses by the method of joints, analysis of trusses by the methods of sections.
• Understand the concept of dynamics as applied to particle. • Determine the motion of particle and rigid body. • Develop equation of motion for different cases.	**Unit VII: Kinematics of particles and rigid bodies (4 hours)** Introduction to dynamics, rectilinear motion of particles, position, velocity and acceleration of a particle and rigid body, determination of motion of particle and rigid body, uniform rectilinear motion of particles, uniformly accelerated rectilinear motion of particles.General plane motion of rigid body.
• Define motion of particle along a curved path. • Resolve velocity and acceleration. • Derive equation of motion for n-t and r- θ coordinate	**Unit VIII : Curvilinear Motion (3 hours)** Curvilinear motion of a particle, position, velocity and acceleration of a particle, rectangular components of velocity and acceleration, introduction of tangential and normal components, radial and transverse components.
• Define Newton's law as applied to particle. • Derive momentum equations and apply work energy principle. • Explain impulsive impact and apply principle of impulse and momentum to solve collision problems.	**Unit IX : Kinetics of particles and rigid body (5 hours)** Newton's Second Law of motion and momentum, equation of motion and dynamic equilibrium, Linear and angular momentum : rate of change and conservation, Kinetic energy of particles, Principle of work & energy application, impulsive motion and impact, central impact (direct and oblique)

References:

1. "Vector Mechanics for Engineers- Sstatics and Dynamics", F.P. Beer and E.R. Jonsion, Jr. 6e, McGraw-Hill Book Co., New York, USA, 1987
2. "Engineering Mechanics-Statics and Dynamics", Shame, I.H. 3rd ed., New Delhi, Prentice Hall of India, 1990.
3. "Engineering Mechanics-Statics and Dynamics", R.C. Hibbeler, Ashok Gupta. 11th edition, New Delhi, Pearson, 2009.

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Course of Study

Course title: Discrete Structure	**Credit:** 3
Course Code: CT 126	**Number of lecture/week:** 3
Year/Semester: First/Second	**Tutorial/week:** 0 **Practical:** 0 hours/week
Level: Bachelor of Engineering (Computer)	**Total hours:** 45

Course Objectives: The goal of this course is to provide students with an understanding of basic concepts in the Discrete Structure. At the end of this course students will be able to: Understand the basic principles of sets and operations in set, demonstrate an understanding of relations and functions and be able to determine their properties, Write an argument using logical notation and determine if the argument is or is not valid, and develop an understanding of how graph and tree concepts are used to solve problems arising in the computer science.

Specific Objectives	Contents (UNIT/CHAPTER)	Duration (Time allocated)
	1. Introduction to Discrete Structures 1.1 **Set:** Sets and Subsets, Power Set, Cartesian product, Set Operations, Set Identities, Venn- Diagram, and Inclusion-Exclusion Principle. 1.2 **Functions:** Basic Concepts, Injective, Surjective, and Bijective Functions, Inverse and Composite Functions, Functions for Computer Science (Ceiling Function, Floor Function, and Boolean Function).	**9 Hours**

	1.3 **Relations:** Relations and their Properties, N-ary Relations and Operations on N-ary Relations, Applications of N-ary Relations, Representing Relations by using Matrix and Graphs, Closure of Relations, Equivalence Relations, Equivalence Classes and Partitions, Partial Ordering, and Total Ordering. 1.4 **Matrix:** Matrix Arithmetic, Transposes and Powers of Matrices, and Zero–One Matrices	
	2. Logic, Reasoning and Proof **2.1 Proposition Logic:** Propositions, Conditional Statements, Truth Tables of Compound Propositions, Applications of Propositional Logic, Propositional Equivalences, Propositional Satisfiability, and Rules of Inference for Propositional Logic and Using Rules of Inference to Build Arguments. **2.2 Predicates and Quantifiers:** Introduction, Universal and Existential quantifiers, Quantifiers with Restricted Domains, and Expressing English statements into Logical Expressions, 2.3 **Introduction to Proof Methods**: Basic Terminologies, Direct Proof, Proofs by Contradiction, Proofs by Contrapositive, Proofs of Equivalence, Vacuous and Trivial Proofs. 2.4 **Methods of Tableaux**	**11 Hours**
	3. Number Theory, Counting and Recurrence Relation 3.1 **Number Theory:** Divisibility and Modular Arithmetic, Modular Exponentiation, Primes and Greatest Common Divisor, Euclidean and Extended Euclidean Algorithm, Bézout's Theorem, Linear Congruence, The Chinese Remainder Theorem, and Fermat's Little Theorem. 3.2 **Counting:** Basic Counting Principles, Complex Counting Problems, Permutations and Combinations, The Binomial Theorem, Pascal's Identity and Triangle, and Vandermonde's Identity.	**11 Hours**

	3.3 **Recurrence Relation:** Recursive Definition of Sequences, Applications of Recurrence Relations, Solution of Linear Recurrence Relations, and Solution of Non-Linear Recurrence Relations.	
	4. Graph Theory **4.1** **Introduction:** Basic Terminology of Graph**,** Undirected and Directed Graphs, and Graph Models **4.2** **Special Types of Graphs:** Complete Graphs, Cycles, Wheels, n-Cubes, Bipartite Graphs, Regular Graphs, Planar Graphs and Euler's Formula for planner graph, and Applications of Special Types of Graphs. **4.3** **Representing Graphs and Graph Isomorphism:** Adjacency lists, Adjacency Matrices, Incidence Matrices, and Isomorphism of Graphs. **4.4** **Connectivity:** Paths, Circuits, strongly connected and weakly connected Graph, Cut vertices, Cut edge and Cut sets **4.5** **Euler and Hamilton Graph:** Euler Paths and Circuits, Hamilton Paths and Circuits, Applications of Hamilton Circuits. **4.6** **Shortest-Path Problems:** Dijkstra's Algorithm. **4.7** **Graph Coloring:** Introduction, The Four Color theorem, Applications of Graph Colorings. **4.8** **Network Flows, Max-flow and Min-cut Theorem** **4.9** **Concept of Tree:** Introduction to tree, Binary tree, m-ary tree, Properties of Trees, Binary Search Trees, Tree Traversal, and Spanning tree (Depth-First Search, and Breadth-First Search).	**14 Hours**

References

1) "Kenneth H. Rosen" Discrete Mathematics and Its Applications, Seventh Edition,
2) "Bernard Kolman Robert C. Busby Sharon Cutler Ross", Discrete Mathematical Structures, Prentice Hall.
3) R. Johnsonbaugh, "Discrete Mathematics", Prentice Hall Inc.
4) G.Chartand, B.R.Oller Mann, "Applied and Algorithmic Graph Theory", McGraw Hill
5) Joe L. Mott, Abrahan Kandel, and Theodore P. Baker, "Discrete Mathematics for Computer Scientists and Mathematicians", Prentice-Hall of India

Evaluation Scheme

The questions will cover all the chapters of syllabus. The evaluation scheme will be as indicated in the table below:

SN.	***Chapter***	***Hours***	***Marks Distribution****
1	Chapter-1	9	12
2	Chapter-2	11	14
3	Chapter-3	11	14
4	Chapter-4	14	20
Total		***45***	***60***

There could be a minor deviation in the marks distribution.

Internal Evaluation (Marks Weightage)		**Final Exam (Marks Weightage)**	**Total**	**Remarks**
Assessment/Class Performance/Attendance/Quizzes/ Tutorials/Presentation	Practical			
40		60	100	Internal marks will be of 40 if there is no practicals in the course

Far Western University
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Bachelor's Degree in Computer Engineering
Course of Study

Course Title: **ENG Chemistry**

Course No.:

Nature of the Course: **Theory**

Level: **BE Computer ENG**

Year: **First**

Credit: **3**

Number of hours per week: **3**

Semester**: First**

1. Course Description

The course of chemistry is mainly designed for the students of Engineering which enable the students to Know basic concepts of some chapters from three branches i.e., physical, organic and inorganic chemistry. Course also includes some topics which are close concerning to the students of engineering. Basic knowledge of electrochemistry, Thermodynamics, polymers, Environmental chemistry, nuclear chemistry, coordination complexes, buffer, Catalyst, lubricants, paint, Cyclic aliphatic compounds, stereochemistry, reaction mechanism etc.

2. Course Objectives:

The general objectives of the course are as follows:

- To enable the students with basic concepts of in Electro Chemistry, Thermodyanamics, Environmental Chemistry, Nuclear chemistry, Buffer and corrosion, catalyst, etc.
- To enable the students to understand some concept of organic chemistry specislly in the topics Cyclic aliphatic compounds, Reaction mechanism and stereochemistry.
- To enable the students to understand some topics in industrial chemistry like paints and lubricants
- To enable the students to appreciate the importance of chemistry and use it in the field of resreach and investigation.

3. Specific Objectives and Contents:

Specific Objectives	contents
To get fundamental knowledge to the students in the field of electrochemistry about electrochemical cells, electrode potential, standard electrode	**Unit I: Electrochemistry (5)** 1.1 Introduction 1.2 Electrochemical cell, Electrode potential and standard electrode potential. 1.3 Measurement of electrode potential cells.

potential, measurement of electrode potential cells, EMF of the cell, Nernst equation and application of electrochemical series and electrochemical and electrolytic cells	1.4 Nernst equation and E.M.F. of the cell 1.5 Application of Electrochemical series, electrochemical and electrolytic cells
To introduce about the fundamental concepts of 1st and second law of thermodynamics which includes Carnot cycle, entropy and entropy change in reversible and irreversible process, Gibb's free energy, Maxwell relation and Gibbs Helmholtz equation and Vent Hoff's equation	**Unit2:Thermodynamics (5)** 2.1 Introduction 2.2 First and second Laws of thermodynamics 2.3 Carnot cycle, Entropy, Entropy change in reversible and irreversible process 2.4Gibbs Free energy, Properties of Gibbs Free energy, Maxwell relations 2.5 Gibbs Helmholtz equation, Vent Hoff equation
To get general ideas about buffer and its type, Henderson's equation for pH of buffer. This chapter will give also the general idea about the corrosion, its type and factor influencing corrosion and its control.	**Unit 3: Buffer and corrosion (2)** 3.1 Introduction 3.2 Types of the buffer 3.3Henderson's equation for pH of buffer. 3.4 Principle of corrosion , electrochemical corrosion its type 3.5 Factor influencing the corrosion and its control
To Explain about introduction, properties of alpha, beta and gamma rays, radioactive decay, stability of nuclei and to explain nuclear binding energy, fission and fusion	**Unit 4: Nuclear Chemistry (2)** 4.1 Introduction 4.2 Radioactivity 4.3Properdies of alpha, beta and gamma rays. 4.4 Radioactive decay, stability of nuclei, 4.5Nuclear binding energy, Nuclear fission and fusion
The main objective of this chapter is to understand about the air, water, soil pollution and different pollutants and their effects in the environment. and to give idea about acid rain, depletion of ozone layer and possible remedies of different pollutants	**Unit 5: Environmental chemistry (4)** 5.1 Introduction 5.2 Air pollution and its pollutants 5.3 Water pollution and its pollutants (Reference to surface and pond) 5.3 Soil pollution and its pollutants 5.4 Effect of air, water and soil pollution in human being and plants and possible remedies 5.5 Acid rain, Ozone layer depletion and its photo chemistry
To be familiar with the terms used in co-ordination complexes, Werner's theory, Valence bond theory, Sedgwick's model and Sedgwick's effective atomic number rule, nomenclatures of co-ordination complexes,	**Unit 6: Co-ordination complexes (5)** 6.1 Introduction 6.2 Term used in the co-ordination complexes and Werner's theory of co-ordination complexes 6.3 Sedgwick's model and Sedgwick's effective atomic number rule

formation of tetrahedral, square planar and octahedral complexes and application of co-ordination complexes	6.4 Nomenclatures of co-ordination complexes(Neutral type, simple and complex cation type, simple anion and complex anion type) 6.5 Valence bond theory of complexes and its application and limitation 6.6 Formation of Tetrahedral, square planar and octahedral complexes and application of co-ordination complexes
To get some brief ideas about the paints and lubricants and their application	**Unit 7: Paints and lubricants (3)** 7.1 Introduction of lubricants 7.2 Function of lubricants 7.3Classification of lubricants 7.4 Introduction of paints 7.5 Types of paints and their application
To make students familiar about catalyst their types and catalytic promoters and inhibitors, theory of catalyst etc.	**Unit 8: Catalyst (2)** 8.1 Introduction 8.2 Types of catalyst 8.3 criteria of catalysis 8.4 Catalytic promoters and inhibitor 8.5 Theory of catalysis 8.6 Enzyme catalysis
To acquire general knowledge about cyclic aliphatic compounds in organic chemistry and their general methods for preparation. this chapter also gives the idea about angle strains in different cyclic compounds like cyclo propane, cyclo butane , cyclo pentane and cyclohexane, conformation of cyclohexane and also to give idea about axial and equatorial bonds	**Unit 9: Cyclic Aliphatic compounds (4)** 9.1 Open chain and cyclic compounds 9.2 Nomenclature 9.3 General methods for preparation 9.4 Reaction of small ring compounds(cyclopropane and cyclo butane) 9.5 Bayer's strain theory 9.6 Sachse-Mohr theory or stainless strain 9.7 Angle strain and orbital picture 9.8 Conformation of cyclohexane 9.9 Equitorial and axial bonds of cyclohexane
To enable general idea and knowledge about different types of polymers and polymerization, mechanism of polymerization (free radicals and carbonium ion), polyethene, PVC, synthetic rubber, nylon 6,6, ete and applications.	**Unit 10: polymers (5)** 10.1 Introduction 10.2 Classification of polymerization(on the basis of origin, structures, mode of formation and thermal properties) 10.3 Mechanism of polymerization(chain reactions involving free radicals and carbonium ion) 10.4 Preparation of Polyethene, PVC, synthetic rubber, nylon 6,6, Bakelite, epoxy reigns, sulphur based polymers. 10.5 Applications of polymers
To get concept of Geometric and optical isomers, cis-trans and E, Z,	**Unit11: Stereochemistry (4)** 11.1 Introduction

optical activity, enantiomers, diastereomers, formation of racemic mixture and their resolutions by mechanical separation method, bio-chemical separation methods, chemical separation	11.2 Stereoisomerism(Geometrical and optical) 11.3 Geometrical isomerism(cis-trans and E,Z concept of geometrical isomerism) 11.4 Optical isomerism with reference to lactic acid and tartaric acid 11.5 Terms optical activity, enantiomers, diastereomers, meso compounds. 11.6 Recimization and resolution
To understand some reaction mechanisms in organic chemistry like $SN_1$and SN_2 , E_1 and E_2 , reactivity, stereochemistry, Mechanism of Aldol condensation and Diels Alder reaction.	**Unit 12: Reaction mechanisms (4)** 12.1 Introduction 12.2 Nucleophilic and Electrophilic substitution reactions 12.3 Mechanism, reactivity and stereochemistry of $SN_1$and SN_2 reactions, Walden inversion. 12.4 Mechanism, reactivity and stereochemistry of E_1 and E_2 reactions 12.5 Mechanism of Aldol condensation and Diels- Alder reaction

Note: The figures in the parentheses indicate the approximate periods for the respective units.

References:

1. Jain and Jain, Engineering Chemistry, Dhanpat Rai publishing co. Ltd.
2. Shashi Chawala, A text book of Engineering Chemistry , Dhanpat Rai Co. Ltd
3. Bahl and Tuli, Essentials of Physical Chemistry , S. Chand & Co. Ltd
4. J.D. Lee, A new concise Inorganic Chemistry , Wiley India Pvt. Ltd.
5. Satya Prakash and G.D. Tuli, Advanced Inorganic chemistry vol 1 and 2, S. Chand & Co. Ltd
6. R.T. Morrison and and R.N. Boyd 7th Edn Organic Chemistry , Pearson publication.
7. Moti kazi Sthapit , Selected topics in physical chemistry, Taleju Prakasan, Ktm.
8. David E. Newton, Chemistry of the Environment, Viba Books pvt. Ltd, new Delhi
9. S.H. Maron, C, Prutton, principle of physical chemistry, John wiley & sons.
10. Dandhya Pimplapure, Rashmi Jain, Usha Soni, Alok Sahay, Inorganic Polymer chemistry Pragati prakashan.
11. V.R. Gowariker, N.V. Vishwanathan, Polymer Science
12. Ernest L. Eliel, Stereochemistry of carbon compoundsds, Tata Mcgraw-Hill Publishing company Ltd. New Delhi
13. K.K. Sharma and L.K. Sharma, A text book of physical chemistry, Vikas Publishing house Pvt. Ltd., Athrai Publication.
14. R.K. Sharma, B. Panthi and Y. Gotame, Text book of Engineering Chemistry
15. M.L Bhusal and P.N. Chaudhary A Text Book Of Chemistry B.sc. Vol. 1 and Vol.2, Ekata Publication.

Evaluation System

Undergraduate Programs							
External Evaluation	**Marks**	**Internal Evaluation**	**Weightage**	**Marks**	**Practical**	**Weightage**	**Mark**
End semester examination	60	Assignments	20%	20	Practical Report copy	25%	20
(Details are given in the separate table)		Quizzes	10%		Viva	25%	
		Attendance	20%		Practical Exam	50%	
		Internal Exams	50%				
Total External	60	Total Internal	100%	20		100%	20
Full Marks 60+20+20 = 100							

External evaluation

1. **End semester examination:**
   It is a written examination at the end of the semester. The questions will be asked covering all the units of the course. The question model, full marks, time and others will be as per the following table.

2. **External Practical Evaluation:**
   After completing the end semester theoretical examination, practical examination will be held. External examiner will conduct the practical examination according to the above mentioned evaluation. There will be an internal examiner to assist the external examiner. Three hours time will be given for the practical examination. In this examination Students must demonstrate the knowledge of the subject matter.

Full Marks: 100, Pass Marks: 45, Time: 3 Hrs

Nature of question	Total questions to be asked	Total questions to be answered	Total marks	Weightage
Group A: multiple choice	20	20	20×1 = 20	100%

Group B: Short answer type questions	8	6	6×8 = 48	
Group C: Long answer type question	3	2	2×16 =32	
			100	

Each student must secure pass marks in internal evaluation in order to appear in the end semester examination. Failed student will not be eligible to appear in the end semester examinations.

Internal evaluation

Assignment: Each student must submit the assignment individually. The stipulated time for submission of the assignment will be seriously taken.

Quizzes: Unannounced and announced quizzes/tests will be taken by the respective subject teachers. Such quizzes/tests will be conducted twice per semester. The students will be evaluated accordingly.

Attendance in class: Students should regularly attend and participate in class discussion. Eighty percent class attendance is mandatory for the students to enable them to appear in the end semester examination. Below 80% attendance in the class will signify NOT QUALIFIED (NQ) to attend the end semester examination.

Presentation: Students will be divided into groups and each group will be provided with a topic for presentation. It will be evaluated individually as well as group-wise. Individual students have to make presentations on the given topics.

Mid-term examination: It is a written examination and the questions will be asked covering all the topics in the session of the course.

Discussion and participation: Students will be evaluated on the basis of their active participation in the classroom discussions.

Instructional Techniques: All topics are discussed with emphasis on real-world application. List of instructional techniques is as follows:

- Lecture and Discussion
- Group work and Individual work
- Assignments
- Presentation by Students
- Quizzes
- Guest Lecture

Students are advised to attend all the classes and complete all the assignments within the specified time period. If a student does not attend the class(es), it is his/her sole responsibility to cover the topic(s) taught during that period.

Chemistry (Laboratory Practical)

Nature of the Course: **Practical**

Level: **BE Computer ENG**

Year: **First**

Semester**: First**

Number of hours per week: **3**

2. Course Objectives

The general objectives of the course are as follows:

- To enable students to perform experiments on viscosity and surface tension.
- To enable the students to develop basic analytical skill on purification of organic and inorganic compounds by crystallization and distillation
- To enable the students to develop basic experimental skill on Determination the temporary and permanent hardness of water.
- To give the experimental idea for Preparation of the organic polymer Nylon 6,6 and Bakelite.
- To estimate the amount of iron present in the supplied sample sample of the ferrous salt using standard potassium permanganate solution (redox titration)

3. Experiments:

1. To prepare the standard buffer solutions using acetic acid and sodium acetate and measure the approximate pH of the given unknown solution by universal indicator method.
2. To determine the hardness of the natural water by complexometric titration using EDTA.
3. To estimate the amount of iron(ferrous) present in the given Mohr's salt with the help of standard potassium permanganate solution (redox titration)
4. To determine of surface tensions of two given liquids with the help of a Stalagnometer.

5. To determine the relative viscosity of two liquids with the help of a Ostwald's viscometer.
6. To determine the surface tension of the given detergent solution and compare its cleansing power with other detergent solutions
7. To determine of melting points of solid organic compounds. `
8. To purify of organic compounds by crystallization and distillation
9. To prepare the organic polymer Nylon 6,6 and Bakelite in the laboratory
10. To separate the components in the mixture by paper chromatography and TLC

References:

1. David P. Shoemaker, Cral W. Garland, Joseph W. Nibler, Experiments in physical chemistry, 5th edition, Mc Graw-Hill Book Company, 1989
2. N. Gurtu, R. Kapoor, **Advanced Experimental Chemistry** (Vol I – III), S. Chand and Co., New Delhi, India, **1989**. (Latest edition).
3. S, M. Ashraf, S. Ahmad, U. Riaz, A Laboratory manual of polymers, I.K. international publishing house Pvt. Ltd.
4. N.K. Vishvoi, Advanced practical organic chemistry, Third edition
5. B. S. Furniss, A. J. Hannaford, P. W. G. Smith, A. R. Tatchel, **Vogel's Text Book of Practical Organic Chemistry**, 5th Edition, Person Education, **2005**.
6. M.K. Stapit, R.R. Pradhanang, Experimental physical chemistry, Taleju Prakasan Ktm.
7. S.K. Bansin and S. Rani , Lab. manual of engineering chemistry
8. N. S. Gnanapragasam, G. Ramamurthy, **Organic Chemistry – Lab Manual,** S. Viswanathan Co., Pvt., India, **1998.**

Far Western University
School of Engineering
Bachelor's Degree in Computer Engineering
Course of Study

Course Title: Engineering Mathematics II	**Credit: 3**
Course Code.:	**Number of lecture/week: 4**
Nature of the Course: Theory	**Tutorial/week: 2**
Year/Semester: First/Second	**Total hours: 45**

Course Objective: The basic objective of the course is to provide a sound knowledge of multivariable function, extreme values of the function of two and three variables, multiple integrals (Double and Triple), ordinary differential equations including their series solutions, Laplace Transform and three dimensional geometry. After learning the course one may enhance the fundamental concepts on Mathematics and able to study the further courses of the subject which are more applicable in Engineering. Detail of the course is as follows:

Course Contents:

Part 1(Multivariable Differential Calculus)

1.1 Concept of functions of two and more variables, Partial derivative offunctions of two and three variables, symmetric and homogeneous function, Euler's Theorem for partial derivative(two and three variables) (3 hrs.)

1.2 Extreme Values: Review of maxima and minima of a function of single variable, concept of critical point, saddle point and point of inflection, maxima and minima (local only)of function of two and three variables including extreme values of these functions under given constraints, determination of Lagrange's multiplier to obtain extreme values. (3 hrs.)

Part 2(Ordinary Differential Equations)

2.1 Formation of a differential equation, order and degree of a differential equation, first order differential equations and their solutions (variable separable form, reducible to separable form, exactness condition and integrating factor, linear and Bernoulli's differential equation). (5 hrs.)

2.2 Second order differential equations (Homogenous and nonhomogeneous) with constant coefficient,

Complementary function and particular integral, general, particular and initial solution. (4 hrs)

2.3 Power series solution of a differential equation with constant as well as variable coefficient, Legendre's and Bessel's differential equation with their solutions, Legendre polynomial, Bessel's function of first and second kind and their properties. (5 hrs.)

Part 3 (Laplace Transform)

3.1 Definition and fundamental formulae of Laplace Transform, existence and uniqueness theorem, linear property, first and second shifting properties, inverse Laplace Transform, Application of Laplace Transform (initial value problem), Convolution Theorem on Laplace Transform and its application. (9 hrs.)

Part 4(Double and Triple Integrals)

4.1 Concept and evaluation of double and triple integrals, change of order for double integral, change of integral in Cartesian form to polar form,Dirichlet integral, area and volume by double integral. (7hrs.)

Part 5(Three Dimensional Geometry)

5.1 Review of coordinate in space and plane. (1hr.)

5.2 Equation of straight line in symmetrical form, reduction of an equation of a straight line from general to symmetrical form, angle between a line and a plane, condition for a line to lie in a plane, coplanar lines, shortest distance. (5 hrs.)

5.3 Standard and general equation of sphere, plane section of sphere, great circle, sphere through the given circle, sphere through the given four points, sphere with the given diameter. (2 hrs.)

5.3 cone and cylinder (definitions and standard equations only). (1 hr.)

References Books

1. E.Kreyszig, *Advanced Engineering mathematics*, Wiley- Eastern, Publication.
2. N. P. Bali, Dr. Manish Goyal, *A text book of engineering mathematics,* Laxmi Publication (P). LTD.
3. Thomas George B. and Finney. Ross L. , *Calculus and Analytical Geometry*, Pearson Education

Far Western University
School of Engineering
Bachelor's Degree in Computer Engineering
Course of Study

Course Title: Object Oriented Programming | **Credit: 3**
Course Code: CT125 | **Number of lecture/week: 3**
Year/Semester: First/Second | **Tutorial/week: 1**
Level: Bachelor of Engineering (Computer) | **Total hours: 45**

Course Objective:

To acquaint the student with Object Oriented Programming. Emphasis will be given on developing object oriented programming skills using C ++.

Course Outline:

Specific Objectives	Contents (UNIT/CHAPTER)	Duration Hr/week
	1. **Object Oriented Programming Approach** 1.1. Basic of Object Oriented Programming 1.2. Features of Object Oriented Programming 1.3. Popular Object Oriented Languages 1.4. Advantages of OOP 1.5. Disadvantages of OOP	**3**
	2. **Basics of C++ Programming** 2.1. C++ Program Structure 2.2. Character Set and Tokens 2.3. Preprocessor Directives 2.4. New Headers 2.5. Namespace Scope 2.6. Variable Declaration and Expression 2.7. Data Types in C++ 2.8. Type Conversion and casting 2.9. User Defined Constant const 2.10. Reference Variables 2.11. Control structures 2.12. Functions 2.12.1. Function Overloading 2.12.2. Inline Function 2.12.3. Default Arguments 2.12.4. Pass by Reference and Return by Reference 2.13. Array, Pointer and String 2.14. Structure and Unions 2.15. Enumeration 2.16. Dynamic Memory Allocation	**5**

	3. Objects and Classes 3.1. C++ Classes 3.2. Objects and the Member Access 3.3. Relation of Object, Class and Memory 3.4. Defining Member Function 3.5. Making Outer Function inline 3.6. Overloading Member Function 3.7. Constructor 3.8. Destructors 3.9. Object as Function Arguments 3.10. Returning Objects from Functions 3.11. Array of Objects 3.12. Pointer to Objects 3.13. Dynamic Memory Allocation for Objects and Object Array 3.14. Dynamic Constructors 3.15. `this` Pointer 3.16. `static` Data Member 3.17. `static` Member Function 3.18. Constant Member Functions and Constant Objects 3.19. Friend Function 3.20. Friend Classes 3.21. Containership	**7**
	4. Operator Overloading 4.1. Overloadable and Non- Overloadable Operators 4.2. Syntax of Operator Overloading 4.3. Unary Operator Overloading 4.4. Binary Operator Overloading 4.5. Operator Overloading using Member Operator Functions 4.6. Operator Overloading using Non Member Function 4.7. Data Conversion 4.8. Explicit Constructors	**5**
	5. Inheritance 5.1. Base Class and Derived Class 5.2. `protected` Access Specifier 5.3. Derived Class Declaration 5.4. Forms of Inheritance 5.5. Public, Protected and Private Inheritance 5.6. Member Function Overriding 5.7. Constructors in Derived Class 5.8. Destructor in Derived class 5.9. Need of Virtual Base Class	**4**
	6. Virtual Functions 6.1. Introduction 6.2. Need of Virtual Function 6.3. Pointer to Derived Class 6.4. Array of Pointers to Base Class 6.5. Pure Virtual functions and Abstract Class 6.6. Virtual Destructor 6.7. reinterpret_cast Operator 6.8. Run-Time Type Information	**4**

	7. Stream Computation 7.1. Input/Output Stream Class Hierarchy 7.2. Testing Stream Errors 7.3. Unformatted Input/Output 7.4. Formatted Input/Output 7.5. File Input/Output with Streams 7.6. File Stream Class Hierarchy 7.7. ASCII and Binary Files 7.8. Read/Write from File 7.9. Sequential Access to File 7.10. Random Access to File 7.11. File Access Pointers and their Manipulators 7.12. Testing Errors during File Operations 7.13. File Input/Output with Member Functions 7.14. Stream Operator Overloading	**6**
	8. Templates 8.1. Function Template 8.2. Overloading Function Template 8.3. Class Template 8.4. Derived Class Template	**4**
	9. Exception Handling 9.1. Basics of Exception Handling 9.2. Advantage over Conventional Error Handling 9.3. Exception Handling Mechanism 9.4. Rethrowing Exception 9.5. Multiple Handlers 9.6. Catching All Exceptions 9.7. Exception with Arguments 9.8. Exceptions Specification for Function 9.9. Exceptions in Constructors and Destructors 9.10. Handling Uncaught Exceptions 9.11. Handling Unexpected Exceptions	**4**
	10. Introduction to Standard Template Library 10.1. Components of STL 10.2. Container 10.3. Iterators 10.4. Algorithms 10.5. Functions Objects	**3**

Project work:

Students shall submit the mini project at the end of class.

Tutorials:

A number of tutorial assignments can be given for better concept in object oriented programming.

Practical:

There shall be 12 lab sessions to cover all the aspects of OOP.

Reference books:

1. Robert Lafore, *"Object Oriented Programming in C++"*, SAMS
2. Herbert Schildt, *"C++ : A Beginner's Guide"*
3. D.S. Baral, D. Baral, *"Secrets of C++"*

Evaluation scheme:

The questions will cover all the chapters in the syllabus. The evaluation scheme will be as possible as indicated in the table below:

Unit / Chapter	Hours	Marks Distribution* (Tentative)
1	3	4
2	5	7
3	7	10
4	5	7
5	4	5
6	4	5
7	6	8
8	4	5
9	4	5
10	3	4

* There may be minor variation in marks distribution.

Internal Evaluation (Marks Weightage)		Final Exam (Marks Weightage)	Total	Remarks
Assessment/Class Performance/Attendance/Quizzes/ Tutorials/Presentation	Practical			
20	20	60	100	Internal marks will be of 20 if there are practicals in the course (20 marks will be allocated for Practicals)

Far Western University
School of Engineering
Bachelor's Degree in Computer Engineering
Course of Study

Course Title: Thermodynamics	**Credit: 3**
Course No:	**Number of period per week: 3**
Nature of the Course: Theory + Practical	**Total hours: 45**
Year: I, Semester: II	
Level: B.E.	
Degree: Bachelor's Degree in Computer Engineering	

1. Course Introduction

Thermodynamics and Heat Transfer enables students to analyse the transfer of heat and work and apply in engineering applications.

2. Objectives

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

- Identify basic thermodynamic terms and apply the basic concepts of thermodynamics in the engineering applications.
- Identify the parameters associated with thermodynamics and heat transfer and measure them using proper instruments.
- Apply the laws of thermodynamics for different working substances used in engineering application.
- Differentiate the working mechanisms of petrol engine, diesel engine, compressor, and refrigeration cycle.
- Identify the parameters affecting heat transfer and their application in engineering fields.

3. Specific Objectives and Contents

Specific Objectives	Contents
• To understand the definition of thermodynamics and its approach.	**Unit I: Introduction (2 hrs)** Definition and scope of Engineering Thermodynamics, Value of energy to society, Microscopic versus macroscopic viewpoint **Unit II: Thermodynamic Parameters and Measurement (2 hrs)**

• To be familiar with the concept of pressure and temperature.	Common Properties: pressure, gauge pressure, atmospheric pressure and absolute pressure, specific volume, temperature, Measurement of pressure, heat and temperature, Zeroth law of thermodynamics, equality of temperature. **Unit III: Concepts and Definitions (3 hrs)**
• To be familiar with the concept of thermodynamic system, properties.	System, surroundings, boundary and universe; closed systems, open systems, and isolated systems, Thermodynamic properties: intensive, extensive and specific properties, Thermodynamic equilibrium, Thermodynamic state, Thermodynamic process with P-v and T-v diagrams (viz. isobaric, isochoric, isothermal, adiabatic, isentropic and polytropic processes), cyclic process, quasi-equilibrium process, reversible and irreversible process
• To be able to do simple calculation of work transfer.	**Unit IV: Energy and Energy Transfer (4 hrs)** Energy and its meaning, Stored energy and transient energy; total energy, Energy transfer: Heat transfer, work transfer, Expressions for displacement work transfer for: isochoric process, isobaric process, isothermal process, isentropic/adiabatic process, polytropic process, Power
• To be familiar with pure substance properties.	**Unit V: Properties of Common Substances (4 hrs)** Pure substance and state postulate, Ideal gas and ideal gas relations, equation of state for simple compressible substance, Two phase (Liquid and vapor) systems: phase change; sub-cooled liquid, saturated liquid, wet mixture, critical point, quality, moisture content, saturated vapor and superheated vapor, P-v and T-v diagram of water in two phase region, Properties of two phase mixtures, Other thermodynamic properties: internal energy, enthalpy, and specific heats, Development of property data: graphical data presentation and tabular data presentation
• To be familiar with first law of thermodynamics and its uses in engineering applications.	**Unit VI: First Law of Thermodynamics (7 hrs)** First law of thermodynamics for control mass; First law of thermodynamics for control mass undergoing cyclic process, First law of thermodynamics for control volume, Control volume analysis: steady state steady flow process and analysis, Control volume application: steady state work applications and steady state flow applications viz. heat exchanger, nozzle, diffuser, turbine, compressor, throttling device and boiler.

• To be identify the concept of second law of thermodynamics and Entropy.	**Unit VII: Second Law of Thermodynamics (8 hrs)** Necessity of formulation of second law, Reversible and irreversible processes, Entropy and second Law of thermodynamics for an isolated system, Entropy and process relation for an ideal gases and incompressible substances, Carnot cycle, heat engine, heat pump and refrigerator, Kelvin-Planck and Clausius statements of the Second law of thermodynamics and their equivalence.
• To learn about heat engine and it's working cycle.	**Unit VIII: Cycle and Heat Engines (7 hrs)** Internal combustion cycles: air standard Otto cycle (Working principle with P-v and T-s diagrams), Air Standard Diesel cycle (Working principle with P-v and T-s diagrams), Brayton cycle (Working principle with P-v and T-s diagrams), Rankine cycle (Working principle with P-v and T-s diagrams), Vapor compression refrigeration cycle, Petrol engine (Working mechanism), Diesel engine (Working mechanism)
• To be learn about different types of heat transfer and its application.	**Unit IX: Introduction to Heat Transfer (8 hrs)** Basic concepts and modes of heat transfer, Fourier's law statement and assumptions, One dimensional steady state heat conduction through a plane wall, Radial steady state heat conduction through a hollow cylinder, Heat flow through composite structures: composite plane wall, multilayer tubes, Electrical analogy for thermal resistance, Combined heat transfer and overall heat transfer coefficient for plane wall and tube, Mechanism of convection; free and forced convection, Heat radiation, Stefan's law, absorptivity, reflectivity and transmissivity; black body, white body and, gray body

Laboratory Works:

1. To measure the pressure, specific volume, and temperature
2. To find the efficiency of a compressor
3. To find the Coefficient of thermal conductivity of a sample
4. To observe the components and working mechanism of four stroke engine viz. petrol engine and diesel engine
5. To measure the emissivity of a sample disk by Stefan Boltzman's apparatus.
6. To measure the performance of Refrigeration/Heat Pump

Prescribed Text

- Y. A. Cengel & M.A. Boles, *Thermodynamics: An Engineering Approach*, McGraw-Hill.

- J.R. Howell and R.O. Buckius, *Fundamentals of Engineering Thermodynamics*, Mc-Graw Hill Publishers.
- Y. A. Cengel, *Heat Transfer: A Practical Approach*, McGraw-Hill.

References

- V. Wylen, Sonntag & Borgnakke, *Fundamentals of Thermodynamics*, John Wiley & Sons, Inc.
- M. J. Moran & H. N. Shapiro, *Fundamentals of Engineering Thermodynamics*, John Wiley & Sons, Inc.
- R. K. Rajput, *Engineering Thermodynamics,* Laxmi Publications, New Delhi.
- E. Rathakrishnan, *Fundamentals of Engineering Thermodynamics*, Prentice Hall of India.
- R. D. Yadav, *A Text Book of Thermodynamics and Heat Transfer*, Pratibha Prakashan Patan Dhoka, Lalitpur.
- M. C. Luintel, *Fundamental of Thermodynamics and Heat Transfer*, Athrai Publications (P) Ltd.

Far Western University
School of Engineering
Bachelor in Computer Engineering
(Course of Study)

Course Title: Data Structures and Algorithms | **Credit: 3**
Course Code: CT 232 | **Number of lecture/week: 3**
Year/Semester: Second/First | **Tutorial/week: 1**
Level: Bachelor of Engineering (Computer) | **Total hours: 45**

Course Objective:

To acquaint students with different data structures like stacks, queues, linked lists, trees, and graphs along with their implementations. It also provides different sorting and searching algorithms and their analysis.

Course Outline:

Specific Objectives	Contents (UNIT/CHAPTER)	Duration Hr/week
	1. Introduction to Data Structures 1.1. Introduction 1.2. Types of Data Structures 1.3. Operations on Data Structures 1.4. Abstract data type 1.5. Algorithms and their types 1.6. Features of Algorithms 1.7. Time and Space Complexity	2
	2. Stacks and Queues 2.1. Stacks 2.2. Array Representation of Stacks 2.3. Operations on Stacks 2.4. Converting Infix Expression into Postfix Expression 2.5. Evaluation of Infix Expression 2.6. Applications of Stacks 2.7. Queues 2.8. Array Representation of Queues 2.9. Operations on Queues 2.10. Linear and Circular Queues 2.11. Applications of Queues	**6**
	3. Linked Lists 3.1. Introduction 3.2. Linked List Versus Arrays 3.3. Implementation of Linked Lists 3.4. Types of Linked Lists 3.5. Linked Stacks and Linked Queues 3.6. Polynomial Representation	**6**

	4. Recursion 4.1. Introduction 4.2. Principles of Recursion 4.3. Types of Recursion 4.4. Tower of Hanoi	**3**
	5. Trees 5.1. Introduction 5.2. Binary Tree 5.3. Binary Search Tree 5.4. Tree Traversal 5.5. Expression Tree 5.6. AVL Tree 5.7. B-Tree 5.8. Red-Black Tree 5.9. Huffman Tree and its Application	**8**
	6. Growth Functions 6.1. Introduction 6.2. Big-Oh Notation 6.3. Omega Notation 6.4. Theta Notation	**2**
	7. Sorting 7.1. Introduction 7.2. Bubble Sort 7.3. Insertion Sort 7.4. Selection Sort 7.5. Merge Sort 7.6. Quick Sort 7.7. Radix Sort 7.8. Heap Sort 7.9. Shell Sort 7.10. Comparison of Sorting Algorithms	**5**
	8. Searching 8.1. Introduction 8.2. Sequential Search 8.3. Binary Search 8.4. Introduction to Hashing 8.5. Hash Table and Hash Function 8.6. Different Hash Functions 8.7. Collisions 8.8. Collision Resolution Techniques	**5**
	9. Graphs 9.1. Introduction 9.2. Graph Representations	**8**

	9.3. Types of Graphs 9.4. Graph Traversal Algorithms 9.5. Transitive Closure of Graph 9.6. Warshall's Algorithm 9.7. Spanning Trees 9.8. Shortest Path Algorithms 9.9. Topological Sorting 9.10. Applications of Graphs	

Project work:

An individual project should be given to each student. 10% of sessional marks should be allocated for evaluation.

Tutorials:

A number of tutorial assignments can be given.

Practical:

There shall be lab exercises on following:

1. Array Implementation of Stack
2. Array Implementation of Queue- Linear and Circular
3. Implementation of Linked Lists - Singly and Doubly Linked Lists
4. Dynamic Implementation of Stack and Queues
5. Application of Recursion - TOH
6. Implementation of trees - Tree Traversals
7. Implementation of Sorting Algorithm
8. Implementation of Searching Algorithm
9. Implementation of Graph Traversal

Books and References:

1. *Data Structures Using C*, Reema Thareja, Oxford University Press
2. *Data Structure and Algorithm : The Complete Reference*, Bal krishna Nyaupane, Heritage Publishers and Distributors Pvt. Ltd.
3. *Data Structures Using C and C++*, Y. Langsam, M.J. Augenstein, A.M. Tanenbaum, Prentice Hall India
4. *Data Structures and Program Design in C*, R.L. Kruse, B.P. Leung, C.L. Tondo, Prentice Hall India

Evaluation scheme:

The questions will cover all the chapters in the syllabus. The evaluation scheme will be as possible as indicated in the table below:

Unit / Chapter	Hours	Marks Distribution* (Tentative)
1	2	3
2	6	8
3	6	8
4	3	5
5	8	10
6	2	4
7	5	6
8	5	6
9	8	10

* There may be minor variation in marks distribution.

Internal Evaluation (Marks Weightage)		Final Exam (Marks Weightage)	Total	Remarks
Assessment/Class Performance/Attendance/Quizzes/ Tutorials/Presentation	Practical			
20	20	60	100	Internal marks will be of 20 if there are practicals in the course (20 marks will be allocated for Practicals)

Far Western University
School of Engineering
Bachelor in Computer Engineering

Course Title:Digital Logic	**Credit: 3**
Course Code: EX 235	**Number of lecture/week: 3**
Year/Semester: Second/Third	**Tutorial/week: 1**
Level: Bachelor of Engineering (Computer)	**Total hours: 45**

1. **Course Introduction**

This course provides an introduction to the fundamental concepts in the basics of combinational as well as sequential logic along with the basics of Digital Circuits and its application.

2. **Course Objectives**:

To understand basic principles of digital logic design, its implementation and application

3. Course Outline:

Specific Objectives	Contents (UNIT/CHAPTER)	Duration (Time allocated)
	UNIT 1: 1.1 Introduction to Digital signals 1.2 Digital wave form and logic 1.3 Digital IC signal levels and clock wave form 1.4 Number Systems: Decimal, Binary, octal, and hexa-decimal number systems and base conversion 1.5 Codes: BCD code, excess-3 code, gray code,	4
	UNIT 2: 2.1 Logic families: Positive logic and Negative Logic, AND, OR, NOT gates 2.2 Universal logic gates NAND,NOR, 2.3 X-OR ad X- NOR GATE,	4
	UNIT 3: 3.1 Boolean Laws and Theorems 3.2 Sum of product methods and simplification 3.3 Product of Sum method and simplification 3.4 Karnaugh Map method – Two, three, four, five variable K-maps 3.5 Converting Boolean expressions to Logic and Vice versa, NAND and NOR implementation – 3.6 Don't-Care conditions 3.7 The Tabulation method	6
	UNIT 4: 4.1 Introduction to Combinational logic 4.2 Design of half adder and full adder. 4.3 Design of half subtractor, full subtractor and parallel binary adder/subtractor. 4.4 Design and implementation of Multiplexer, Multiplexer tree 4.5 Design and implementation of DE-Multiplexer, De.Multiplexer tree 4.6 Decoder 4.7 Encoder 4.8 Parity generators and checker.	8

	UNIT 5 5.1 Introduction to Sequential Circuit 5.2 RS flip flops and gated flipflops 5.3 Edge triggered RS, D, JK and T flipflops, characteristic equation and table 5.4 Realization of one flip flop using other flip flops, JK Master-Slave flip flop. 5.5 Flip flop timing 5.6 Shift registers, SISO, SIPO, PISO, PIPO Universal shift registers 5.7 ring counter and shift counter 5.8 Design of sequence generators	8
	UNIT 6 6.1 Introduction to digital counter, Modulus 6.2 Asynchronous: ripple counter, Decade counter 6.3 Up/Down counter 6.4 Changing the counter Modulus 6.5 Synchronous Counter 6.6 Counter design 6.7 Application of digital counter; digital clock	6
	UNIT 7 7.1 Introduction to Sequentional State Machines 7.2 Types of State Machines 7.3 State Diagram,State Table,State Assignment 7.4 Moore and Mealy Model 7.5 State Machine Examples and D e sig n Principles 7.6 Hazzards in asynchronous system	7
	UNIT 8 8.1 Computer Meomory; RAM and ROM 8.2 ROM Organisation - PROM, EPROM, EEPROM,EAPROM 8.3 RAM organization, - Write and Read operation, Memory cycle and Timing wave forms. 8.4 Memory decoding and memory expansion.	5

4. Practical:

1. Understand the functioning of logic gates, their implementation and verification of truth tables.
2. Develop the understanding of the working of different combinational logic circuits.
3. Understand and verify the working of various sequential logic circuits.

5. References

1. Thomas L. Floyd, "Digital Fundamentals", 8th Edition, Pearson Education Inc, 2004
2. John.M Yarbrough, "Digital Logic Applications and Design", Thomson Learning, 2006.
3. John F.Wakerly, "Digital Design", Fourth Edition, Pearson/PHI, 2008
4. M. Morris Mano, "Digital Design", 4th Edition, Prentice Hall of India Pvt. Ltd., 2008 / Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003

Evaluation scheme

The questions will cover all the chapters in the syllabus. The evaluation scheme will be as possible as indicated in the table below:

UNIT	Hours	Marks distribution* (Tentative)
1	4	4
2	4	6
3	6	8
4	8	12
5	8	10
6	6	8
7	7	8
8	5	4

* There may be minor variation in marks distribution

Internal Evaluation (Marks Weightage)		Final Exam (Marks Weightage)	Total	Remarks
Assessment/Class Performance/Attendance/Quizzes/ Tutorials/Presentation	Practical			
40		60	100	Internal marks will be of 40 if there are no practical works in the course
20	20	60	100	Internal marks will be of 20 if there are practicals in the course (20 marks will be allocated for Practicals)

Far Western University
School of Engineering
Bachelor in Computer Engineering

Course Title: Electrical Circuit Theory	**Credit: 3**
Course No:	**Number of period per week: 3**
Nature of the Course: Theory + Practical	**Total hours: 45**
Year: II, Semester: I	
Level: B.E.	
Degree: Bachelor's Degree in Computer Engineering	

1. Course Introduction

The Electrical Circuit Theory provides the basis for formulation and solution of equations from the given circuit. It helps to understand the behavior of the circuit and develop relation between input and output of one-port and two port networks.

2. Objectives

After successfully completing the course activities, the student will be able to:

- Formulate differential equation from various R, L & C network.
- Solve the given differential equations using direct and indirect methods.
- Formulate transfer function from given network.
- Analyze the frequency response of system from given transfer function.
- Design or synthesize the network from transfer function.

3. Specific Objectives and Contents

Specific Objectives	Contents
• To understand the basic concept of circuit differential equations. • To be familiar with forced response of the circuit due to constant, sinusoidal, exponential and polynomial sources. • To be familiar with the concept of initial conditions and transient response of the circuit. • To understand the complete response of RL, RC and RLC circuits due to sinusoidal source. • To be familiar Laplace transform, its properties. • To be familiar with finding solutions of first and second order circuits using Laplace Transform.	**Unit I: Circuit Differential Equations (12 hrs)** 1.1. Review of voltage divider, current divider, Mesh and Nodal Analysis 1.2. Relation between voltage and current of different circuit elements 1.3. The differential operator & Operational impedance 1.4. Formulation of circuit differential equations 1.5. Forced response due to constant, sinusoidal, exponential and polynomial functions 1.6. Initial conditions in circuit elements, Initial value of derivatives 1.7. Procedure for evaluating initial conditions 1.8. Transient response of first order differential equation of relaxed system. **Unit II: Circuit Dynamics (7 hrs) (6hrs)** 2.1 First order RL and RC circuits 2.2 Time constant in RL and RC circuits 2.3 Second order RLC circuit 2.4 Damping factors and damping coefficients. 2.5 Complete response of RL,RC and RLC circuits to sinusoidal input **Unit III: Laplace Transformation and its application in circuit (6 hrs) (7hrs)** 3.1 Definition and properties 3.2 Laplace transform of common forcing functions, 3.3 Initial and final value theorem 3.4 Inverse Laplace transform 3.5 Partial fraction expansion

• To understand the concept of transfer functions, poles and zeros. • To learn about the network stability and stability criteria. • To understand Z, Y, and ABCD parameters of two port network. • To understand the concept of circuit synthesis. • To design RL, RC and LC network • To understand the frequency response of network. • To understand the concept of different types of filters.	3.6 Solutions of first order and second order system, RL, RC & RLC circuits **Unit IV: Transfer Functions (8 hrs) (6hrs)** 4.1 Transfer functions of Network system 4.2 Poles and Zeros 4.3 Time- domain behavior from pole-zero locations 4.4 Stability and Routh's Criteria, Network stability 4.5 Network function in two-port network 4.6 Z and Y parameters of two-port network 4.7 Conversion from Z and Y parameter to ABCD and hybrid parameters. **Unit V: One-port passive network (7 hrs) (6hrs)** 5.1 Properties of one-port passive network, 5.2 Positive Real Function, 5.3 Properties of RL and RC network, 5.4 Synthesis of RL, RC and LC network using Foster's and Cauer's method **Unit VI: Frequency Response of Network (5 hrs) (5hrs)** 6.1 Magnitude and phase responses, 6.2 Bode plots and its applications, 6.3 Concept of different types of filters.

Laboratory:

1. Simulation of RC circuit for different types of sources using MATLAB

2. Measurement of step, impulse and ramp response of RC circuit using oscilloscope.

3. Simulation of RL circuit for different types of sources using MATLAB

4. Measurement of sinusoidal response of RL circuit using oscilloscope.

5. Simulation of Frequency responses of first order and second order circuits using MATLAB.

6. Measurement of Frequency responses of first order and second order circuits using oscilloscope.

Prescribed Text

1. *"Network and systems"* : D.Roy - Choudhary

2. "Engineering Circuit Analysis" : W H Hayt, J E Kemmerly, S M Durbin, TMH Publication

References

1. *"Network Analysis"* :M.E.Van Valkenburg, Third edition Prentice Hall of India, 1995.
2. *"Course in Electrical Circuit Analysis":* M.L. Soni, and J.C. Gupta, , Dhanapat Rai & Sons, India.
3. *"Electrical Network Theory":* KC Nag, A.H. Wheeler and Company (P) Limited, India.
4.

Far Western University
School of Engineering
Bachelor in Computer Engineering

Course Title: Electromagnetics	**Credit: 3**
Course No:	**Number of period per week: 3**
Nature of the Course: Theory + Practical	**Total hours: 45**
Year: II, Semester: I	
Level: B.E.	
Degree: Bachelor's Degree in Computer Engineering	

1. Course Introduction

The Engineering Electromagnetics uses basic concepts from Physics and enable students to identify electrostatic and magneto statics problems.

2. Objectives

After successfully completing the course activities, the student will be able to:

- Identify coordinate systems and their use in electromagnetics.
- Identify electrostatics laws and use those laws to derive electric field intensities.
- Identify the relationship between electric flux density, and electric field intensity.
- Solve electrostatics problems involving electric energy, potential, conductors, capacitance and dielectrics
- Identify the laws of magnetostatics and use those laws to derive magnetic field intensities.
- Identify Maxwell's equation in Integral and Point form.

3. Specific Objectives and Contents

Specific Objectives	Contents
• To understand different types of coordinate system.	**Unit I: Vector Analysis (7 hrs)** 1.1 The Rectangular Coordinate System 1.2 The Circular Cylindrical Coordinate System 1.3 The Spherical Coordinate System
• To be familiar with field of a line and sheet of charge.	**Unit II: Coulomb's Law and Electric Field Intensity (5 hrs)** 2.1 Coulomb's Law 2.2 Electric Field Intensity 2.3 Field of a Line Charge 2.4 Field of a Sheet of Charge
• To understand Gauss's Law and its application. • To be familiar with Divergence theorem.	**Unit III: Electric Flux Desnsity, Gauss's Law, and Divergence (4 hrs)** 3.1 Electric Flux Density 3.2 Gauss's Law, and it's application 3.3 Divergence Theorem
• To be familiar with potential difference, potential and potential gradient.	**Unit IV: Energy and Potential (5 hrs)** 4.1 Energy Expended in Moving a Point Charge in an Electric Field 4.2 Definition of Potential Difference and Potential 4.3 Potential Gradient, and Energy Density in the Electrostatic Field
• To be familiar with current density and continuity of current.	**Unit V: Conductors and Dielectrics (2 hrs)** 5.1 Current and Current Density 5.2 Continuity of Current
• To understand the concept of capacitance and parallel plate capcitor. • To be familiar with Poisson's and Laplace Equations.	**Unit VI: Capacitance (7 hrs)** 6.1 Capacitance 6.2 Parallel-Plate Capacitor 6.3 Poisson's and Laplace Equations 6.4 Examples of the Solution of Laplace's Equation
• To understand the Biot-Savart Law and Ampere's circuital law.	**Unit VII: The Steady Magnetic Field (7 hrs)** 7.1 Biot-Savart Law 7.2 Ampere's Circuital Law 7.3 Curl, and Stokes' Theorem 7.4 Magnetic Flux and Magnetic Flux Density
• To be able to differentiate between the force on a moving charge and on a differential current elements.	**Unit VIII: Magnetic Forces, Materials, and Inductance (2 hrs)** 8.1 Force on a Moving Charge 8.2 Force on a Differential Current Elements
	Unit IX: Time-Varying Fields and Maxwell's Equation (6 hrs)

• To understand the concept of time varying fields and Maxwell's equations.	9.1 Faraday's Law 9.2 Displacement Current 9.3 Energy in Magnetic Fields 9.4 Maxwell's Equation in Point Form 9.5 Maxwell's Equation in Integral Form 9.6 Poynting Theorem

Laboratory Experiments

1. Mapping of Electrostatic Field on Electro-Conducting paper
2. Determination of the Dielectric Constant of an Insulator
3. Display of Magnetic Hysteresis
4. Measurement of Velocity Factor of a Co-axial Cable

Prescribed Text

- *"Engineering Electromagnetics":* William H. Hayt, Jr, John A Buck, Tata McGraw Hill Publication, Latest Edition

Reference

- *" Elements of Electromagnetics"*: Matthew Sadiku, Oxford University Press, Latest Edition
- *"Elements of Engineering Electromganetics":*N. Narayana Rao, Latest Edition

Far Western University
School of Engineering
Bachelor in Computer Engineering

Course Title: Engineering Mathematics III	**Credit: 3**
Course Code.:	**Number of lecture/week: 4**
Nature of the Course: Theory	**Tutorial/week: 2**
Year/Semester: Second/First	**Total hours: 45**

Course Objective: The basic objective of the course is to provide a sound knowledge of determinant, matrix algebra, derivative and antiderivative of vector valued function (Line, surface and volume integrals), infinite series, Fourier series and linear programming. After learning the course one may enhance the fundamental concepts on Mathematics and able to study the further courses of the subject which are more applicable in Engineering.

Course Contents:

Part 1(Matrix and Determinant)

1.1 Review of matrix and determinant with their properties (1 hrs.)

1.2 System of linear equations with their solution by Gauss elimination method (2 hrs.)

1.3 Rank of a matrix, consistency and inconsistency of a system of linear equations (2hrs.)

1.4 Concept of vector space, subspace, linearly dependent and independent vectors, basis of a vector space, linear transformation (2hrs.)

1.5 Eigenvalues and Eigenvectors, Cayley-Hamilton Theorem(without proof) and its use to find an inverse of a matrix, diagonalization of a matrix, determination of a modal matrix (3 hrs.)

Part 2(Linear Programming)

6.1 Review of graphical method for a system of linear inequalities (1 hr.)

6.2 Concept of simplex method and its use to find optimal solution. Concept of duality and dual simplex method, Big-M method (5 hrs.)

Part 3(Fourier series)

3.1 Periodic function, even and odd function, trigonometric function (1 hr.)

3.2 Fourier series of a function with period 2π and arbitrary period $2L$ (3 hrs.)

3.3 Fourier sine and cosine series of the half range function (1 hr.)

Part 4(Infinite Series)

4.1 Concept of sequence and series and their convergence (2 hrs.)

4.2P-test, Ratio test, Root test, Integral test, Leibnitz test and absolute convergence, Interval and radius of convergence of power series, Taylor and Maclaurin series expansion(no need to prove) of functions

(6hrs.)

Part 4(Vector Calculus)

4.1 Concept of scalar and vector point functions,differentiation and integration of vectors, directional derivative, tangent vector to a curve (3 hrs.)

4.2 Gradient, Divergence and Curl with their properties (3 hrs.)

4.3 Path, simply connected region, line of integration, evolution of line integral, surface integral and volume integrals (4 hrs.)

4.4 Application of Greens, Gauss divergence and Stokes Theorems. (6 hrs.)

Reference Books

1. E.Kreyszig, *Advanced Engineering mathematics*, Wiley- Eastern, Publication.
2. N. P. Bali, Dr. Manish Goyal, *A text book of engineering mathematics,* Laxmi Publication (P). LTD.
3. Thomas George B. and Finney. Ross L. , *Calculus and Analytical Geometry*, Pearson Education

Far Western University
School of Engineering
Bachelor in Computer Engineering

Course title: Theory of Computation	**Credit: 3**
Course Code: CT 233	**Number of lecture/week: 3**
Year/Semester: Second/Third	**Tutorial/week: 1**
Level: Bachelor of Engineering (Computer)	**Total hours: 45**

Course Objectives: The goal of this course is to provide students with an understanding of basic concepts in the theory of computation. At the end of this course students will: be able to construct finite state machines and the equivalent regular expressions, be able to prove the equivalence of languages described by finite state machines and regular expressions, be able to construct pushdown automata and the equivalent context free grammars, be able to prove the equivalence of languages described by pushdown automata and context free grammars, and be able to construct Turing machines.

Specific Objectives	Contents (UNIT/CHAPTER)	Duration (Time allocated)
	1. Set, Relations, Proofs Techniques and Language **1.1. Set:** Sets and Subsets, Power Set, Cartesian product, Set Operations, Set Identities, and Venn- Diagram 1.1 **Functions and Relations:** Basic Concepts, Injective, Surjective, and Bijective Functions; Special types of Binary Relations: Reflexive, Symmetric, Anti-symmetric and Transitive; N-ary Relations and Applications of N-ary Relations; Equivalence Relations, Equivalence Classes and Partitions, Partial Ordering, and Total Ordering. 1.2 **Three fundamental Proof Techniques**: The principal of Mathematical Induction, The Pigeonhole Principle, and The Diagonalization Principle. 1.3 **Alphabets, Strings, and Languages**	**6 hrs**
	2. Finite Automata, Regular Expression and Regular Languages 2.1. **Introduction:** Formal definition, why to study finite automata, state table, state diagram, and transition functions. 2.2. **Deterministic Finite Automata:** Formal definition, Notation for DFA's, Designing DFA.	**12 Hours**

	2.3. **Non-Deterministic Finite Automata:** Formal definition, Notation for NDFA's, Designing NDFA. 2.4. **Equivalence of DFA and NDFA** 2.5. **Construction of minimum state Finite Automata** 2.6. **Regular Expression:** Definition, Operators of regular expression, Algebraic Law for Regular Expression, Building regular expression, and Application of regular expression. 2.7. **Regular Expression and Finite Automata:** Converting regular expression to Finite Automata and Vice-versa, and Arden's Theorem. 2.8. **Regular Language:** Definition, Closure Properties of Regular Languages, Pumping Lemma for Regular Languages.	
	3. Context Free Grammar (CFG) and Push Down Automata (PDA) 3.1. **Introduction to CFG:** Formal definition, Designing examples of CFG, Leftmost and Rightmost Derivations, Parse Tree, Ambiguity in CFG, and Removal of Ambiguity 3.2. **Introduction to PDA:** Formal definition, Deterministic and Non-deterministic PDA, and Designing examples of PDA. 3.3. **Equivalence of Context Free Grammar and Push Down Automata** 3.4. **Closure properties of Context Free Languages** 3.5. **Pumping Lemma for Context Free Languages** 3.6. **Application of CFG** 3.7. **Normal Forms of CFG:** Chomasky Normal Form (CNF) and Greibach Normal Form (GNF)	**12 Hours**
	4. Turing Machine 4.1. **Introduction:** Definition of Turing machine, Representation of Turing Machine, Notation for Turing machine, and Designing examples of Turing Machine 4.2. **Computing with Turing machine** 4.3. **Extensions of Turing machine** 4.4. **Nondeterministic Turing Machine** 4.5. **Unrestricted grammar**	**7 Hours**
	5. Undecidability 5.1. **Recursive and Recursively enumerable languages.** 5.2. **Properties of Recursive and Recursively enumerable languages**	**5 Hours**

	5.3. **The Church-Turing thesis** 5.4. **Halting Problem** 5.5. **Universal Turing machine** 5.6. **Undecidable problems about Turing machine** 5.7. **Undecidable problems about Grammars**	
	6. Computational Complexity 6.1. **Tractable and Intractable problems** 6.2. **The Class P:** Problem Solvable in Polynomial Time, and Example: Kruskal's Algorithm 6.3. **The Class NP:** Nondeterministic Polynomial Time, and Example: The Travelling salesman problem. 6.4. **NP-Complete Problems**	**3 Hours**

References

1) H. R. Lewis, C. H. Papadimitriou, "Elements of theory of computation", Pearson Education.
2) John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman-Introduction to automata theory, languages, and computation-Addison-Wesley
3) Michael Sipser-Introduction to the Theory of Computation-Thomson South-Western

Evaluation Scheme

The questions will cover all the chapters of syllabus. The evaluation scheme will be as indicated in the table below:

SN.	***Chapter***	***Hours***	***Marks Distribution****
1	Chapter-1	6	8
2	Chapter-2	12	15
3	Chapter-3	12	15
4	Chapter-4	7	10
5	Chapter-5	5	7
6	Chapter-6	3	5
Total		***45***	***60***

There could be a minor deviation in the marks distribution.

Internal Evaluation (Marks Weightage)		**Final Exam (Marks Weightage)**	**Total**	**Remarks**
Assessment/Class Performance/Attendance/Quizzes/ Tutorials/Presentation	Practical			
	40	60	100	Internal marks will be of 40 if there is no practicals in the course

Far Western University

School of Engineering

Bachelor in Computer Engineering

(Course of Study)

Course Title: Algorithmic Mathematics	Credit: 3
Course Code: CT 243	Number of lecture/week: 3
Year/Semester: Second/Fourth	Tutorial/week: 0
Level: Bachelor of Engineering (Computer)	Total hours: 45

1. Course Introduction: This course provides an introduction to algorithmic mathematics for undergraduate students. In this course, a detailed examination of the solution of technical as well as scientific mathematics problem using various algorithms will be given. The theory of numerical, statistical, and optimal computational procedures along with practical applications will be discussed for the solution of various technical and scientific problems.

2. Course Objectives: This course is designed to solve the technical and scientific problems by using the theory of numerical, statistical, and optimal computational procedures along with practical applications.

3. Course Outline: Solution of Algebraic and Transcendental Equations, Interpolation, Curve Fitting, Numerical Differentiation and integration, Matrices and Linear Systems of Equations, Numerical Solution of Ordinary and Partial Differential Equations, Descriptive Statistics, Probability Distributions, Optimization Techniques, Transformation

Specific Objectives	Contents (UNIT/CHAPTER)	Duration (Time allocated)
	UNIT 1:☒ SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS 1.1 Newton Raphson Method, 1.2 Secant Method, 1.3 Solution of systems of Nonlinear Equations (Newton Raphson Method)	3 Hrs.

	UNIT 2: INTERPOLATION 2.1. Errors in polynomial interpolation 2.2. Finite Differences 2.3. Newton's formulae for Interpolation 2.4. Lagrange 's Interpolation Formula	5 Hrs.
	UNIT 3: CURVE FITTING, B-SPLINES AND APPROXIMATION 3.1. Least- squares Curve Fitting Procedures (Linear, Quadratic and Exponential) 3.2. B-splines 3.3. Approximation of Functions	4 Hrs.
	UNIT 4: NUMERICAL DIFFERENTIATION AND INTEGRATION 4.1. Numerical Differentiation, Trapezoidal Rule, Simpson's 1/3 –Rule, Simpson's 3/8 –Rule 4.2. Newton-Cotes Integration Formulae 4.3. General Quadrature Formula 4.4. Gaussian Integration	4 Hrs.
	UNIT 5: MATRICES AND LINEAR SYSTEMS OF EQUATIONS 5.1. Solution of Linear Systems- Direct Methods (Gauss Jordan) 5.2. Solution of Linear Systems- Iterative Method (Gauss-Seidel) 5.3. Eigen value Problem (Eigen Value, Eigen Vector)	3 Hrs.
	UNIT 6: NUMERICAL SOLUTION OF ORDINARY	4 Hrs.

	DIFFERENTIAL EQUATIONS 6.1. Solution of Taylor's Series 6.2. Euler's Method (Modified Method) 6.3. Simultaneous and Higher Order Equations (4th order Runge Kutta Method) 6.4. Boundary Value Problems (Finite Difference Method)	
	UNIT 7: NUMERICAL SOLUTION OF THE PARTIAL DIFFERENTIAL EQUATIONS 7.1. Finite- Difference Approximations to derivatives 7.2. Laplace's Equation, Parabolic Equations, Hyperbolic Equations 7.3. Iterative Methods for solution of Equations	3 Hrs.
	UNIT 8: INTRODUCTION AND DESCRIPTIVE STATISTICS 8.1. An overview of probability and statistics 8.2. Pictorial and tabular methods in descriptive statistics 8.3. Measures of central tendency, dispersion, and direction 8.4. Joint and conditional probabilities 8.5. Central limit theorem	4 Hrs.
	UNIT 9: DISCRETE RANDOM VARIABLES AND PROBABILITY DISTRIBUTIONS 9.1. Random variables, Probability distributions for random variables, Expected values of discrete random	5 Hrs.

	variables 9.2. The binomial probability distribution 9.3. Hypothesis testing using the binomial distribution 9.4. The Poisson probability distribution	
	UNIT 10: OPTIMIZATION TECHNIQUES 10.1. The simplex method, Objective function and constraint conditions, Changing inequalities to equalities, The conical form of solution, Optimal values of variables 10.2. Integer programming 10.3. Dynamic programming	5 Hrs.
	UNIT 11: TRANSFORMATION 11.1. Laplace transform 11.2. Fourier transform 11.3. Discrete Fourier transform 11.4. Fast Fourier transform 11.5. Z transform and their inverse transform	5 Hrs.

4. Project work:

Not Applicable

5. Tutorials:

Not Applicable

6. Practical:

1. Write a program in C/C++ to implement all the algorithms discussed from Unit 1 to Unit7.

2. Implement one problem using the Simplex Method in Excel using Excel Solver.

7. References

1. E. Kreyszig, “Advanced Engineering Mathematics”, Wiley-Eastern Publication

2. Jay L. Devore, "Probability and Statistics for Engineering and the Sciences", Brooks/Cole Publishing Company, Monterey, California, 1982.

3. Introductory methods of Numerical analysis, S.S. Sastry

4. An Introduction to numerical computations, S. Yakowitz and F. Szidarovszky

5. Numerical Methods, Dr. V.N. Vedamurthy, Dr. N. Ch. S.N . Iyengar

6. Numerical Methods , E. Balagurusamy

8. Evaluation scheme

The questions will cover all the chapters in the syllabus. The evaluation scheme will be as possible as indicated in the table below:

Units	**Hours**	**Marks Distribution*(Tentative)**
1	3	4
2	5	7
3	4	5
4	4	5
5	3	4
6	4	5
7	3	4
8	4	5
9	5	7
10	5	7
11	5	7

* There may be minor variation in marks distribution

Internal Evaluation (Marks Weightage)		Final Exam (Marks Weightage)	Total	Remarks
Assessment/Class Performance/Attendance/Quizzes/ Tutorials/Presentation	Practical			
20	20	60	100	

Far Western University

School of Engineering

Bachelor in Computer Engineering

Course Title: Applied Mathematics	**Credit: 3**
Course Code.:	**Number of lecture/week: 4**
Nature of the Course: Theory	**Tutorial/week: 2**
Year/Semester: Second/Second	**Total hours: 45**

Course Objective: The basic objectives of the course is to provide a knowledge of complex analysis, Z- transform which are widely applicable in the study of signal system and other engineering field as well . In addition to these,another aim of this course is to provide the knowledge of Fourier Integral, Fourier transform and some important second order partial differential equations which equally important and applicable in any disciplines of engineering.

Course Contents:

Part 1(Complex Analysis)

1.1Analytic Functions and Conformal Mapping: Complex number system, polar representation of complex number, power and roots of a complex number, various sets in the complex plane, simply connected and multiply connected domains in the complex plane, function of a complex variable, Limit, Continuity and differentiability of a complex valued function of a complex variables,Analytic functions, Cauchy Riemann equations in Cartesian and polar form, elementary functions of a complex variable, harmonic functions and their harmonic Conjugates, conformal mapping, linear fractional transformation, construction of conformal mapping between some standard domains.**(7 hrs.)**

1.2Complex Integration and Applications: Line integral in the complex plane**,** Cauchy integral theorem, Cauchy integralformula, Derivatives of analytic functions, sequence and series of complex numbers, power series of complex numbers, Taylor series representation of analytic functions, Laurent series , zeros of analytic function, singularities and their classifications, Singularity at infinity, Residue theorem, Application of residue theorem to evaluate real integrals. **(8 hrs.)**

Part 2(Z - Transform)

2.1Introduction and Basic Properties of Z- Transform: Introduction to Z- transform, Z-transform of elementary functions, linear property of Z- transform, multiplication by a constant and a^k, Complex translation (first shifting)theorem, shifting(second shifting) theorems, initial and final value theorems, differentiation in the z domain, convolution property of Z- transform, introduction to two sided Z-transform.

(4 hrs)

2.2 Inverse Z transform and Applications: Definition of inverse Z- transform, Poles and zeros in the z-plane, evaluation of inverse Z- transform by method of direct division, method of

partial fraction and method of inversion integral(residue) method, application of Z-transform to solve difference equations. **(4 hrs)**

Part 3(Fourier Integral and Fourier Transform)

3.1Fourier Integral: Review of Fourier series, Fourier series in complex form, derivation of Fourier integral of a non periodic function $f(x)$ from a fourier series of a periodic function$f_L\ (x)$ of period $2L$ as $f(x) = \lim_{L\to\infty} f_L\ (x)$, Fourier cosine and Fourier sine integrals. **(4 hrs.)**

3.2Fourier Transform : Fourier Cosine and Fourier Sine Transform, Linear properties of Fourier cosine and sine transform, Fourier cosine and sine transform of derivatives, complex form of Fourier Integral and Fourier transform.
(4 hrs)

Part 4 (Partial Differential Equations)

4.1Introduction to Partial Differential equations: Basic concepts of partial differential equations, some important partial differential equation of second order, derivation of one dimensional wave equations. Solution of one dimensional wave and heat equation satisfying given boundary condition by using method of separation of variable, and solution of entire problem satisfying given boundary and initial conditions by use of Fourier series method, D'Alembert's solution of wave equations.
(7 hrs.)

4.2 Vibration of Membrane and Laplace Equations:

Derivation of two dimensional wave equation,Solution of two dimensional wave and heat equation satisfying given boundary condition by using method of separation of variable, and solution of entire problem satisfying given boundary and initial conditions by use of double Fourier series method, Laplace equation, Laplace equation in Polar, cylindrical and spherical co-ordinates. **(7 hrs.)**

References Books

1. E.Kreyszig, *Advanced Engineering mathematics*, Wiley- Eastern,Publication.
2. A.V. Oppenheim, *Discrete- Time Signal Processing,*Prentice Hall,India Limited
3. K. Ogata,*Discrete -Time Control system*,Prentice Hall,India Limited

Far Western University

School of Engineering

Bachelor in Computer Engineering

Course Title: Electrical Machine **Credit: 3**

Course No: CT 123 **Number of period per week: 3**

Nature of the Course: Theory + Practical **Total hours: 45**

Year: II, Semester: II

Level: B.E.

Degree: Bachelor's Degree in Computer Engineering

1. Course Introduction

This course aims to introduce the principle of electromechanical energy conversion. This course will help the students to know the characteristics, construction, operation and applications of different types of electrical machines. The course includes transformer, dc machines, synchronous machines and induction machines. Laboratory experiments are to be conducted as a part of the course to reinforce theoretical concepts and provide students an exposure to electrical motors, generators and transformers.

2. Objectives

After successfully completing the course activities, the student will be able to:

- Get the concept of electromechanical energy conversion.
- Know the principle of operations of electrical motors, generators and transformers.
- Understand the mathematical models, circuit models of different electrical machines.
- Select appropriate type of electrical machine for specific application.
- Understand the installation, testing and commissioning of electrical machines operation.

3. Specific Objectives and Contents

Specific Objectives	Contents
• To understand the fundamentals of a transformer, its construction, equivalent circuit losses and applications • To understand the basic principles of electromechanical energy conversion. • To understand the fundamentals of dc machines, its construction, equivalent circuit losses, speed control and characteristics	**Unit 1: Transformers Fundamentals:** Transformer construction and practical consideration, transformer on load, ideal transformer, real transformer and equivalent circuit, transformer losses, transformer testing, efficiency and voltage regulation, autotransformer, three phase transformers, parallel operation of transformers **Unit 2: Electromechanical Energy Conversion:** Energy in magnetic systems, field energy and mechanical force, energy conversion via electric field **Unit 3: DC Machines:**

• To understand the fundamentals of synchronous machines, its construction, equivalent circuit and characteristics • To understand the fundamentals of induction machines, its construction, equivalent circuit losses, speed control and characteristics	Construction of dc machines, emf and torque, circuit model, armature reaction, compensating winding, commutation, methods of excitation, magnetization characteristic, self excitation, characteristics of dc generators, characteristics of dc motors, starting of dc motors, speed control of dc motors, braking of dc motors, efficiency and testing **Unit 4: Synchronous Machines:** Construction, basics of synchronous model, circuit model of synchronous machine, determination of synchronous reactance, determination of armature reaction, ampere turns and leakage reactance, nature of armature reaction, synchronizing to infinite bus-bars, operating characteristics, power flow equations, capability curve of synchronous generator **Unit 5: Induction Machines:** Construction, flux and mmf waves in induction motor-principle of operation, development of circuit model, power across air gap, torque and power output, test to determine circuit model parameters, starting, speed control, single phase induction motors

Laboratory Works:

1. To determine the efficiency and regulation of single phase transformer
2. Perform short circuit and open circuit test of transformer of single phase transformer
3. To perform Speed control of a separately excited DC motor
4. To perform Load test on DC shunt and series motors
5. To determine equivalent circuit parameters of Three Phase Induction Motor
6. To study the methods of speed control of Three Phase Induction Motor.
7. To determine equivalent circuit parameters of Three Phase Alternator.
8. To determine the equivalent circuit parameters of single phase induction motor

Prescribed Text

- D. P. Kothari, I. J. Nagrath, '*Electrical Machines'*, Tata Mc Graw- Hill,

Reference

- S.J. Chapman, *Electric Machinery Fundamentals*, McGraw-Hill
- Fitzgerald. A.E., Charles Kingsely Jr, Stephen D.Umans, '*Electric Machinery'*, Tata McGraw Hill Books Company,
- P. S. Bhimbra, '*Theory of Electric Machines'*, Khanna Publishers

Far Western University

School of Engineering

Bachelor in Computer Engineering

Course Title: Electronic Device & Circuit	**Credit: 3**
Course Code: EX 245	**Number of Lectures / Week: 3**
Year/Semester: Second Year / Fourth Semester	**Tutorials / Week: 1**
Level: Bachelor of Engineering (Computer)	**Total Hours: 45**

Course Objectives:

This course provides a platform for students to understand working of active devices such as Diode, BJT, JFET and MOSFET as well as circuits and systems like amplifiers, oscillators and voltage regulator circuits. Students are also taught to analyze and design circuits using these active devices. This is one of the foundation courses which is required for students to understand working of complex electronic circuits and systems.

Chapter Number	Contents	Duration
1	**Semiconductor Diode** 1.1 Review of insulator, semiconductor and conductor 1.2 Theory of p-n junctions 1.3 Forward and reverse biasing of diode 1.4 Diode as a nonlinear device 1.5 Ideal and piecewise linear model of diode 1.6 Junction capacitance and its effects 1.7 Diode switching times 1.8 Junction breakdown 1.9 Construction, characteristics and applications of Zener diodes and Schottky diodes	**[6 Hours]**
2	**Bipolar Junction Transistor** 2.1 Current flow mechanism in PNP and NPN transistor 2.2 Input and output characteristics of CE, CB, and CC transistor configurations 2.3 Reach through and punch through effects 2.4 Active, cutoff and saturation modes of operations of BJT 2.5 BJT as an amplifier and a switch 2.6 BJT biasing, DC load line, AC load line and Q point 2.7 Stability factor 2.8 Small Signal Equivalent Circuit Models 2.9 The Ebers-Moll Model	**[8 Hours]**
3	**Field Effect Transistor** 3.1 Comparison between FET and BJT	**[8 Hours]**

	3.2 Construction and working principle of JFET 3.3 Drain and transfer characteristics of JFET and JFET parameters 3.4 Construction and working principle of DMOSFET and EMOSFET 3.5 MOSFET circuits at DC 3.6 MOSFET as an amplifier 3.7 Biasing in MOS amplifier circuits 3.8 Small signal analysis of CS, CD, and CG configurations	
4	**Output Stages and Power Amplifiers** 4.1 Classification of output stages 4.2 Class A output stage 4.3 Class B output stage 4.4 Class AB output stage 4.5 Biasing the class AB output stage 4.6 Class C output stage 4.7 Transformer coupled push-pull stages 4.8 Tuned amplifiers	**[7 Hours]**
5	**Signal Generator & Waveform Shaping Circuits** 5.1 Operational amplifier based Sinusoidal oscillator 5.2 Operational amplifier based RC oscillator circuits 5.3 LC and Crystal Oscillators 5.4 Waveform generation using a-stable multi-vibrators 5.5 Integrated circuit timers (555 timer) 5.6 Precision rectifier circuits	**[5 Hours]**
6	**Multistage Amplifiers** 6.1 Gain calculation of n-stages of cascaded amplifiers 6.2 Methods of coupling 6.3 Expression of voltage gains, current gains, input and output impedances for two stages RC coupled amplifier 6.4 Cascaded BJT and FET amplifiers 6.5 CASCODE amplifiers	**[6 Hours]**
7	**Voltage Regulators** 7.1 Bandgap voltage reference regulators 7.2 Transistor series regulators 7.3 Improving regulator performance 7.4 Current limiting 7.5 Integrated circuit voltage regulator	**[5 Hours]**

List of Practical / Experiments

S.N.	Experiment Name
1	Obtain I-V characteristics of Diode
2	Obtain I-V characteristics of Zener Diode
3	Obtain characteristics of BJT, JFET and FET amplifiers
4	Build and test transformer coupled class-A amplifier

5	Design of operational amplifier based RC phase shift and Wein Bridge oscillator
6	Design of oscillators using 555 timer
7	Build and test transistor based series voltage regulator

References

1. A.S. Sedra and K.C. Smith, "***Microelectronic Circuits***", 2nd Edition, Holt, Rinehart and Winston, Inc. New York.
2. Jacob Millman & Christos Halkias, "***Electronic Devices and Circuits***", Tata McGraw Hill, India.
3. Theodore F. Bogart, "***Electronic Devices and Circuits***", Universal Book Stall, India.
4. Robert Boylestad & Louis Nashelsky, "***Electronic Devices and Circuit Theory***", Prentice Hall, India.
5. Albert P. Malvino, "***Electronic Principles***", Tata McGraw Hill, India.

Evaluation Scheme:

Chapter	Hours	Marks Distribution*
1	**6**	**6**
2	**8**	**10**
3	**8**	**10**
4	**7**	**10**
5	**5**	**10**
6	**6**	**8**
7	**5**	**6**

** There may be minor variation in marks distribution*

Internal Evaluation (Marks Weightage)		Final Exam (Marks Weightage)	Total	Remarks
Assessment/Class Performance/Attendance/Quizzes/ Tutorials/Presentation	Practical			
40		60	100	Internal marks will be of 40 if there are no practical works in the course
20	20	60	100	Internal marks will be of 20 if there are practicals in the course (20 marks will be allocated for Practicals)

Far Western University

School of Engineering

Bachelor in Computer Engineering

Course Title: English for Communication	**Credit: 3**
Course Code.:	**Number of lecture/week: 3**
Nature of the Course: Theory	**Tutorial/week: 1**
Year/Semester: II/IV	**Total hours: 45**

1. Course Introduction

This course is designed for the students of Computer Engineering with the objective of developing all four skills of communication useful for their professional career.

2. Course Objectives

This course has the following objectives: After going through the course the students will be able to

a. Comprehend the authentic reading materials
b. Make students critical readers
c. Help students' critical readers
d. Help students to develop strategies of communication in speaking and writing.
e. Develop grammatical competence to communicate their ideas and messagesin English
f. Write notice, agenda and minutes
g. Write proposals
h. Write reports
i. Write research articles with appropriate references
j. Develop Presentation and oratorskills

3. Contents

Unit One: Listening (8 hours)

1.1. Listening for gist – skimming
1.2. Listening for specific information- scanning
1.3. Listening for detail understanding
1.4. Making inferences and forming opinions from listening
1.5. Summarizing what was listened
1.6. Listening for comprehension

Unit 2: Reading (8 hours)

2.1. reading for main ideas.
2.2. reading for details
2.3. use graphic organizer to understand reasons

2.4. use compare and contrast organization to examine similarities and differences between two subjects
2.5. identify counter arguments and refutations to better evaluate ideas in a text
2.6. reading for central theme

Unit Three: Speaking (9 hours)

3.1. Use repetition and signal words
3.2. Take notes to prepare for a presentation
3.3. Giving advice
3.4. Ask open ended and follow up questions
3.5. Use of discourse markers and fillers in conversation
3.6. Use persuasive language to encourage positives attitudes
3.7. Interview others to discover the information
3.8. Talk about real and unreal conditions
3.9 Take notes to prepare for a presentation or group discussion

Unit Four: Grammar (10 hours)

4.1. Tenses
4.2. Modals
4.3. Determiners pronouns and noun phrases
4.4. Prepositions, adjectives and adverbs
4.5. Verb structures
4.6. Word formation
4.7. Conditionals, clauses, questions, indirect speech
4.8. Sentences and varieties of English

Unit Five: Writing (10 hours)

5.1. Analyzing and writing paragraphs
5.2. Writing Proposal: parts of proposals
5.3. Summary writing
5.4. Letter writing (formal)
5.5. Responding to the texts in writing
5.6. Writing Notices with agenda and minutes
5.7. Writing reports:formal, informal and field reports (parts and components of the reports)

Unit Six: Writing Research Articles (3 hours)

6.1. Introductions
6.2 Procedures

4. Methodology and Techniques

- Class presentation
- Discussion

- Group work/pair work
- Project work
- Self-study

5. Evaluation Scheme

- Internal 40%
- External 60%

- The internal examination will be conducted based on the following criteria:
    a) Attendance 10%
    b) Speaking test (unit 3) 30%
    c) Assignment 10%
    d) Paper presentation 10%
    e) Mid-term exam 40%

- External Evaluation (Final Examination) 60%
    Office of the Controller of Examination will conduct semester/ final examination at the end of each semester. The distribution of points for the types of questions to be asked in final examination is as follows:
    1) Objective type question (Multiple choice items 20 x 1) 20 points
    2) Short answer questions (6 questions x 8 points) 48 points
    3) Long answer questions (2 questions x 16 points) 32 points
    Total 100 points

Prescribed Books

1. Daise, D., Norloff, C. and Carne, P. (2011) .*Q: Skills for Success (Reading and Writing) – 4.* New York. Oxford University Press. (Unit I, II and VI)
2. Freire, R. and Jones, T. (2011). *Q: Skills for Success (Listening and Speaking) – 4.* New York. Oxford University Press.
3. Kumar Ranjit. Research Methodology: Pearson Education
4. Lloyd, M. and Day, J. (2011). *Active Grammar*, Level 3. Cambridge. Cambridge University Press. *(Unit IV)*

Far Western University

School of Engineering

Bachelor in Computer Engineering

Course Title: **Microprocessor** **Credit**: 3	
Course Code: EX 242	**Number of lecture/week**: 3
Year/Semester: Second/ Fourth	**Tutorial/week**: 1
Level: Bachelor of Engineering (Computer)	**Total hours**: 45

1. Course Introduction: After completion of this subject, students will be able to develop Assembly Programming and to design Microprocessor – based System

2. Course Objectives: To be familiar with Microprocessor based system, Programming and Hardware

3. Course Outline:

Specific Objectives	Contents (Unit/Chapter)	Duration (Time allocated)
Introduction to Microprocessor	**Unit 1 / Chapter 1: Introduction** 1.1 Block diagram of a Digital Computer 1.2 Microprocessor: Definition, Types, Microprocessor based system 1.3 System Bus: Definition, Types, Organization 1.4 SPC, Von – Neumann and Harvard Architecture 1.5 CU: Definition, Types, Block Diagram with operation	**[5]**
8085 MPU	**Unit 2 / Chapter 2: Programming in 8085** 2.1 Features of 8085 MPU 2.2 Pin configuration and description 2.3 Internal Architecture 2.4 Instruction and Data formats 2.5 Addressing Modes: Definition, Types, Examples 2.6 Instruction Set 2.7 Various Assembly programming examples: 2.7.1 Program related to data transfer 2.7.2 Program including Arithmetic and Logical Operations 2.7.3 Looping and Branching 2.7.4 Multiplication and Division 2.7.5 Data Conversion: Binary to BCD, BCD to Binary, Binary to ASCII and ASCII to binary	**[8]**
8086 MPU	**Unit 3 / Chapter 3: Programming in 8086** 3.1 Features and Characteristics 3.2 Pin Description and Internal Architecture 3.3 Addressing Modes: Definition, Types, Examples	**[10]**

	3.4 Assembly Language Syntax: Comments, Identifiers, Reserve Words, Statement, Directives, Operators 3.5 Instruction Set 3.6 Assembling, Linking and Execution 3.7 DOS Function: Keyword and Video Services, INT 10H and INT 21H 3.8 Various Assembly programming examples: 3.7.1 Program related to data transfer 3.7.2 Program including Arithmetic and Logical Operations 3.7.3 Looping and Branching 3.7.4 String and Table Processing 3.7.5 Data Conversion: Binary to BCD, BCD to Binary, Binary to ASCII and ASCII to binary 3.7.6 Read and Write Numbers in different formats	
Microprocessor Based System	**Unit 4 / Chapter 4: Interfacing and Processing Cycle** 4.1 Instruction Cycle and Machine Cycle 4.2 Bus Timing Diagram for various instructions in 8085 4.3 RTL: Definition, Symbol and Examples for 8085 Instructions 4.4 Memory: Definition, Types, Hierarchy 4.5 Interfacing I/O and Memory 4.5.1 Address Decoding: Definition, Types 4.5.2 Mapping: Definition, Types, Differences 4.5.3 Interface: Definition, Needs, Types, Differences 4.5.4 I/O port address decoding using NAND gate and Decoder 4.5.4 Memory (RAM, ROM) address decoding using NAND gate and Decoder 4.6 Modes of Serial Transmission: Synchronous an Asynchronous 4.7 Serial Interface: RS 232, RS 423, RS 422 4.8 Modes of Parallel Transmission 4.9 PPI Device 8255: introduction, Block Diagram, Modes of Operation, Control Word 4.10 DMA: Need, Operation, DMA Controller	**[12]**
Interrupt	**Unit 5 / Chapter 5: Interrupt Processing in Microprocessor** 5.1 Interrupt: Definition, Types, ISR 5.2 Interrupt Processing in 8085 5.2.1 Interrupt Pins, Priorities 5.2.2 Interrupt Processing 5.2.3 Interrupt Instructions: EI, DI, RIM, SIM 5.3 Interrupt Processing in 8086 5.2.1 Interrupt Pins, Priorities 5.2.2 Interrupt (Hardware and Software) Processing 5.2.3 Interrupt Vector Table (IVT)	**[5]**

Advanced Concept	**Unit 6 / Chapter 6: Additional Topics** 6.1 Parallelism 6.1.1 Real and Pseudo Parallelism 6.1.2 Fetch – Execute Overlap and Pipelining 6.1.3 Flynn's Classification 6.1.4 Resource Allocation and Interprocessor Communication 6.2 OS and Its Features 6.3 MPU Architecture Standards 6.3.1 RISC and CISC 6.3.2 Accumulator Based and General Register Based MPU 6.3.3 DSP	**[5]**

4. **Project Work**: Not Needed

5. **Tutorials:** Should be given by Subject Teacher covering various assembly programming in 8085 & 8086 and address decoding for I/O ports & memory.

6. **Practical:** There will be 10 to 12 lab exercises to program 8085 MPU in Training Kit and 8086 using MASM.

7. **References:**

1. Ramesh S Goankar, "Microprocessor Architecture, Programming. And Applications with the 8085", Prentice Hall, Latest Edition
2. Peter Abel, "IBM PC Assembly Language and Programming", Pearson Education Inc., Latest Edition
3. D V Hall, "Microprocessir and Interfacing, Programming and Hardware", Tata McGraw Hill, Latest Edition
4. William Stalling, "Computer Organization and Architecture", Prentice Hall, Latest Edition

8. **Evaluation scheme:**

The questions will cover all the chapters in the syllabus. The evaluation scheme will be as possible as indicated in the table below:

Unit / Chapter	Hours	Marks Distribution* (Tentative)
1	5	6
2	8	10
3	10	12
4	12	18
5	5	8
6	5	6

* There may be minor variation in marks distribution.

Internal Evaluation (Marks Weightage)		Final Exam (Marks Weightage)	Total	Remarks
Assessment/Class Performance/Attendance/Quizzes/ Tutorials/Presentation	Practical			
20	20	60	100	Internal marks will be of 20 if there are practical in the course (20 marks will be allocated for Practical)